

International Journal of Scientific and Research Publications

Print Version, Volume 9, Issue 8
August 2019 Edition
ISSN 2250-3153



IJSRP Inc.
www.ijsrp.org



DOI: 10.29322/ijsrp

International Journal of Scientific and Research Publications

GENERAL INFORMATION:

IJSRP, International Journal of Scientific and Research Publications publish monthly journal under ISSN 2250-3153.

ONLINE VERSION

<http://www.ijsrp.org/e-journal.php>

PRINT VERSION (E-book)

<http://www.ijsrp.org/print-journal.php>

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Online Banking in Emerging Markets: Lebanese Case.

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DOI: 10.29322/IJSRP.9.08.2019.p9202
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9202>

Abstract- Now days E-banking has been a major concern for all developed and developing countries. Online banking became a major system in all banking transactions. And each day the online banking is being spread and new innovative ideas created that aims for facilitating and enhancing financial transactions of the customers in terms of speed, cost, transparency and comfort. Despite all its benefits still many societies' especially in developing countries unfamiliar and lack trust in dealing in online banking. This study aims to study the ability of Lebanese people as a case for emerging market to adapt and trust the online banking.

Index Terms- Online banking, Lebanon, challenges, customers, acceptance, gender, age, trust, technology

I. INTRODUCTION

E-banking or Internet banking is defined as the use of the Internet to deliver banking activities such as money transfer, paying bills, viewing current and savings account balance, paying mortgages and purchasing financial instruments and certificates of deposits (Chavan, 2013). E-payment is described as a means where business transactions are fulfilled electronic devices such as personal computers, telephones, and fax machines, Internet card payments and other electronic channels. The electronic communications used in e-banking includes Internet, e-mail, e-books, data base and mobile phones. Sarita Bahl (2012) stated that electronic banking or e-banking has existed for some time in the form of teller machines. It can be used to eliminate also any geographic distances between customer and bank branch. Electronic banking could also be considered as an opportunity for countries that are developing their financial systems to advance to the development stages. Customers in such countries might benefit from the banks' services and have a direct access on these services from banks abroad through wireless communication systems more rapidly than traditional wired communication network. The advanced computer and communication technologies as well as the accessibility of the internet helped to make it possible for everyone to do most of the banking transactions online without even stepping to any financial institute, in other words this leads to the emerging of e-banking. E-banking has been considered as a revolution in the banking industry. It was predicted previously that banks are like dinosaurs and should be replaced one day by microcomputers. This has pointed to the threats and challenges in the banking industry, letting bank to formulate the best strategic plans to win back their customers. Their main concern is the all technologies relating to computer and telecommunication. The industry realized that improving the customer service can be achieved through adopting new technologies. For instance, American banks have started their e-banking services in the early 1992. Banks realized that there were a significant number of customers who are willing to do e-banking. Hence, many banks that operated 24 hours/day have developed numerous e-banking applications that allow their customers to get benefits of these services such as transferring money among accounts, paying bills, checking account history, and downloading information about statements.

II. METHODOLOGY AND DATA

Our empirical test will detect how trust, privacy and security, perceived ease of use, and perceived usefulness impact the adoption of e-banking services by Lebanese bank's customers. To detect the impact of these variables, we will use multiple regressions. The descriptive statistics are used to detect the frequencies, means, medians, standard deviations, minimums, maximums, and correlation of regression variables. Multiple regressions will be performed to assess the strength of the research's empirical results.

1.1. Variables' Specifications and Expected Signs

Our research is based on a model called Technology Acceptance Model (TAM) which determines the factors that affect the users' acceptance of an information system. This model suggests that the acceptance of any new information system is determined by some beliefs drawn from the users' behaviors such as perceived ease of use (PEOU), perceived usefulness (PU), in addition to other variables that has impact on PU and PEOU such as trust and privacy and security. Therefore, the independent variables will be perceived ease of use, perceived usefulness, trust, and privacy and security, whereas the dependent variable will be the willingness of

Lebanese customers to use e-banking services. In our study, we will focus on how much perceived ease of use, perceived usefulness, trust, and privacy and security may affect the willingness of Lebanese customers to use e-banking services.

1.2. Data

The data was collected through a survey questionnaire shown in the Appendix distributed randomly to 140 respondents. Only 100 questionnaires were returned back.

1.3. Research Question

This study raises two questions:

- 1) What is the level of acceptance of the Lebanese customers to use e-banking services offered by the Lebanese banks?
- 2) What is the level of willingness of the Lebanese customers to share private information and credit card information through the internet?

III. FINDING AND RESULTS

a. Descriptive statistics

This section presents some summary statistics for the collected data

Table 1: Summary Statistics of Males and Females

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid F	41	41.0	41.0	41.0
M	59	59.0	59.0	100.0
Total	100	100.0	100.0	

Source: done by author

Table 1 presents that 59 out of 100 respondents are males while 41 out of 100 respondents are females. This means that 59 % of the respondents are 52 males while 41% of the respondents are females. So, the sample consists of more males than females.

Table 2: Summary statistics of age groups

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 20-30	38	38.0	38.0	38.0
30-40	43	43.0	43.0	81.0
40-50	12	12.0	12.0	93.0
50-60	7	7.0	7.0	100.0
Total	100	100.0	100.0	

Source: done by author

Table 2 shows that the sample consists of four age groups: 20-30, 30-40, 40-50, and 50-60. The above bar chart presents that 38% of the sample falls in the age group 20-30, 43% falls in the age group 30-40, 12% falls in the age group 40-50, and only 7% of the sample falls in the age group 50-60. This means that the highest percentage is that of the age group 30-40, so most of the respondents are between the ages thirty and forty.

Table 3: Summary statistics of purchasing products through the web

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	68	68.0	68.0	68.0
1	32	32.0	32.0	100.0
Total	100	100.0	100.0	

Notes: product purchasing is a dummy variable where: No= 0 and Yes= 1

Source: author's own work

Table 3 demonstrates the behavior of purchasing products through the internet. The results showed that 68% of the respondents haven't bought any products through the internet and their answers are represented by the value zero. On the other hand, only 32% of the respondents bought products through the internet and their answers are represented by the value 1. This could explain that Lebanese customers are not willing to make online shopping because they don't have enough trust to do that for many reasons. First, the Lebanese laws and regulations don't provide customers with the safety and security systems to do online shopping. They don't also provide safe solutions in case any online financial problems happen with the users. Second, the Lebanese customers themselves lack the strong backgrounds of using the internet for commerce in contrary with other customers in Europe or the United States, for instance, who are highly involved in the business to consumer (B2C) transactions.

Table 4: Summary statistics of having an Internet Bank Account

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	48	48.0	48.0	48.0
1	52	52.0	52.0	100.0
Total	100	100.0	100.0	

Notes: having an internet bank account is a dummy variable where: No= 0 and Yes= 1

Source: author's own work

Table 4 presents the percentage of respondents who have an internet bank account and those who don't have an internet bank account. Results showed that 52% of the respondents do have an internet bank account and they are represented by the number 1(yes=1), while 48% of the respondents don't have an internet bank account and they are represented by the value zero (No=0). Many reasons were provided by respondents who don't have an internet bank account. Some of them mentioned that they concerned about privacy and security issues; some stated that they don't see any real value in having this type of account, and others claimed that they are not interested in using new systems and new technologies. Respondents who have internet bank accounts emphasized on the facilities provided by such online banking systems such as convenience (24 hours service, everywhere connectivity). The table below will explain more the reasons of choosing the internet bank accounts by Lebanese customers.

Table 5: Summary statistics of reasons for choosing e-banking services.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	25	25.0	48.1	48.1
1	2	2.0	3.8	51.9
2	2	2.0	3.8	55.8
3	22	22.0	42.3	98.1
4	1	1.0	1.9	100.0
Total	52	52.0	100.0	
Missing System	48	48.0		
Total	100	100.0		

Notes: 0= convenience (24 hours service, everywhere connectivity), 1= Curiosity, 2= low service charge, 3=easy to maintain my banking transaction activity, 4= other reasons. Source: done by the author

Source: author's own work

Table 5 presents the reasons for choosing e-banking services by Lebanese banks' customers. Out of 52 respondents who have internet bank accounts, 25 stated that they chose e-banking services for convenience issues that let users access their accounts wherever and whenever they are. Twenty two respondents chose e-banking services because they can easily maintain their banking transaction activities such as transferring funds between accounts, balance inquiry, paying bills and other services. In addition, two respondents chose e-banking services for curiosity reasons; two for the low service charge offered by these e-banking services, and only one respondent chose to use these services for unknown reasons. The above results show that the most important reasons for choosing online banking services is the ability of bank customers to access their accounts when and where they needed that saving their costs and time instead of waiting in question in banks for a long time.

Table 6: Summary statistics of online services adopted by Lebanese customers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	12	12.0	23.1	23.1
	1	32	32.0	61.5	84.6
	2	7	7.0	13.5	98.1
	4	1	1.0	1.9	100.0
	Total	52	52.0	100.0	
Missing	System	48	48.0		
Total		100	100.0		

Notes: 0= pay bills, 1= balance inquiry, 2= transfer funds between accounts, 3=process payroll, 4=order check books.
Source: author's own work

Table 6 shows the different online features (services) used by Lebanese customers. Results showed that 12 users which forms about 23.1% of those who have an internet bank account use online banking to pay their bills and save time instead of going to the required places to pay these bills. In addition, 32 users out of 52 who have an internet bank account use online banking services to inquire balance for their accounts. They form 61.5% of online banking users. Moreover, 7 users (13.5%) use e-banking services to transfer funds between accounts while only one user (1.9%) use e-banking services to order check books, noticing that process payroll is a service that is not practiced by Lebanese customers. We concluded from the above results that most of the Lebanese customers use online banking services for checking their accounts and getting a balance inquiry only, which proves that users in Lebanon lack the motivation, confidence, and background that encourage them to use the internet for more valuable and effective reasons.

Table 7: Summary statistics of customers' satisfaction of online banking services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	12	12.0	23.1	23.1
	3	26	26.0	50.0	73.1
	4	14	14.0	26.9	100.0
	Total	52	52.0	100.0	
Missing	System	48	48.0		
Total		100	100.0		

Notes: 0= very unsatisfied, 1= unsatisfied, 2= neutral, 3=satisfied, 4=very satisfied
Source: author's own work

Table 7 presents the percentages of satisfaction of e-banking services among Lebanese customers. Results showed that 50% of Lebanese customers who has an internet bank account are satisfied with the e-banking services they are using, while 26.9% are very satisfied with these services. On the other hand, 23% of the customers are neutral with these services which mean that they are not finding any added value when using such online services. But as table 7 showed previously that 61.5% of the customers use e-banking services for balance inquiry reasons, so users who stated that they are very satisfied with the online banking services are not practicing real online financial transactions, they are just checking their accounts from time to time rather than doing a real business through the internet.

Table 8: Descriptive statistics of variables

	N	Minimum	Maximum	Mean	Std. Deviation
Dep Willingness	100	.0	.8	.418	.2686
V1= Trust	100	.00	1.00	.3654	.42911
V2=privacy and security	100	1	7	2.12	1.781
V3=ease	100	.00	4.00	2.3846	.69186
V4=usefulness	100	.00	3.00	1.4110	.73430
Valid N (listwise)	100				

Source: author's own work

Table 8 presents the descriptive statistics of the dependent variable willingness of Lebanese customers to use online banking services as well as the descriptive statistics of the independent variables trust, privacy and security, perceived ease of use, and perceived usefulness. The dependent variable willingness shows a minimum value of zero and a maximum value of 0.8. The mean of the dependent variable is equal to 0.418 and the standard deviation is equal to 0.2686. As to the independent variable trust it shows a zero minimum value, a maximum value equal to 1, a mean equal to 0.3654, and a standard deviation equal to 0.42911.

The independent variable privacy and security shows a minimum value equal to 1, a maximum value equal to 7, a mean equal to 2.12, and a standard deviation equal to 1.781. The minimum value of the independent variable perceived ease of use is equal to zero, the maximum value is equal to 4, the mean is equal to 2.3846, and the standard deviation is equal to 0.69186. Finally, the minimum value of the independent variable perceived usefulness is equal to zero, the maximum value is equal to 3, the mean is equal to 1.4110 and the standard deviation is equal to 0.73430.

1.4. Correlation and Regression Analysis

Table 9: Correlations matrix of variables

		Dep. Willingness	V1= Trust	V2=privacy and security	V3=ease	V4=usefulness
Dep Willingness	Pearson Correlation	1	.178	-.037	-.072	.196
	Sig. (2-tailed)		.157	.767	.566	.117
	N	100	100	100	100	100
V1= Trust	Pearson Correlation	.178	1	-.078	.281*	.322**
	Sig. (2-tailed)	.057		.536	.023	.009
	N	100	100	100	100	100
V2=privacy and security	Pearson Correlation	-.037	-.078	1	.109	.053
	Sig. (2-tailed)	.767	.536		.388	.676
	N	100	100	100	100	100
V3=ease	Pearson Correlation	-.072	.281*	.109	1	.143
	Sig. (2-tailed)	.566	.023	.388		.255
	N	100	100	100	100	100
V4=usefulness	Pearson Correlation	.196	.322**	.053	.143	1
	Sig. (2-tailed)	.117	.009	.676	.255	
	N	100	100	190	100	100

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed)

Source: author's own work.

Table 9 presents the correlation matrix of variables. Firstly, we will discuss the correlation between the dependent variable (willingness of Lebanese customers to use online banking) and all the independent variables. The correlation between the dependent variable (willingness) and the independent variable (trust) is equal to 0.178 so it's positive and statistically significant at 10% (0.057). The correlation between the dependent variable (willingness) and the independent variable (privacy and security) is equal to -0.037 so it's negative and also statistically insignificant (0.767). The correlation between the dependent variable (willingness) and the independent variable (perceived ease of use) is equal to -0.072 so it's negative and statistically insignificant (0.566). Finally, the correlation between the dependent variable (willingness) and the independent variable (perceived usefulness) is equal to 0.196, so it's positive but also statistically insignificant (0.117). On the other hand, we will discuss the correlation between the independent variables themselves. The correlation between trust and privacy and security is equal to -0.078 so it's negative and statistically

insignificant (0.536). This means that as trust increases, customers will be less private and secured to use internet banking. In addition, the correlation between trust and perceived ease of use is equal to 0.281 so it's positive and statistically significant at 5% (0.023), also the correlation between trust and perceived usefulness is equal to 0.322 so it's positive and statistically significant at 1% (0.009). Moreover, the correlation between privacy and security and perceived ease is equal to 0.109 so it's positive but statistically insignificant (0.388), whereas the correlation between privacy and security and perceived usefulness is equal to 0.053 but also statistically insignificant. And finally, the correlation between perceived ease of use and perceived usefulness is equal to 0.143 so it's positive but also statistically insignificant (0.255).

Regression Estimations

In this section we are going to study the impact of each of perceived ease of use, perceived usefulness, trust, and privacy and security on the willingness of Lebanese customers to adopt e-banking services. We will present four multiple regression models where each has different combination of variables.

Hypothesis 1 Null hypothesis H0: perceived ease of use has a positive impact on the willingness of Lebanese customers to adopt e-banking services.

Hypothesis 2 Null hypothesis H0: perceived usefulness has a positive impact on the willingness of Lebanese customers to adopt e-banking services.

Hypothesis 3 Null hypothesis H0: trust has a positive impact on the willingness of Lebanese customers to adopt e-banking services.

Hypothesis 4 Null hypothesis H0: privacy and security has a positive impact on the willingness of Lebanese customers to adopt e-banking services.

Table 10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.269 ^a	.072	.010	.2672
2	.268 ^b	.072	.026	.2651
3	.231 ^c	.053	.023	.2655
4	.196 ^d	.039	.023	.2655

Source: Authors own work

Table 10 presents four models. Model 1 explains 1% of the variability of the dependent variable (willingness of Lebanese customers to use online banking services), while model 2 explains 2.6% of the variability of the dependent variable. As to model 3 and 4, they both explain 2.3% of the variability of the dependent variable.

Table 11: Coefficients' and independent variable

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.431	.133		3.252	.002
	V1= Trust	.102	.086	.163	1.188	.040
	V2=privacy and security	.003	.019	-.018	-.145	.085
	V3=ease	-.054	.051	-.140	-1.067	.290
	V4=usefulness	.060	.048	.165	1.252	.215
2	(Constant)	.428	.130		3.304	.002
	V1= Trust	.103	.084	.165	1.227	.025
	V3=ease	-.055	.050	-.142	-1.105	.273
	V4=usefulness	.060	.048	.164	1.255	.214

3	(Constant)	.309	.072		4.277	.000
	V1= Trust	.080	.082	.128	.980	.031
	V4=usefulness	.057	.048	.155	1.190	.238
4	(Constant)	.317	.072		4.418	.000
	V4=usefulness	.072	.045	.196	1.590	.117

Dependent variable: Dependent willingness

Source: done by author

Table 11 presents the regression estimates for willingness of Lebanese customers to adopt e-banking services. We present several models to test the impact of the independent variables in different combinations on the dependent variable. V1 (trust) shows to have a positive and significant impact on willingness in all models at 5%. This suggests that trust is an important variable in affecting the willingness of customers to use internet banking. V2 (privacy and security) shows to have a positive and significant impact on willingness in model one at 10%. This suggests that privacy and security is an important variable in affecting the willingness of customers to use internet banking. The independent variables perceived ease of use and perceived usefulness show to have no significant impact on the willingness which suggests that they are not important variables in affecting the willingness of customers to use internet banking.

The regression equation is as follows:

$$y = a + bx_1 + cx_2 + dx_3 + ex_4 + e$$

Model 1: $y = 0.431 + 0.102V1 + 0.003V2 - 0.0554V3 + 0.060V4 + e$

Model 2: $y = 0.428 + 0.103V1 - 0.055V3 + 0.060V4 + e$

Model 3: $y = 0.309 + 0.080V1 + 0.057V4 + e$

Model 4: $y = 0.317 + 0.072V4 + e$

IV. CONCLUSION

As a conclusion the online banking is being expanded in Lebanon, males tend to use online banking more than females this can be easily explained in an emerging market such as Lebanon since males are more useful to fund transfers, online trading requests, Internet accounts and other electronic business, this shows that Females should be more encouraged to using online banking.

Moreover the most people using online banking is under the age of 40 since they are more familiar via technological services than older people and this shows the importance to train older people for using such technology.

The statistics also showed that many people are still not encouraged to purchase products online while few of them are encouraged to purchase and pay online, this shows that the trust in such technology is still weak and that's what banks should focus on to support such technology.

Knowing that from the overall bank customers about half of them have an internet bank account and most of them choose to have an online banking account since they believe that it could be more easier to maintain banking transactions such as balancing inquiry in the first level then comes paying bills, transferring funds and ordering check books respectively.

APPENDIX

Questionnaire

Directions: Tick the box which corresponds to your choice

A- General Information:

1. Name: _____

2. Age:

- 20- 30
- 30-40
- 40-50
- 50-60

3. Gender:

- Male
- Female

4. Educational level:

- PHD
- Master Degree
- Bachelor
- High School
- Undergraduate
- Other

5. Are you employed?

- Yes
- No

If yes, how many years of experience do you have?

- 2 years
- 4 years
- 6 years
- More than 8 years

B- Internet and Banking Information: The following five questions will study the effect of perceived ease of use on the adoption of e-banking by banks' customers.

1. How long have you been using the World Wide Web (WWW)?

- 1 to 2 years
- 2 to 4 years
- 4 to 6 years
- 6 to 8 years
- More than 8 years

2. How many hours per week do you use your computer for work?

- Less than 1 hour
- 1 to 5 hours
- 5 to 10 hours
- 10 to 20 hours
- Over 20 hours

3. Which of the following methods do you use while using online services?

- DSL
- Dial-up
- Cable
- Broadband

4. How frequently do you use e-banking services per month?

- 1 to 3 times
- 3 to 8 times
- 8 to 12 times
- Over 12 times

5. How frequently do you use an Automated Teller Machine (ATM) per month?

- Less than 1time
- 1 to 3 times
- 3 to 8 times
- 8 to 12 times
- Over 12 times

The following three questions will study the effect of privacy and security on the adoption of e-banking by bank's customers.

1. Do you have an Internet bank account?

- Yes
- No

2. Do you use any of the following when you use e-banking? (choose the most frequent used ones)

- Security device
- SMS text password (SMS from your bank providing u with the password)
- E- certificate
- I never use these

3. If you don't have an internet bank account, what are the main reasons that you have not opened one yet? (check all that apply)

- Never heard of Internet banking
- Concerned about security and privacy
- Don't see any real value in having this type of account
- Not available through my bank
- The new system is not friendly used
- I am not skillful in the computer
- Others

The following two questions will study the effect of trust on the adoption of e-banking by bank's customers.

1. Have you purchased any product through WWW?

- Yes
- No

2. What is the percentage of your household monthly income you deposit to your internet bank account?

- 10%
- 20%
- 30%
- 40%
- 50%
- Don't know
- Not applicable

The following five questions will study the effect of perceived usefulness on the adoption of e-banking by bank's customers.

1. If you don't have an internet bank account, how likely is it that you will open one within the next 12 months?

- Very Unlikely
- Somewhat unlikely
- Somewhat likely
- Very likely

2. What is the reason for choosing e-banking services?

- Convenience (24 hours service, everywhere connectivity)
- Curiosity
- Low service charge
- Easy to maintain my banking transaction activity
- Others

3. Which online features (services) do you use regularly? Please select all that apply.

- Pay bills
- Balance inquiry

- Transfer funds between accounts
- Process payroll
- Order check books
- Others

4. How frequently do you visit your traditional bank since you started using online banking?

- Less than 1 time
- 1 to 2 times
- 2 to 4 times
- 4 to 6 times
- 6 to 8 times

5. How satisfied are you with online banking services?

- Very satisfied 77
- Satisfied
- Neutral
- Unsatisfied
- Very unsatisfied

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Prevalence and Factors Associated With Initiation of Isoniazid Preventive Therapy among Children Aged Below Five Years in Kisumu County

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DOI: 10.29322/IJSRP.9.08.2019.p9203

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9203>

Abstract- Tuberculosis is a crucial global public health problem which ranks second to HIV/AIDS as cause of mortality and is the leading cause of morbidity and mortality among people living with HIV/AIDS. Kenya is burdened with an estimated TB prevalence of 266 per 100,000. 52.5% of cases and 5.2% TB associated mortality occur among children below 5 years. Kisumu County is a TB and HIV endemic zone with a prevalence of 208-306 per 100,000 and 19.3% respectively. Children below 5 years who are household contacts with sputum positive pulmonary tuberculosis persons should be initiated on Isoniazid Preventive Therapy (IPT). This practice remains low hampering the 'END TB' strategies in Kisumu County. This descriptive Cross-Sectional study determined prevalence and factors associated with IPT initiation among children below 5 years living in Kisumu County. Significance was set at $p < 0.05$ and analysis done using STATA. Prevalence was established as [70.2%; 95% C.I (63.0-76.6)] with highest uptake among females [72.6%; 95% C.I (67.7-80.7)] against [67.5%; 95 % C.I (56.3-76.9)] in males. Caregivers with Higher level of education [aPR=1.36; 95% C.I (1.04-1.78)] were more likely to initiate children on IPT compared to those with incomplete primary education. Respondents of younger age [aPR=1.48; 95% C.I (1.27-1.73)] were more likely to initiate children on IPT compared to those > 40 years. The study concluded that IPT uptake is still unexpectedly low and this may be a major driver of TB infection in young children. The study recommends that the Ministry of health should advocate for health promotion activities unlimited to sensitization. Further studies need to examine the correlates of adherence and predictors of missed opportunity to IPT initiation.

Index Terms- Prevalence, Isoniazid, Tuberculosis, cross-sectional, household.

I. INTRODUCTION

Tuberculosis (TB) is a universal public health problem, coming after HIV/AIDS as the greatest cause of mortality. *Mycobacterium tuberculosis* infection is also a leading cause of

morbidity and mortality among people living with HIV (PLHIV) worldwide [1] [2]. Overall, 83% of all TB cases in 2014 reportedly occurred in the 22 high burden countries. Of these countries, 9 are found in Africa: South Africa, Nigeria, Ethiopia and Kenya among others. In the year 2015, there were 10.4 million incident cases of TB globally of which 10% occurred in children. Prophylaxis with INH has been demonstrated to reduce remarkably the incidence of TB in children aged below five years who are household contacts of sputum positive Pulmonary Tuberculosis (PTB) persons and in people living with HIV/AIDS (PLHIV) through prevention of disease progression. Children are highly susceptible to TB infection, which mostly occurs following exposure from an infectious adult [3]. In Kenya, TB is the leading cause of morbidity and mortality among persons infected with HIV. Kenya is one of the 22 high TB burden countries in the world with a national prevalence of 266 (range 189-281) per 100,000 population, and an incidence of 81,518. Forty-five percent (36,817) were new sputum positive cases. Children contributed 8.5% (6,968) with county variations ranging from 4.6% in Murang'a to 17.8% in Turkana; 52.6% of the children being below the age of 5 years, and 47.4% between 5-14 years of age. Recognizing the high prevalence of TB in the country, especially in the wake of HIV epidemic, and in line with WHO policy on TB and HIV collaborative activities, The Kenyan Ministry of Health (MOH) recommends IPT for all children below five years who are in close contact with an infectious smear or culture positive PTB case. In Kenya uptake of IPT in children is still low with a national uptake of 5.5% among children aged below five years with a household contact of sputum positive PTB against an adult uptake of 33% [4]. This necessitates the need for IPT uptake to be met by the country as a whole, especially Kisumu County.

II. METHODOLOGY

Study design: The descriptive cross-sectional study was conducted in Kisumu East Sub County, Kisumu County

Table 1: Inclusion and Exclusion criteria

Inclusion criteria	Exclusion criteria
Sputum positive PTB persons with household contacts aged below five years enrolled for TB care within the selected TB clinics in Kisumu County.	Sputum positive PTB persons with household contacts aged below five years and are on transit to other counties
Ability to provide an informed consent.	Persons who are very sick and are unable to consent and respond the questionnaire
Persons aged 18 years and above.	

Sample size determination: Sample size used was 175, based on Cochran equation for proportion with estimates of IPT uptake in children at 6.0%. Disproportionate sampling technique was used to determine the number of smear positive TB persons with contacts aged below five years and Purposive sampling to select sputum positive PTB persons with at least one child below five years for each stratum.

Data collection: Data was collected from respondents during their clinic revisits. The questionnaires were administered at the end of patient clinical examination and dispensing of medications following successful consenting process.

Data Analysis: Data was keyed in Access, cleaned and validated for analysis. Fisher’s exact test was used to determine the association between categorical variables and initiation on IPT. Generalized linear model was used to model IPT initiation since the prevalence was greater (>10%), thus logistic regression with odds ratios was not appropriate measure of effect. Explanatory variables that were significant at bivariate analysis $P < 0.2$ were further incorporated in the final multivariable regression model using backward elimination and retaining predictors significant at $P < 0.05$. Potential confounding effect

was examined for each covariate by two-way interactions. Data analysis was done using STATA version 14.1.

Ethical considerations: Ethical approval was sought from Institutional Review Board of the University of Eastern Africa, Baraton (REC: UEAB/8/8/2017) and the JOOTRH (ERC.1B/VOL.1/398). A written informed consent was obtained from the participants before collecting data while privacy and confidentiality was ensured on all the information obtained.

III. RESULTS

Socio-Demographic Characteristics of respondents: The mean age of the respondents was 33.2 [SD± 11.2] with 102(27.4%) aged between 25-29 years. Out of 175, 95 (54.3%) were female and 51(29.6%) of the respondents had incomplete secondary education. One hundred and two (58.9%) of the respondents were in a monogamous marriage. Ninety-four (53.7%) of the respondents resided in urban settlement with 89(52.5%) of the respondents being unskilled in their occupation. (Table 2).

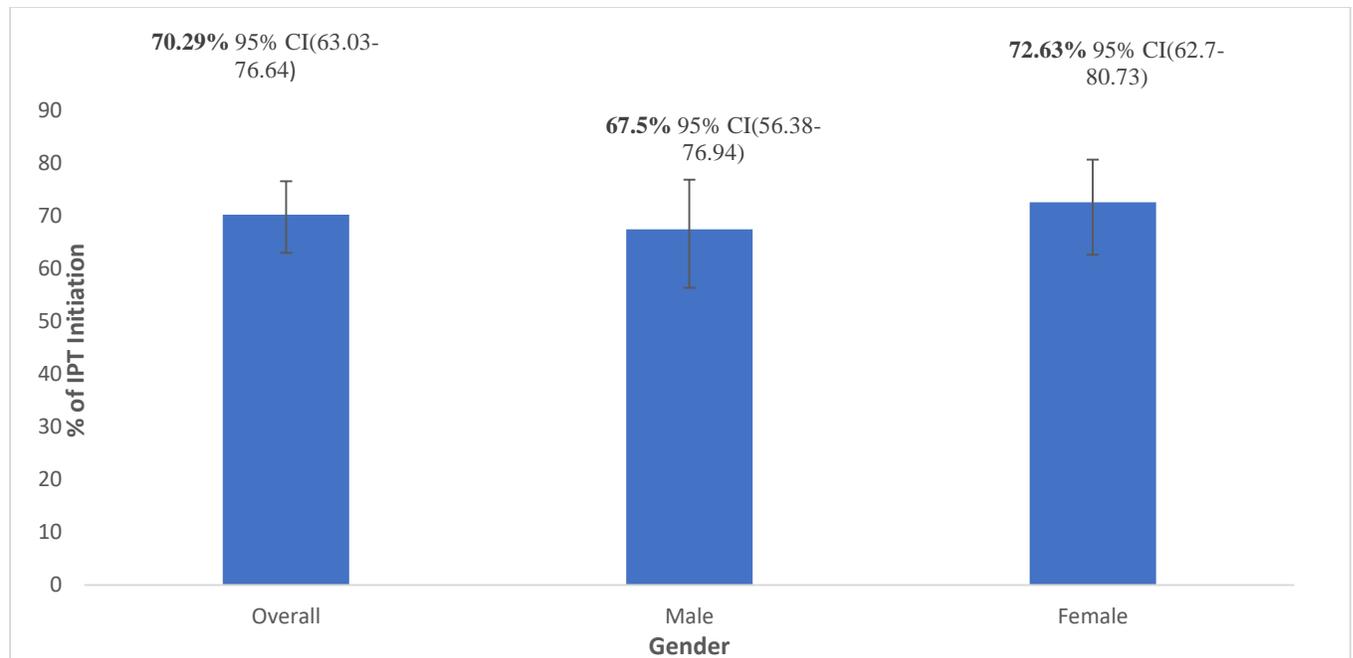
Table 2 Socio demographic Characteristics of the respondents

Characteristics (N=175)	Overall n(%)
Mean Age (33.2 ± 11.2)	
Sex	
Male	80(45.7)
Female	95(54.3)
Level of Education	
Primary incomplete	42(24.4)
Primary complete	29(16.8)
Secondary incomplete	51(29.6)
Above secondary	50(29.2)
Marital Status	
Married monogamy	102(58.9)
Married polygamy	23(13.3)
Divorced/Separated/Single	48(27.8)
Age group (Years)	
<25	30(17.1)
25-29	48(27.4)
30-34	41(23.4)
35-40	19(10.8)
>=40	37(21.1)

Residence	
Urban	94(53.7)
Peri-urban	33(18.8)
Rural	48(27.5)
Relationship to the child	
Parent	114(73.6)
Relative/caretaker	41(26.4)
Social economic Status	
Poorest	34(21.3)
Poorer	30(18.7)
Middle	33(20.6)
Richer	35(21.8)
Richest	28(17.5)
Number of persons in the household	
1-2	24(14.0)
3-5	106(62.0)
>5	41(24.0)
Average time of contact during the day	
<3 hours	26(15.7)
3-6 hours	71(43.0)
> 6 hours	68(41.2)
Sleep with the child in the same room	
Yes	107(61.1)
No	68(38.9)

The prevalence of IPT initiation: The overall prevalence of IPT initiation among children aged below 5 years was 70.3 % (n=123) with 69(72.6%) IPT initiation among female PTB contacts compared to 54(67.5%) among male PTB contacts (Figure 1).

Figure 1: The Prevalence of IPT initiation



Socio-demographic factors associated with initiation of IPT: Complete primary level of education, incomplete secondary level of education and above secondary (Crude PR=1.52; 95%CI 1.07-2.16; P=0.020); (Crude PR=1.49; 95%CI 1.30-1.71; P<0.001) and (Crude PR=1.56; 95%CI 1.21-2.01; P=0.001) respectively, were more likely to initiate their children on IPT as compared to those with incomplete primary level of education. Respondents whose age group was <25Yrs (Crude PR=1.43; 95%CI 1.02-1.99; P=0.038) were more likely to initiate their children on IPT compared to those of

>=40 Yrs age group. Moreover, respondents who resided in urban and pre-urban areas (Crude PR=1.89; 95%CI; 1.49-2.40; P<0.001) and (Crude PR=1.66; 95%CI 1.35-2.05; P<0.001) respectively, were more likely to initiate their children on IPT compared to those who resided in rural areas. Notably, respondents who were skilled in their occupation (Crude PR=1.26; 95%CI 1.16-1.37; P<0.001) were more likely to initiate their children on IPT as compared to those of unskilled occupation (Table 3).

Table 3: Socio-demographic factors associated with initiation of IPT

Socio-demographic factors	Overall N(%)	Initiated n(%)	Not Initiated n(%)	Crude PR(95% CI)	P-value
Sex					
Male	80(45.7)	54(67.5)	26(32.5)	Ref	
Female	95(54.3)	69(72.6)	26(27.4)	1.08(0.98-1.18)	0.127
Level of Education					
Primary incomplete	42(24.4)	21(50.0)	21(50.0)	Ref	
Primary complete	29(16.8)	22(75.8)	7(24.1)	1.52(1.07-2.16)	0.02
Secondary incomplete	51(29.7)	38(74.5)	13(25.5)	1.49(1.30-1.71)	<0.001
Above secondary	50(29.1)	39(78.0)	11(22.0)	1.56(1.21-2.01)	0.001
Marital Status					
Married monogamy	102(58.9)	82(80.4)	20(19.6)	1.54(0.99-2.40)	0.053
Married polygamy	23(13.3)	15(65.2)	8(34.8)	1.25(0.76-2.05)	0.373
Divorced/Separated/Single	48(27.8)	25(52.1)	23(47.9)	Ref	
Age group (Years)					
<25Yrs	30(17.1)	22(73.3)	8(26.7)	1.43(1.02-1.99)	0.038

25-29Yrs	48(27.4)	39(81.2)	9(18.8)	1.58(0.99-2.51)	0.052
30-34 Yrs	41(23.4)	31(75.6)	10(24.4)	1.47(0.95-2.29)	0.086
35-40 Yrs	19(10.8)	12(63.2)	7(36.8)	1.23(0.68-2.21)	0.487
>=40 Yrs	37(21.1)	19(51.4)	18(48.6)	Ref	
Residence					
Urban	94(53.7)	78(82.9)	16(17.1)	1.89(1.49-2.40)	<0.001
Peri-urban	33(18.8)	24(72.7)	9(27.3)	1.66(1.35-2.05)	<0.001
Rural	48(27.5)	21(43.7)	27(56.3)	Ref	
Occupation					
Skilled	81(47.6)	63(77.7)	18(22.3)	1.26(1.16-1.37)	<0.001
Unskilled	89(52.4)	55(61.8)	34(38.2)	Ref	
Relationship to the child					
Parent	114(73.5)	91(79.8)	23(20.2)	1.13(0.93-1.37)	0.224
Relative/caretaker	41(26.5)	29(70.7)	12(29.3)	Ref	

PR- Prevalence ratio, CI- Confidence Interval

Socio-economic factors associated with initiation of IPT: Respondents whose social economic status were middle and richer (Crude PR=1.61; 95% CI 1.06-2.44; P=0.025) and (Crude PR=1.70; 95% CI 1.18-2.44; P=0.004) were more likely to initiate their children on IPT compared to those from the poorest social economic position. Respondents who had 3-5 and more than five persons in the household (Crude PR=2.35; 95% CI 1.21-4.56; P=0.012); (Crude PR=2.12; 95% CI 1.03-4.38; P=0.042) were more likely to initiate their children on IPT compared to those who had 1-2 number of persons in the household. Notably, respondents who sleep with their children in the same room (Crude PR=1.54; 95% CI 1.04-2.27; P=0.032) were more likely to initiate their children on IPT compared to those who did not sleep with the children in the same room (Table 4.3).

Table 4: Socio-economic factors associated with initiation of IPT

Household factors level	Overall N(%)	Initiated n(%)	Not Initiated n(%)	Crude PR (95% CI)	P-value
Social economic Status					
Poorest	34(21.2)	16(47.1)	18(52.9)	Ref	
Poorer	30(18.7)	20(66.7)	10(33.3)	1.42(0.83-2.42)	0.201
Middle	33(22.1)	25(75.8)	8(24.2)	1.61(1.06-2.44)	0.025
Richer	35(21.8)	28(80.0)	7(20.0)	1.70(1.18-2.44)	0.004
Richest	28(17.5)	24(85.7)	4(14.3)	1.82(0.93-3.55)	0.079
Number of persons in the household					
1-2	24(14.0)	8(33.3)	16(66.7)	Ref	
3-5	106(62.0)	83(78.3)	23(21.7)	2.35(1.21-4.56)	0.012
>5	41(24.0)	29(70.7)	12(29.3)	2.12(1.03-4.38)	0.042
Average time of contact during the day					
<3 hours	26(15.7)	14(53.5)	12(46.2)	Ref	
3-6 hours	71(43.0)	60(84.5)	11(15.5)	1.57(0.97-2.53)	0.065
> 6 hours	68(41.3)	49(72.1)	19(27.9)	1.34(0.92-1.95)	0.129
Sleep with the child in the same room					
Yes	107(61.1)	87(81.3)	20(18.7)	1.54(1.04-2.27)	0.032
No	68(38.9)	36(52.9)	32(47.1)	Ref	

Multivariate analysis of factors associated with initiation of Isoniazid Preventive Therapy: A multivariate prevalence revealed that respondents who had secondary incomplete level of

education (Adjusted PR=1.36; 95% CI 1.04-1.78; P=0.023), were more likely to initiate their children on IPT as compared to those with incomplete primary level of education level. Respondents

aged between 25-29 years (Adjusted PR=1.48; 95% CI 1.27-1.73; P<0.001) were more likely to initiate their children on IPT compared to those of aged 40 years and above. Those who resided in urban and pre-urban (Adjusted PR=1.56; 95%CI 1.16-2.09; P=0.003) and (Adjusted PR=1.60; 95%CI 1.06-2.42; P=0.024) respectively, were more likely to initiate their children on IPT compared to those who reside in rural areas. Respondents who had 3-5 people and more than five persons in the household (Adjusted PR=1.69; 95% CI 1.13-2.51; P=0.010) and (Adjusted

PR=2.19; 95% CI 1.42-3.37; P<0.001) were more likely to initiate their children on IPT compared to those with 1-2 persons in the household.

Moreover, respondents who had 3-6 hours and more than six hours' average time of contact during the day (Adjusted PR=1.63; 95% CI 1.14-2.33; P=0.007) and (Adjusted PR=1.50; 95% CI 1.09-2.06; P=0.012) were more likely to initiate their children on IPT compared to those who had less than three hours average time of contact during the day.

Table 5: Multivariate analysis of factors associated with initiation of Isoniazid Preventive Therapy.

	Overall N(%)	Initiated n(%)	Not Initiated n(%)	Adjusted PR (95% CI)	P-Value
Level of Education					
Primary incomplete	42(24.4)	21(50.0)	21(50.0)	Ref.	
Primary complete	29(16.8)	22(75.8)	7(24.1)	1.39(0.78-2.47)	0.259
Secondary incomplete	51(29.7)	38(74.5)	13(25.5)	1.36(1.04-1.78)	0.023
Above secondary	50(29.1)	39(78.0)	11(22.0)	1.37(0.86-2.18)	0.175
Marital Status					
Married monogamy	102(58.9)	82(80.4)	20(19.6)	1.27(0.90-1.79)	0.173
Married polygamy	23(13.3)		8(34.8)	1.30(0.88-1.94)	0.183
Divorced/Separated/Single	48(27.8)	25(52.1)	23(47.9)	Ref.	
Age group (Years)					
<25 Yrs	30(17.1)	22(73.3)	8(26.7)	1.21(0.90-1.62)	0.189
25-29 Yrs	48(27.4)	39(81.2)	9(18.8)	1.48(1.27-1.73)	<0.001
30-34 Yrs	41(23.4)	31(75.6)	10(24.4)	1.25(0.92-1.71)	0.138
35-40 Yrs	19(10.8)	12(63.2)	7(36.8)	1.13(0.65-1.95)	0.651
>=40 Yrs	37(21.1)	19(51.4)	18(48.6)	Ref.	
Residence					
Urban	94(53.7)	78(82.9)	16(17.1)	1.56(1.16-2.09)	0.003
Peri-urban	33(18.8)	24(72.7)	9(27.3)	1.60(1.06-2.42)	0.024
Rural	48(27.5)	21(43.7)	27(56.3)	Ref.	
Occupation					
Skilled	81(47.6)	63(77.7)	18(22.3)	1.05(0.84-1.30)	0.647
Unskilled	89(52.4)	55(61.8)	34(38.2)	Ref.	
Social economic Status					
Poorest	34(21.2)	16(47.1)	18(52.9)	Ref.	
Poorer	30(18.7)	20(66.7)	10(33.3)	0.87(0.52-1.45)	0.608
Middle	33(22.1)	25(75.8)	8(24.2)	0.75(0.50-1.12)	0.169
Richer	35(21.8)	28(80.0)	7(20.0)	0.76(0.46-1.27)	0.307
Richest	28(17.5)	24(85.7)	4(14.3)	0.86(0.47-1.59)	0.644
Number of persons in the household					
.1-2	24(14.0)	8(33.3)	16(66.7)	Ref.	
.3-5	106(62.0)	83(78.3)	23(21.7)	1.69(1.13-2.51)	0.010
>5	41(24.0)	29(70.7)	12(29.3)	2.19(1.42-3.37)	<0.001
Average time of contact during the day					
<3 hours	26(15.7)	14(53.5)	12(46.2)	Ref.	
3-6 hours	71(43.0)	60(84.5)	11(15.5)	1.63(1.14-2.33)	0.007
> 6 hours	68(41.3)	49(72.1)	19(27.9)	1.50(1.09-2.06)	0.012
Sleep With the child in the same room					
Yes	107(61.1)	87(81.3)	20(18.7)	1.26(1.05-1.50)	0.010
No	68(38.9)	36(52.9)	32(47.1)	Ref.	

IV. DISCUSSION

The prevalence of IPT initiation: This study established 70.2% prevalence rate of IPT initiation among children aged below 5 years. Females' contacts had the highest initiation rate 72.6% compared to 67.5% among males. A study in Ethiopia of 221 children eligible for IPT, 64.3% (142) received IPT, 80.3% (114) successfully completed six months of therapy. No child developed active TB while on IPT. Contact screening is recommended by the WHO despite the implementation challenges [5]. Children whose caregivers had a history of being on IPT had an increased likelihood of initiation according to a study in Nairobi [6]. It is estimated that around 10% of the world's tuberculosis (TB) cases occur in children 0–14 years of age [7]. WHO guidelines promote active screening and Isoniazid Preventive Therapy (IPT) for such children under 5 years, this established intervention is still not completely embraced in endemic countries [8]. Of the 184 children who were screened in a study of IPT Programme in South Africa, 59% ($n=108$) were documented as having started IPT, 2 started full TB treatment and for 40% ($n=74$) there was no documentation of further management or follow-up. The last represents missed opportunities for providing TB preventive therapy in a community where TB is rife [9].

A number of important initiatives have been facilitated by the childhood TB subgroup of the WHO Stop TB partnership aimed at greater emphasis on childhood TB by National TB programmes (NTP) that includes screening children living with an infectious case followed by the provision of preventive therapy (PT) for those cleared of TB disease [3]. However, these recommendations, including preventive therapy provision, are rarely fully implemented in high-burden countries. This is vital as a large proportion of childhood TB occurs in children younger than 5 years who would have been eligible for PT [10]. Literature review regarding barriers to implementation of PT found that there are a myriad of factors, including difficulties in screening, poor adherence, fear of increasing INH resistance and poor acceptability among primary caregivers and healthcare workers [8].

The benefits of PT have been recognized since the 1950s. Studies indicate that to attain TB eradication by 2050, preventive measures must be included in TB programmes [11]. Following infection, infants and young children (<5 years) are at the highest risk of progression to disease. Review of the pre-chemotherapy literature shows that 40–50% of infected infants (0–11 months), 10–20% of children aged 1 year and 10% of children aged 2–4 years progress to disease [12].

Household level factors associated with initiation of IPT: Studies in developed and developing countries show that the most effective means of case identification is at the household contact level [13, 14]. Studies have shown that risk of TB was associated with the number of people living together in the household also referred to as overcrowding [15–17]. Studies have shown that increased household size was found to be important factor in infection of TB and overcrowding has been documented as a risk factor for TB in a variety of settings [18, 19]. This study

is consistent with the fact that overcrowding is a risk factor for TB and revealed that respondents who had more than five persons in the household were more likely to initiate their children on IPT compared to those who had 1–2 persons in the household. Respondents who sleep with their children in the same room were more likely to initiate their children on IPT compared to those who did not sleep with their children in the same room. Studies have shown that children exposed to patients who are sputum positive and/or have extensive lung involvement are at high risk of infection. Children who sleep in close proximity to a source case and those whose source case is a female family member are also at increased risk, more than five times higher in some reports hence a higher likelihood of initiation to IPT [20–22].

Recommendation: This study recommends that the Ministry of Health and collaborates to advocate for health promotion activities such as sensitization among smear positive PTB persons with children aged below 5 years to help bolster IPT uptake in rural areas.

Acknowledgements: I sincerely thank the Almighty God for enabling me carrying out this research, my supervisors Prof. Gideon Kikuyu and Dr. Walter Otieno for their immense support. Great thanks to Ethical Review Committee of Jaramogi Oginga Odinga Teaching and Referral hospital and University of Eastern Africa, Baraton for permission to carry out data collection. The opinions and assertions contained herein are the private opinions of the authors and are not to be construed as reflecting the views of the Jomo Kenyatta University of Agriculture and Technology (JKUAT).

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Computational Calculation of Binding Energy of Methane with $[\text{Mn}(4\text{-Picoline})_2]^{2+}$ Dication Complex ion in the Gas Phase: Theory and Experiment.

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DOI: 10.29322/IJSRP.9.08.2019.p9204

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9204>

ABSTRACT

Across the globe the search for ways of a more resourceful convention of the abundant, untapped reserves of over 1850.5 ppb of methane gas. The UV photofragment spectrum of the dication complex ion $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ had been recorded in the gas phase for theoretical and experimental analysis using a quadrupole ion trap mass spectrometer. Using a combination of the pick-up technique and high energy electron impact the $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ ions were prepared and then held in a cold ion trap where they were excited with tuneable UV radiation and effectively activated further with methane. From the DFT calculations, the optimised C1 conformer of $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ was confirmed.

Methane activation with manganese 4 methyl dication complex ion resulted in the formation $[\text{Mn}(4\text{-Picoline})_3\text{H}_2\text{O}]^{2+}$, $[\text{Mn}(4\text{-Picoline})_3(\text{H}_2\text{O})_2]^{2+}$, $[\text{Mn}(4\text{-Picoline})_3\text{N}_2]^{2+}$, $[\text{Mn}(4\text{-Pico})_3\text{CO}_2]^{2+}$, $[\text{Mn}(4\text{-Picoline})_3(\text{CH}_3)_2]^{2+}$ and $[\text{Mn} 4\text{-Picoline} (\text{CH}_4)]^+$ were recorded. The calculated charge on the metal centre was reduced by approximately 20% in the optimised geometry $[\text{Mn}(4\text{-Picoline})_3\text{CH}_4]^{2+}$ of as compared to the charge of +2 assumed on Mn metal in the potential energy curve, (PEC) calculation. The DFT calculated result revealed that the binding energy of methane to the metal dication complex ion was that overestimated on the PEC model by 32%.

KEY WORDS: Manganese, Binding energy, 4- Picoline, Methane, DFT, PEC, Gas Phase.

INTRODUCTION

Methanol is the simplest alcohol molecule and is emerging as a clean, sustainable transportation fuel of the future across the world [1]. Methanex is working with partners worldwide to promote methanol as a clean, sustainable road fuel. Currently methanol is blended with gasoline in high-proportion such as M85-M100 in flex-fuel or in low-quantities and used in existing road vehicles or dedicated methanol-fuelled vehicles. In recent times technology is also being commercialized to use methanol as a diesel substitute. [2].

China currently leads the world in methanol fuel blending. In 2017, China consumed as much as 12 million metric tons (4 billion gallons) of methanol to fuel various cars, trucks and buses. China's fuel pool consists of 8% methanol and Chinese drivers have covered more than 200 million miles in methanol fuelled cars [2]. Statistics reveal that in more than a dozen provinces blends such as M15 (15% methanol and 85% gasoline) are sold as 95 and 97 octane fuels for use in existing passenger cars. The central government of China considers methanol as a strategic transportation fuel and in an attempt to develop national standards for methanol-fuelled vehicles, the government has launched a demonstration of light-and heavy-duty vehicles running on M85 (85% methanol and 15% gasoline) and M100 (100% methanol) in Shanxi, Shaanxi provinces and in the city of Shanghai [2].

It is not surprising that across the globe the methanol fuel 'fever' is spreading uncontrollably like a bush fire. In November, 2013, Israeli Prime Minister Benjamin Netanyahu launched a demonstration of M15 vehicles and hosted a fuel choices summit in Tel Aviv to focus attention on the potential for methanol based fuels in Israel. As a way of encouragement and promoting methanol fuel, the federal government of Australia does not tax methanol fuels, and Methanol Institute member company Coogee Energy is demonstrating the use of gasoline, ethanol and methanol (GEM) fuels in passenger cars [2]. President Obama recently called the United States the "Saudi Arabia of natural gas" and asserted that it was time for our oil-dominated transportation fuel market to open the door to natural gas. As he rightly said it would be cheaper for consumers and reduce the strategic importance of oil but first we need cars that can run on methanol, a high-octane fuel made from converted natural gas [2].

With the aim to develop a cost efficient and environmentally friendly vehicle with zero harmful emissions and an exhaust that is as clean as the air surrounding, the Danish methanol fuel cell manufacturer SerEnergy has launched a commercial reformed methanol fuel cell vehicle with a driving range up to 800 km on a tank of methanol [3].

Currently global methane concentrations have reached 1850.5 ppb in July 2018 [4]. This very large reserves of methane, could serve as a feedstock for the production of chemicals and as a source of energy well. Both methane and carbon dioxide are similarly problematic however, methane retains, roughly 30 times more heat than CO₂ in the atmosphere even though CO₂ is five times more than methane [5]. The future global task is to trap methane and convert it into the best efficient use and other valuable and/or environmentally friendly chemical compounds [4].

This research sought to form doubly charged manganese dication complexes [Mn(4-methyl Pyridine)₃]²⁺ ions and activate them with methane follow by the calculation of the binding energy of methane to the metal complexes in the gas phase [6]. Imagine an industry that has methane as feed stock for the production of chemicals and as a source of energy where methane is converted to much more efficient and environmentally friendly methanol. For example, fractional oxidation of methane offers a distinct road of direct converting of methane to liquid methanol as reveal by the equation $\text{CH}_4 + \frac{1}{2}\text{O}_2 \rightarrow \text{CH}_3\text{OH}$ [8].

2.0 Experimental Procedure

The apparatus shown schematically in Fig. 1 detailed the experimental procedure for the formation of [Mn(4-Picoline)₃]²⁺ dication complex ions. The systematic description of the entire instrument was given by the author in his previous publication [9]. In summary the instrument has five differentially pumped vacuum chambers namely supersonic expansion, beam collimation, metal vaporization and pick-up (oven), quadrupole mass selection and ion trapping.

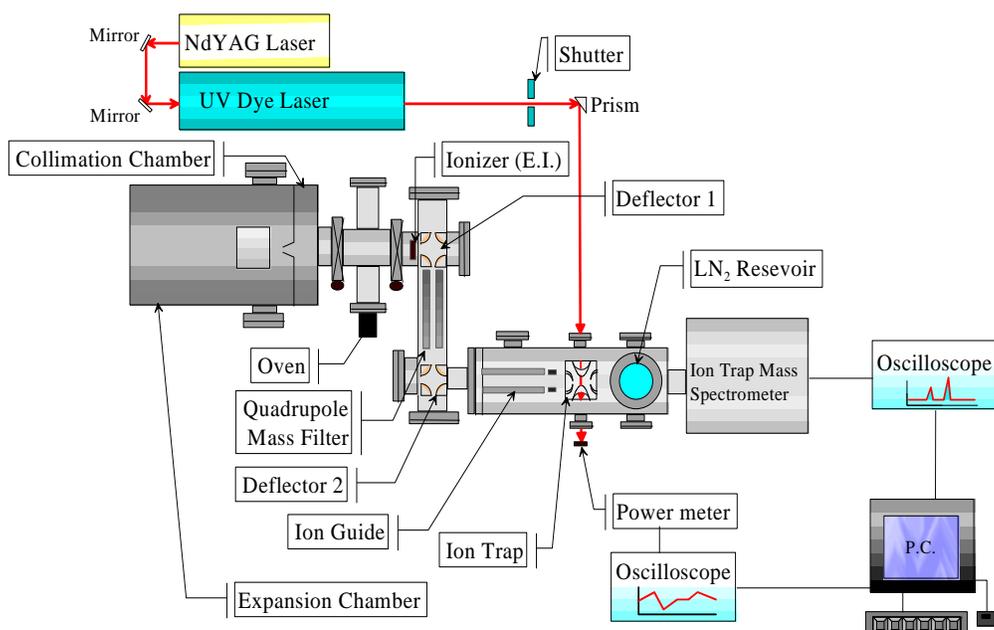


Fig. 1. Schematic diagram of the experimental set up, showing the pick-up region (oven), the quadrupole mass filter, and the ion trap, together with auxiliary equipment.

RESULTS AND DISCUSSION

The appearance of discrete structured sharp mass spectrum of $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ at 167 amu and a minuscule hydrated complex of $[\text{Mn}(4\text{-Picoline})_3\text{H}_2\text{O}]^{2+}$ at 176 amu (Figure 2) similar to what was observed in the ethane activation [9] indicates that the working conditions in the experiment set up remained the same in both methane and ethane activation with $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ metal dication complex ion.

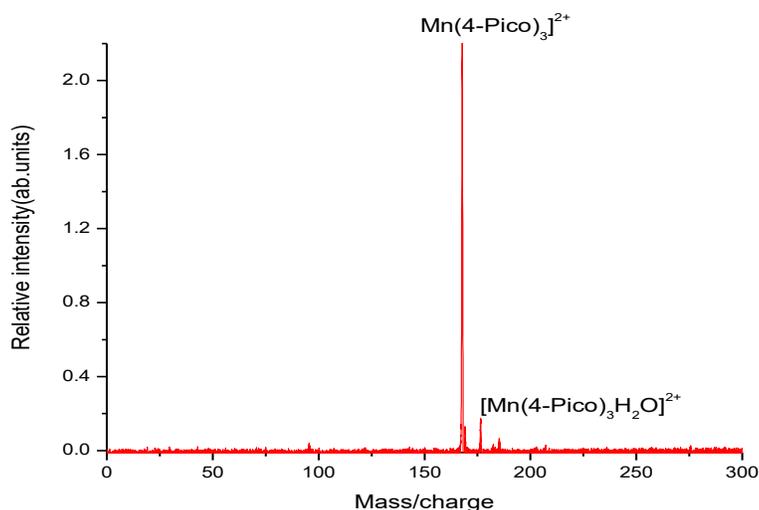


Figure 2: Mass spectrum of $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ [9]

ACTIVATE OF $[\text{Mn}(4\text{-PICOLINE})_3]^{2+}$ WITH METHANE

Figure 3 represents the photofragmentation pattern of the manganese dication complex ion $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ with methane. As revealed distinct ion peaks namely the isolated parent fragment of $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ at 167 amu the hydrated parent dication complex ions of $[\text{Mn}(4\text{-Picoline})_3\text{H}_2\text{O}]^{2+}$ at 176 amu and the dihydrated parent dication complex ions $[\text{Mn}(4\text{-Picoline})_3(\text{H}_2\text{O})_2]^{2+}$ at 185 amu, the metal dication nitro parent complex ion $[\text{Mn}(4\text{-Picoline})_3\text{N}_2]^{2+}$ at 181 amu, the carbonated parent fragment, $[\text{Mn}(4\text{-Pico})_3\text{CO}_2]^{2+}$ at 189 amu were observed. The ability of the $[\text{Mn}(4\text{-Picoline})_3]^{2+}$ to pick methyl under laser power was observed in the formation of $[\text{Mn}(4\text{-Picoline})_3(\text{CH}_3)_2]^{2+}$ at 182 amu. The photofragmentation path with the loss of a picoline ion was observed resulting in the formation of a main daughter fragment peak corresponding to coordinatively unsaturated $[\text{Mn}(4\text{-Picoline})]^{+}$ at 148 amu. The ability of this daughter fragment to pick methane to form manganese 4-picoline monovalent complex ion of $[\text{Mn} 4\text{-Picoline}(\text{CH}_4)]^{+}$ at 164 amu was recorded.

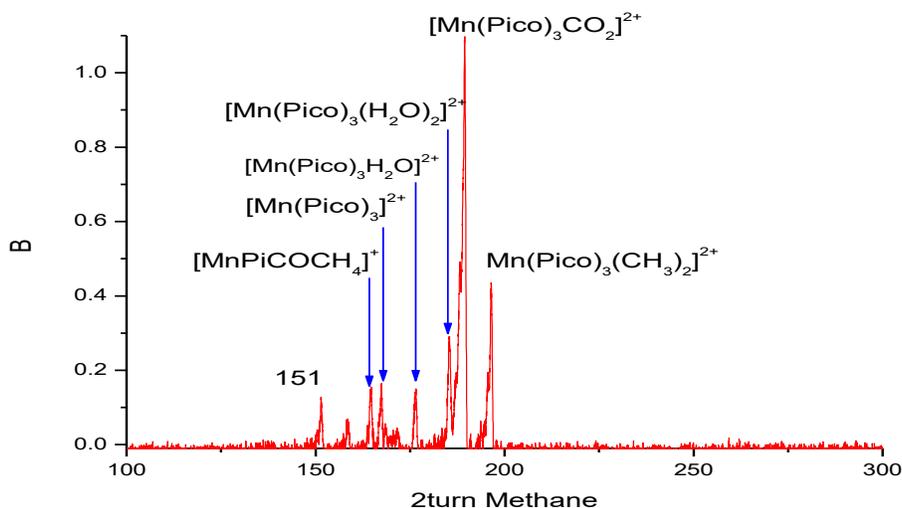


Figure 3: Photofragment mass spectrum of $[\text{Mn}(4\text{-Picoline})_3\text{CH}_4]^{2+}$ (44000cm^{-1})

CALCULATION OF THE STRUCTURE AND BINDING ENERGY OF METHANE WITH MANGANESE 4-PICOLINE COMPLEX DICATION IONS.

The optimised geometry conformer of $[\text{Mn}(4\text{-Picoline})_3\text{CH}_4]^{2+}$ was observed to be C_1 symmetry Figure 4 and the shortest manganese-methane (Mn-C) distance of 2.0 Å.

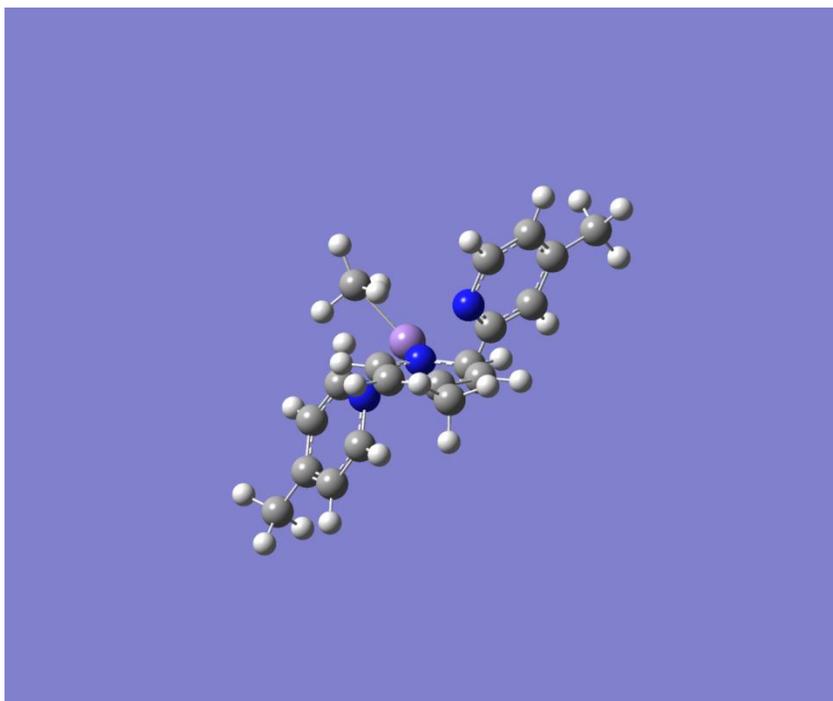


Figure 4: The Optimized geometry of $[\text{Mn}(4\text{-Pico})_3\text{CH}_4]^{2+}$ with C_1 Symmetry

Table 1: Binding Energies of Methane with $\text{Mn}(\text{4-Picoline})_3^{2+}$ Complex Ion Calculated using both BVP86/6311++G(d, p) and TPSSh/6311++G(d, p)

Reaction	BVP86/kJ/mol	TPSSh/kJ/mol
$[\text{Mn}(\text{4-Picoline})_3]^{2+} \rightarrow \text{Mn}^{2+} + 3(\text{4-Picoline})$	1617.31	1617.31
$[\text{Mn}(\text{4-Picoline})_3\text{Me}]^{2+} \rightarrow [\text{Mn}(\text{4-Picoline})_3]^{2+} + \text{Me}$	13.15	13.14
$[\text{Mn}(\text{4-Picoline})_2\text{Me}]^{2+} \rightarrow [\text{Mn}(\text{4-Picoline})_2]^{2+} + \text{Me}$	35.71	35.72
$\text{Mn}(\text{4-Picoline})\text{Me}]^{2+} \rightarrow [\text{Mn}(\text{4-Picoline})]^{2+} + \text{Me}$	120.17	120.10
$[\text{Mn}(\text{4-Picoline})_2]^{2+} \rightarrow \text{Mn}^{2+} + 2(\text{4-Picoline})$	1371.14	1371.14
$[\text{Mn}(\text{4-Picoline})]^{2+} \rightarrow \text{Mn}^{2+} + \text{4-Picoline}$	110.86	110.84

For $\text{Mn}(\text{4-Picoline})_3\text{CH}_4^{2+}$ complex ion the binding energy was maximised at the optimised structure. The one-third the binding energy of $[\text{Mn}(\text{4-Picoline})_3]^{2+} \rightarrow \text{Mn}^{2+} + 4\text{-Picoline}$ calculated at different levels of theory of zero point energy are in realistic agreement: BP86/6-311++G(d, p) and TPSSh/6-311++G(d, p) at the same levels of theory gave and 527.18 kJ/mol. This theoretical calculated binding energy corresponds to 44068.80 cm^{-1} per molecule which perfectly falls within the experimental photon energy range of 35000 to 45000 cm^{-1} over which the photofragmentation spectra were recorded.

THE ONE DIMENSIONAL POTENTIAL ENERGY CURVE OF $[\text{Mn}(\text{4-PICOLINE})_3\text{CH}_4]^{2+}$

In order to picture the observed charge separation reactions qualitatively a one dimensional potential energy curve model of $[\text{Mn}(\text{4-Picoline})_3\text{CH}_4]^{2+}$ was plotted (Figure 5). From the curves, it was observed that the H transfer separation giving $[\text{Mn}(\text{4-Picoline})_3\text{CH}_3]^{2+} + \text{H}$ from $[\text{Mn}(\text{4-Picoline})_3\text{CH}_4]^{2+}$ (green line) was located closer to the stable curve (red line). The photoinduced charge transfer to give $\text{Mn}(\text{4-Picoline})_3^+$ and CH_4^+ of $[\text{Mn}(\text{4-Picoline})_3\text{CH}_4]^{2+}$ was not observed in the photofragmentation because this reaction is endothermic as evidenced by observing that the potential energy curve (blue) lies above the attractive curve. At the optimised geometry of $[\text{Mn}(\text{4-Picoline})_3\text{CH}_4]^{2+}$ (Figure 4) the manganese-methane distance (Mn-C) is 2.0 \AA which corresponds to 0.18 eV (17.36 kJ/mol in photon energy) on the PEC. Comparing with the calculated DFT of 13.15 kJ/mol it is clear that the PEC calculated value was overestimated by 4.21 kJ/mol which is due to fact that the actual charge on the Mn in the optimised geometry was 1.61 while the charge of $\text{Mn}=2$ was assumed in the PEC calculation.

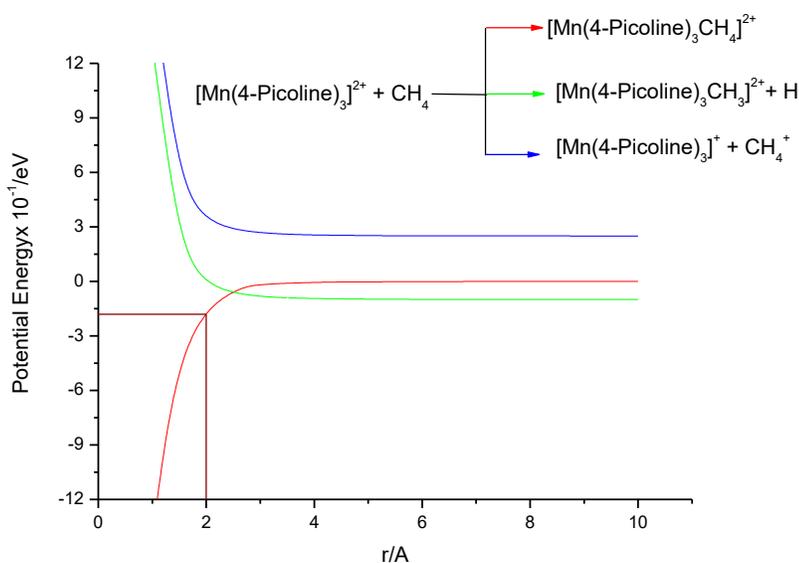


Figure 5: The Potential Energy Surface Curve model showing attractive and repulsive curves of ion-ligand $[\text{Mn}(\text{4-Picoline})_3\text{CH}_4]^{2+}$

CONCLUSION

The average binding energy per molecule of Picoline calculated for $[\text{Mn}(\text{4-Picoline})_3]^{2+}$, lies within the photon energy range over which the photofragmentation spectra were recorded. C_1 symmetry optimised geometry of the methane manganese 4-picoline dication complex ions was observed. The calculated charge on the manganese metal centre was 1.61 on the DFT optimised geometry while the charge assumed for the PEC calculation was +2. The interaction of methane with the $[\text{Mn}(\text{4-Picoline})_3]^{2+}$ resulted in the overestimation of binding energy on the PEC model by 32% as compared to DFT calculation.

Acknowledgement

The author is grateful to Prof. Anthony Stace of University of Nottingham School of Chemistry, UK for all the sacrifice, contributions and support to see this research through, Dr Lifu Ma formerly of University of Nottingham School of Chemistry for his contributions Prof Hazel Cox of the University of Sussex UK, Computational chemistry Department for the Software and the computer time.

FUNDING

The author is obligated to British government for granting him 'International Excellence Research Award' which made the financial assistance for this research in the Nottingham University possible.

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Development of OCD (Offensive, Counter Attack, Defensive) Learning Strategies to Improve Understanding Reading Skills of 4th Grade Students

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DOI: 10.29322/IJSRP.9.08.2019.p9205

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9205>

Abstract: This research (R & D) uses a Four-D Model approach with the aim of developing OCD (Offensive, Counter Attack, Defensive) learning strategies to improve reading comprehension skills with exposition text material. 60 students were taken who were divided into control classes and experiments with homogeneous abilities. The nonequivalent control group desing test was used to determine the effectiveness of the OCD strategy to influence student learning outcomes by $t_{test} > t_{table} = 6.76 > 0.20017$ and get 90.5% responses of students with very good categories. This shows that the OCD learning strategy can improve reading comprehension skills in exposition text material.

Keywords: *development, strategy, OCD, reading comprehension, exposition text*

INTRODUCTION

Reading comprehension is an inhibiting factor in the world of education, especially classical learning in high school elementary school. This fact is certainly a material consideration and reflection of each teacher in the teaching process. Sometimes students lack respect for reading activities and assume that reading is a simple process that only relies on the sense of sight and utterances. Such understanding is certainly contrary to the nature of reading comprehension. Because, in the process of reading a text, not only the eyes and utensils are functioned, but also the human mind (brain), as well as other tools found in individuals, such as prior knowledge related to text and understanding of vocabulary.

Reading is a complex process (Stern & Shalev, 2013, p. 432), and reading comprehension is a complex cognitive procedure, which ideally produces mental representation and coherence about certain content, namely the contents of one genre of comprehension text (Schmitz, Grasel, & Rothstein, 2017, p. 1117). The comprehension text itself is sometimes assessed directly and explored through questions (pre-read) and viewing or examining images of the text. Text that is used as a discipline tool in schools (Mason, Zaccoletti, Caretti, Scrimin, & Irene, 2018, p. 1) is exposition text. The main communicative purpose of the exposition text is "informing" so that the reader learns something (Kim & Clarania, 2017, p. 911). The exposition text will specifically be explored with knowledge of main ideas, explanatory sentences, difficult words, and discovering new knowledge using their own sentences. Because, according to Daley & Rawson (2018, p. 2) that students cannot memorize every word in detail from a genre of text. Hierarchically, the exposition text according to Herbert, Bohaty, & Lambert (2018, p. 2120) there are five exposition text structures, namely simple, comparable or contrasting descriptions, sequences, causes or consequences, and problems or solutions. Simplified by Montelongo & Herter (2010, p. 89) that exposition text is divided into four types, including problem-solution, comparative-contrast, cause-effect, and generalization.

Based on observations at SD Kemala Bhayangkari 9 that the fundamental problem that causes the objective of learning to read comprehension comprehensively is not yet fully understood is still conventional learning (teacher centered). This has an impact on students who are of moderate and low ability. Students with moderate and low ability have not and are not even actively involved in learning because the strategies implemented cannot yet demand the involvement of each student. The result of domination has a real impact on the learning outcomes of students with moderate and low abilities who have not been able to meet the standards of the Indonesian Language MSC (Minimum Standard of Completeness). For this reason, it needs to be evaluated to find strategic alternatives in minimizing the inability of students in reading comprehension learning.

The real phenomenon mentioned above can be overcome by developing learning strategies that can facilitate students in comprehending comprehensively one reading genre because it is one of the dimensions of the 2013 Curriculum demands, namely student activity in reading comprehension. According to Majid (2013, p. 4), learning strategies include the objectives of the activity, who is involved in the activities, the contents of the activities, the process of activities and the means of supporting activities. Rohman & Amri (2013, p. 29-30) classify strategies into four perspectives, namely direct, indirect, interactive, empirical, and independent learning strategies. The learning strategy implemented in learning to read the understanding of exposition texts in class IV students is called the OCD strategy. This strategy was adopted from the strategy of soccer (Futsal), namely offensive, counter attack, defensive. This OCD strategy is based on "activeness and collectivity" of students. It further emphasizes the role of students (student centered), while the teacher as a facilitator.

In this strategy, students will be divided into three groups with the initials O "offensive, C" counter attack ", and D" defensive ". Group D has a central role in answering all questions or objections proposed from groups O and C. Group O has a single role, namely asking, while group C has a dual role of asking and refutation. The three groups will be rolled following the referenced text changes (exposition text). Each group consists of high, medium and low ability students. The OCD strategy regulation requires each student to argue with a patterned strategy (low-ability students will answer first, after that are moderate-capable students, and high-ability students). So activeness and collectivity in learning are highly demanded and related to the Futsal match strategy system that a match will be successful if the structure of coordination between players is needed to minimize the tendency to centralize certain players or leaders (Travassos, Bourbousson, Esteves, Marcelio, Pacheco, & Davids , 2016, p. 99). The results of adoption of the Futsal strategy adapted into the learning steps, and implementation in learning reading comprehension are expected to be able to improve student learning outcomes in order to achieve MSC (Minimum standard of Completeness).

This study aims to describe the feasibility of OCD learning strategies to improve the reading comprehension skills of fourth grade students, describe the practicality of OCD learning strategies to improve reading comprehension skills of class IV students, and describe the effectiveness of OCD learning strategies to improve reading comprehension skills of fourth grade students.

METHOD

This research is R & D using the Four-D Model adapted from Thiagarajan (1974, p. 37). Based on the Four-D development model, this study was developed until the phase of dissemination or dissemination. A total of 60 students divided into two classes namely experiment and control were taken randomly. The data collection instruments used in this study were note-taking techniques, documentation, observation sheets, questionnaires, and learning outcomes tests in the form of 30 MCQs. The feasibility analysis of the OCD learning strategy is done with a validation sheet that uses a Likert Scale. Practical analysis of OCD learning strategies using teacher and student observation sheets, teacher and student response sheets. Analysis of the effectiveness of the OCD learning strategy can be seen from the student learning outcomes test. Test the learning outcomes through the following stages of processing, (1) test the validity of the expert (lecturer) and be tested on students using the Product Moment correlation formula; (2) the test of learning outcomes is tested for reliability using the Spearman Brown formula; (3) normality test with the formula Chi squared; (4) homogeneity test with variant formula; and (5) t-test using the Nonequivalent Control Group Design.

RESULT OF RESEARCH

The results of the feasibility test of the OCD learning strategy are obtained from the validation sheet. Validated components are learning tools, initial ability test questions (pre-test) and final ability test questions (post-test). Questionnaire for the feasibility of learning strategies is given during individual trials and small group trials. The results of the validation sheet from the validator are as follows:

Table 1.
Results of Validation

Validation Sheet	Percentage	Category
RPP of OCD Learning Strategy	75,16%	Revision
<i>Pre-test</i>	86,98%	Worth using without revision
<i>Post-test</i>	88,78%	Worth using without revision
Teacher and Student Activity Sheet	88,75%	Worth using without revision
Teacher and Student Respon Sheet	91,75%	Worth using without revision

Source: secondary data proceed, 2019

From the results of the validation sheet, it was stated that the OCD learning strategy, learning tools, initial ability test questions (pre-test) and final ability test questions (post-test) were suitable for use in learning. Related to the results sheet of the feasibility response instrument for the learning strategy can be seen in table 2 below:

Tabel 2.
Result of Feasibility Questionnaire Strategy

Trials	Total Of Students	Scores Obtained	%	Interpretations
Trial Limited	10	88	79,77	Very good with revisions

Scale Trial Size	30	478	95,16	Very good
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Source: secondary data proceed, 2019

The results of the student response questionnaire stated that the appropriate OCD learning strategies matched the percentage of limited trials and large-scale trials.

The practicality of the OCD learning strategy can be seen from the results of the observation sheets of teacher and student activities, teacher and student response sheets filled in by two fourth grade teachers in elementary school. The results of the percentage of learning implementation in table 3 below.

Tabel 3.
Teacher Activity Observation

Observer		Total	Percentage	Information
O1	O1			
30	30	60	93,75	Very good

Source: Secondary data proceed, 2019

Based on the data above, it can be concluded that the results of observation of teacher activities using the OCD learning strategy are very good. Furthermore, student activities during learning can be seen in table 4 below.

Tabel 4.
Student Activity Observation

Observer		Total	Percentage	Information
O1	O1			
30	30	60	93,75	Very good

Source: secondary data proceed, 2019

In accordance with the table above, it can be concluded that student activities during the implementation of learning using the OCD learning strategy are categorized very well. For the results of practicality questionnaire learning strategies can be seen in table 5 below.

Tabel 5.
Results of Practicality Questionnaire OCD Learning Strategy

Respondents		Total	Information
1	2		
26	27		
Percentage		94,6%	

Source: secondary data proceed, 2019

Table 5 shows that OCD learning strategies are very good or practical to use in learning activities.

The effectiveness of OCD learning strategies is known through test results (student learning outcomes). Before being used for research, the learning outcomes test questions are first validated to the expert (lecturer). After that, it was tested on 10 students and calculated using the product moment correlation formula, with the question criteria said to be valid if $r_{count} > r_{table}$, which is 0.514. The results of the validation test can be seen in the following table.

Tabel 6.
Result of Question Validation

Valid Questions	Invalid Questions
1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19 20,21,22,23,24,27,28,29, 32,33,34,	22,25,26,30,35

Source: secondary data proceed, 2019

Of the 35 questions, there are 5 questions that are not valid so that 30 questions are taken to be used as learning outcomes test instruments. After testing the validity, reliability testing is done using the Spearman Brown formula. The calculation results obtained by the reliability of questions is 0.876. Referring to the interpretation of reliability according to Guilford, the test can be concluded to have very high reliability.

The question of validity and reliability will be used for the pre-test and post-test questions in the experimental class during the field trials. The results of the pre-test and post-test will be tested by t-test to determine the effectiveness of the OCD learning strategy. However, before being tested with a t-test, the results of the pre-test and post-test first pass the normality test using the chi-square formula. The results of the pre-test and post-test normality test can be seen in table 7 below.

Tabel 7.
Normality Test

Normality Test	X count	X table	Information
Eksperimental Post-test	0,23333	0.242	Distributed data normal
Control Post-test	0.2	0.242	Distributed data normal
Eksperimental Post-test	0.13333	0.242	Distributed data normal
Control Post-test	0.13333	0.242	Distributed data normal

Source: secondary data proceed, 2019

The next step after the normality test is to conduct a homogeneity test to find out whether the two classes are homogeneous or not. The homogeneity test is carried out using the variance formula. The sample is said to be homogeneous if the value of $F_h < F_t$, with F_t of 1.861. The following are the homogeneity test results of the pre-test and post-test.

Tabel 8.
Homogeneity Test

Homogeneity Test	F count	F table	Information
Pre-test	1,091770	1,861	Homogenous
Post-test	1,360311	1,861	Homogenous

Sumber: data sekunder diolah, 2019

After it is known and proven that the distribution of the data of the two classes is normal and homogeneous, then a t-test with the criteria used is carried out H_0 is accepted if $t_{count} < t_{table}$. The t-test is carried out using the following formula (Arikunto, 2010, p. 349):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2 + S_2^2}{n_1 + n_2}}}$$

Based on the results of the calculation above, it was found that student learning outcomes after learning were 6.76. This can be interpreted that $6.76 \geq 0.20017$, it can be concluded that H_0 is rejected and H_a is accepted. Thus there can be a significant difference between the learning outcomes of the experimental class students and the control class.

DISCUSSION

Feasibility of learning strategies based on the results of validation to learning device experts and elementary school teachers. The development of OCD learning strategies to improve comprehension reading skills is categorized very well. After going through the validation stage and being declared fit for use, the OCD learning strategy can be continued in the next stage, namely limited trials and wide-scale trials. In addition to validating the OCD learning strategy, validation of the learning device was also carried out, initial ability test questions (pre-test), and final ability test (post-test). The overall results of the validation indicate that the learning device, the initial ability test questions (pre-test), and the final ability test (post-test) questions are

appropriate to use. Based on the results of the feasibility analysis, the appropriate OCD learning strategy is used to increase the reading comprehension skills of fourth grade students.

The practicality of the OCD learning strategy can be seen from the results of the teacher activity observation sheet with a score of 93.75%, the observation sheet of student activity with a score of 93.75% very good category, and the practicality questionnaire of the OCD learning strategy filled by two grade IV teachers. 94.6% with a very good category.

The effectiveness of the learning strategy is based on the pre-test and post-test questions for the experimental and control classes in the field test, namely class IV SD Kemala Bhayangkari 9. Class IV B as the control class, while class IV A as the experimental class. Field trials were carried out using nonequivalent control group design techniques. To find out the effectiveness of the OCD learning strategy was calculated using the t-test. Based on the t-test that has been done, the results are 6.76. With t table for df 58 is 0.20017. From these results it can be interpreted that $6.76 \geq 0.20017$, then H_0 rejected and H_a accepted. Thus it can be concluded that there are significant differences between the learning outcomes of the experimental class students and the control class. So, learning uses effective OCD learning strategies to improve student learning outcomes. This is evidenced by the significant difference in learning outcomes between the experimental class and the control class.

CONCLUSION

Based on the results of the research and discussion the results of the study can be summarized as follows: (1) feasible OCD learning strategies are used to improve reading skills in understanding the exposition text of class IV students by referring to the results of the validation and strategy feasibility questionnaire stating that the OCD learning strategy is feasible. (2) The OCD learning strategy is used to improve reading skills in understanding the exposition text of fourth grade students. It can be seen from the calculation of the percentage of observation of teacher activities, student activities, and practicality questionnaires of learning strategies that are in a very good category. (3) Effective OCD learning strategy is used to improve reading skills in understanding the exposition text of class IV students based on the results of the t-test, where the value of t count > t table, which is $2.565 > 2.093$, or in other words H_0 is rejected and H_a is accepted. So it can be concluded that learning uses an effective OCD learning strategy to improve student learning outcomes because there are significant differences in learning outcomes between the experimental class and the control class.

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Diagnostic Analysis of Dermoscopy on Nail Psoriasis

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DOI: 10.29322/IJSRP.9.08.2019.p9206

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9206>

Abstract- Introduction: Nail psoriasis is one of the clinical manifestations of psoriasis that found in the nail, usually affecting the nail plate, nail bed, hyponychium, and nail matrix. Histopathology examination is the gold standard for diagnosis of nail psoriasis. Recently, dermoscopy is reported to have good diagnostic value in dermatology, because it can assess the nail bed and nail plate. Dermoscopy can be done quickly and it is inexpensive.

Objective: To find out the diagnostic value of dermoscopy in nail psoriasis patients.

Subjects and Methods: This study is an analytical study with a diagnostic test design, which include 17 samples of nail lesions of patients with and without psoriasis lesions on the skin. Samples were chosen by non probability sampling with consecutive sampling technique. Dermoscopy and punch biopsy were performed on subjects's nail matrix. The collected data is tabulated and presented in a frequency distribution table. To assess the diagnostic capabilities of dermoscopy, calculations were performed using 2 x 2 tables, where sensitivity values, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (PLR), negative likelihood ratio (NLR) and accuracy were compared with gold standard, which histopathology examination.

Results: From 17 subjects, there were 76,47% nail psoriasis cases that were diagnosed using dermoscopy and 70,58% cases through histopathology examination. Dermoscopy have sensitivity of 75%, specificity of 40%, PPV of 75%, NPV of 40%, PLR of 0.8, NLR of 0.62, and accuracy of 64.70%.

Conclusions: Dermoscopy cannot be used as a diagnostic tool in nail psoriasis.

Index Terms- dermoscopy, histopathology, nail psoriasis

I. INTRODUCTION

Nail psoriasis is one of the clinical manifestations of psoriasis in the nail, usually affecting the nail plate, nail bed, hyponychium, and nail matrix.¹ The clinical manifestations of nail psoriasis are pitting, nail discoloration (salmon patch, oil drop), onycholysis, subungual hyperkeratosis and splinter hemorrhage.^{2,3} Nail psoriasis can cause discomfort in many patients and can cause significant functional disorders, pain, and psychological stress. This can affect patients in their activities and social life.^{3,4}

The current study estimates that around 7.5 million people in the United States or around 2.2% of the population suffer from nail psoriasis. Psoriasis can occur at any age, but is rarely found at less than 10 years of age, is more common at the age of 15-30

years.⁵ The number of clinical trials with a specific focus in nail psoriasis is currently still low.¹ Until now there is no prevalence data focused on nail psoriasis in Indonesia.

Pitting is a shallow curve or hole in the nail plate that varies in its morphology and distribution. Pitting shows damage to the uppermost layer of the nail plate, which arises from the proximal matrix. Psoriasis lesions in the nail matrix mainly consist of groups of parakeratosis cells in the stratum corneum, which interfere normal keratinization process. When the nail plate grows outward, the parakeratosis cells are exposed to the surrounding environment and the cells decay gradually, leaving different curves on the nail plate. As a result of the accumulation of parakeratosis cells in the nail plate causing the area to become brittle, less attached to each other then peeling off. Generally the diameter of the groove is less than 1 mm.⁶⁻⁸

Nail color change that specific for nail psoriasis is "oil drop" or "salmon patch". It is characterized by a reddish yellow color on the nail bed that looks like a drop of oil under the nail plate. This unique picture of lesions in the nail pads is caused by parakeratosis and tightly arranged acanthosis under the nail plate that looks like a yellowish color.^{2,9} Onycholysis is an expansion of psoriasis in the hyponychium with manifestations of yellow scaly debris that lifts the nail plate. Psoriasis on the nail pads causes the separation of the nail plate from the nail pad. Nails are released in an irregular manner. The nail plate turns yellow, looks like a fungal infection. Apart from the nail plate starting from the distal groove or from the bottom of the nail plate, this onycholysis can affect several nails. Onycholysis can increase the risk of infection, because it allows pathogen to enter nail tissue.^{10,11}

Subungual hyperkeratosis is derived from deposition and collection of cells under the nail plate that have not undergone desquamation. The height of the nail plate raised from the nail bed depends on the level of psoriasis activity in certain structures, such as hyponychium. Hyponychium undergoes some minor vasodilation and a weak inflammatory reaction that consists of lymphocyte cells. A strong inflammatory reaction will excrete protein exudate in the dermis or glycoprotein serum. Although arising from the dermal layer, glycoproteins migrate through the epidermis and accumulate intracellularly in the stratum corneum. Serum deposition is most likely responsible for the appearance of yellow lesions under the nail plate.^{7,9}

Splinter hemorrhage can be seen as small line with length of 3 mm in distal of nail plate.^{7,9} This condition often caused by trauma.¹¹ There are other nail lesion that can be seen. Lesion on nail matrix on short period of time usually caused by intermittent inflammation on nail fold, causing horizontal line and elevation on nail plate, generally known as Beau's line. On the other hand,

lesion on nail matrix in long period of time can cause onychorrhexis.

The gold standard examination to diagnose nail psoriasis is through histopathological examination. Other additional examination that can be used is dermoscopy.⁹ Dermoscopy is a non-invasive procedure using a magnifying tools called a dermatoscope.¹² The use of dermoscopy in nail psoriasis is to detect abnormalities in nail bed and nail plates. This examination is also thought to substitute for histopathological examination in diagnosis of nail psoriasis. Dermoscopy can be quickly done and it is inexpensive. Also, it can help to diagnose nail psoriasis in clinically atypical cases.^{6,9} Dermoscopy has recently been known as an effective tool in diagnosing nail diseases.⁴² This can be seen from several studies using dermoscopy in viewing images and enforcing nail psoriasis using dermoscopy.^{13,14}

II. METHODS

This study is an analytical study with a diagnostic test design with 17 samples of nail lesions with psoriasis lesions on the skin and without psoriasis lesions on the skin. Samples were chosen by non probability sampling with consecutive sampling technique. Dermoscopy and punch biopsy were performed on the nail matrix of the sample. The collected data is tabulated and presented in the form of a frequency distribution table. To assess the diagnostic capabilities of drmoscopy, calculations were performed using 2 x 2 tables, where sensitivy values, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (PLR), negative likelihood ratio (NLR) and accuracy compared with gold standard, which is histopathological examination.

III. RESULTS

In this study, an examination of patients with nail disorders was performed in patients with nail lesions, in psoriasis and non-psoriasis patients with total of 17 subjects. All research subjects undergone history taking, physical examination, dermatology, dermoscopy and histopathology. The collected datas were then tabulated and analyzed statistically.

The most common clinical features of nails in 17 subjects was onycholysis (46.6%), while the least was splinter hemorrhage (20%) (table 1). From dermoscopic examination, the most frequent findings was pitting (58.8%), while the least was subungual. hyperkeratosis (33.3%) (table 2)

TABLE 1. THE FREQUENCY DISTRIBUTION OF THE STUDY SUBJECTS (N = 17) NAIL LESIONS WITH PSORIASIS LESIONS ON THE SKIN AND WITHOUT

PSORIASIS LESIONS ON THE SKIN BASED ON CLINICAL MANIFESTATION.		
Clinical manifestation	n	Percentage
Onycholysis	7	46,6 %
Pitting	6	40 %
Beau`s lines	5	33,3%
Subungual hyperkeratosis	5	33,3%
Salmon patch	4	26,6%
Splinter hemorrhage	3	20%

TABLE 2. FREQUENCY DISTRIBUTION OF RESEARCH SUBJECTS WITH NAIL LESIONS BASED ON DERMOSCOPY RESULT

Clinical manifestation	n	Percentage
Pitting	10	58,8 %
Onycholysis	7	46,6 %
Beau`s line	7	46,6 %
Splinter hemorrhage	7	46,6 %
Salmon patch	5	33,3%
Subungual hyperkeratosis	5	33,3%

According to several literatures, there are patterns that can be found in accordance with the clinical manifestations of nail psoriasis. Dermoscopy can be useful in evaluating the shape of lesions in nail psoriasis patients in cases without typical nail lesions and its findings can be varied depending on the nail unit involved. Dermoscopy can be useful to differentiate onycholysis caused by onychomycosis, nail psoriasis and trauma onycholysis^{15,16} (Table 3). Onycholysis in onychomycosis can appear as multiple longitudinal striae of the same or different colors (can be yellow, white, brown, etc.) in nail plate. This is caused by reflection, invasion of the fungal colonies and subungual debris.¹⁷ Onycholysis caused by trauma can be seen in the proximal part there is no limit either in the form of lines or erythematous areas. In nail psoriasis, on the proximal edge appears an area with erythematous lines surrounding the onycholysis.¹⁵

TABLE 3. FREQUENCY DISTRIBUTION OF CLINICAL MANIFESTATION AND DERMOSCOPY IN NAIL LESIONS WITH PSORIASIS ON THE SKIN AND WITHOUT PSORIASIS ON THE SKIN.

Dermoscopy	n	percentage
Nail psoriasis	13	76,47%
Onychomycosis	3	17,64%
Trauma onycholysis	1	5,88%

TABEL 4. FREQUENCY DISTRIBUTION OF HISTOPATHOLOGICAL EXEMINATION.										
No	Hype r-keratosis and parakeratosis	Dilation of blood vessels	Munro abscess (polymorphonuclear exocytosis)	Hype r-granulosis	Ach an-tosis	Infiltrates of inflammatory cells	Spo ng-iosis	Sero us exudate	Perivas cu-lar lymphocyte/ne utro-phil infiltrates	Confir m diagnostic psoriasis
P1	+	-	-	+	+	+	-	-	+	Yes
P2	-	-	-	-	-	+	-	-	+	-
P3	+	-	-	-	+	+	-	-	+	Yes
P4	+	-	-	-	+	+	+	-	+	Yes
P5	+	-	-	-	-	-	-	-	-	-
P6	+	-	-	+	-	-	-	-	-	-
P7	+	-	-	-	+	+	+	-	+	Yes
P8	+	-	-	+	+	-	-	-	-	-
P9	+	-	+	+	+	-	+	-	+	Yes
P10	+	-	-	+	+	+	-	-	+	Yes
P11	+	-	-	+	+	+	+	-	+	Yes
P12	+	-	-	+	+	+	-	-	+	Yes
P13	+	-	-	+	+	+	-	-	+	Yes
P14	+	-	-	-	+	+	+	-	+	Yes
P15	+	-	-	+	+	+	-	-	+	Yes
P16	-	-	-	+	+	-	-	-	-	-
P17	+	-	-	+	+	-	-	-	+	Yes
n	15	0	1	11	14	11	5	0	13	12
%	88,23 %	0%	5,88%	64,70 %	82,3 5%	64,70%	29,4 1%	0%	76,47%	70,58%

In this study, the most common histopathological features were hyperkeratosis with parakeratosis of 88.23% and the least was munro abscess 5.88%.

Dermoscopy examination to detect nail psoriasis compared with histopathological examination as the gold standard has a diagnostic test sensitivity of 75%, which means the ability of the dermoscopy device to determine that a positive lesion of nail psoriasis is 75%. Specificity value was 40%, positive predictive value was 75%, negative predictive value was 40%, positive likelihood ratio was 0.8, negative likelihood ratio 0.62 and the accuracy of dermoscopy for nail psoriasis was 64.70%.

IV. CONCLUSIONS

Through this study, we found that sensitivity, specificity, PPV, NPV, PLR, NLR and accuracy values of dermoscopy were low. Therefore, we concluded that dermoscopy could not be used as a diagnostic tool to replace histopathological examination. We suggest to perform similar study in multicenter setting.

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Dermatoglyphics –A Curtain To Periodontal Cachet

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DOI: 10.29322/IJSRP.9.08.2019.p9207

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9207>

Abstract- Periodontal disease compromises a wide range of inflammatory condition that affect supporting structure of teeth. To minimize the progression of periodontal disease early detection is crucial. Traditional periodontal parameters have its own limitation. Hence newer diagnostic methods are under research to overcome the difficulty with conventional methods. Dermatoglyphics stands out to be an unexplored field in diagnosing various diseases including periodontal diseases. This review highlights the role of palmar dermatoglyphics as an early predictor for periodontal disease.

Index Terms- Dermatoglyphics, Periodontitis, Whorls, Loops And Fingerprints

I. INTRODUCTION

Periodontitis is an inflammatory disease affecting the supporting structure of tooth as a result of host microbial interaction. It is multifactorial in origin. Early detection of this disease is pivotal since it allows to minimize the dynamics of progression of disease¹. Traditional periodontal diagnostic parameters used clinically include probing depths, bleeding on probing, clinical attachment levels, plaque index, and radiographs assessing alveolar bone level. However, along with these conventional techniques, newer diagnostic methods are under research to overcome the difficulty of sample collection, patient psychology, fear of dental instrument and ease of predicting disease progression. In Periodontology, Dermatoglyphics stands out to be an unexplored field with vast potential in estimating disease progression and treatment prognosis.

Dermatoglyphics are the patterns or the skin ridges on the pads of fingers which represent a person's finger prints. Sir Francis Galton in 1892, published his works on fingerprints². He put forth a rule called 'evidence of no change', which states that an individual's ridge patterns remain consistent throughout his/her lifetime. This hypothesis was later coined as 'Dermatoglyphics' by Dr Harold Cummins and Charles Midlo who detailed the concept as the study of definite ridge patterns on the fingers, palms and soles³. The term comes from two Greek words (Derma = skin; Glyphe = carve)³. It refers to the formation of epidermal skin ridges on volar pads. The formation of these ridge patterns occurs in the 6-7th week of the embryonic period and terminates around the 20th week of gestation.⁴ It is believed due to external pressure of amniotic fluid on body and internal blood pressure on extremities. During early embryogenesis, the directions of the epidermal ridges which develop on the volar surfaces of soles, palms and ridges are determined. Above the proximal end on the distal metacarpal bone volar pads appear like a mound shaped

elevations on each finger. The size and position of these pads are responsible for the shape and formation of the ridge patterns⁵. Seven genes are at least thought to be involved in finger ridge formation⁵. The patterns of nervous system, the genes encoding for the layers of skin, the amount of buckling instability and other factors determine an individual's specific unique set of fingerprints.

In dentistry, evaluation of dermatoglyphics has been associated with several disorders like, hereditary gingival fibromatosis, cleft lip/ palate, bruxism, dental caries etc. Genetics has been linked with periodontitis since ancient times. However, the method used to establish the genetic basis of periodontitis are unavailable at most times and are expensive as well.

Dermatoglyphics have a strong inheritable genetic connection and can be used as diagnostic tool for oral disease and other disease whose aetiology may be influenced directly or indirectly by genetic inheritance⁷. Numerous studies has pointed out the genetic etiology of periodontal disease -Kornman *et al.* studied genetically determined polymorphism in interleukin-1 (α and β), tumor necrosis factor- α , CD14 promoter region and shown them to be risk factors for chronic periodontitis⁸; Another study by Atasu *et al* also concluded strong correlation between dermatoglyphics and Aggressive periodontitis⁹.

Every man is unique so does his fingerprints. Dermatoglyphics has come to be recognized as a potent tool in identification of patients with definite group of periodontal disease. The earliest detection of disease is the key for a successful treatment plan. With the advent of newer techniques of diagnosis, this can throw light into the future of treatment modalities

II. PRINCIPLE OF DERMATOGLYPICS

Fingerprint has three important principles⁹:

A): It is an individual characteristic

B): It will remain unchanged during individual's lifetime

C): It have general ridge patterns which help to classify systematically

III. CLASSIFICATION OF FINGERPRINTS

In 1892, as stated by Sir Francis Galton, fingerprints are classified as Arches, Loops, and Whorls. The classic and widely used syllabary is A= arches; Lr = radial loops; Lu= ulnar loops; and W= whorls⁹ (Figure 1)

Arches(A): It is the simplest pattern found on fingertips and least frequent pattern, which pass across the finger with slight bow distally. These are parallel ridges that traverse the

pattern area and form a curve that is concave proximally. It makes about five percentage of pattern. They can be either plain arch or tented arch.(Table 1)

ii) Loops(L): It is the most common pattern on the fingertip and accounts for about 70%of population. These involves series of ridges enter the pattern area on one side of the digit, recurve abruptly, and leave the pattern area on the same side. The loop pattern is subdivided into two types: ulnar and radial loops .(Table 2)

Based on size and shape they can be classified as large or small, tailor short, vertically or horizontally oriented, plain loop or double loop. Transitional loops can occasionally resemble whorls or complex patterns.

iii) Whorls: It accounts for 25 to 35% of fingerprints. They make a turn through at least one circuit. Subtypes of whorl patterns include:(Table 3)

IV. DERMATOGLYPHIC LANDMARKS

Dermal ridges configuration has be classified into three major group: Tri –Radius, Core and Radiant (Table 4) ⁹
The whorls contain two triradii, while loop possess only one triradius. On the other hand, triradius is absent in arches. Therefore, these patterns may be identified from the occurrence of triradius

V. PALMAR PATTERN CONFIGURATION

To compare dermatoglyphics analyses in different individuals, the palm has been classified into severally anatomically designed thenar areas; 1st, 2nd, 3rd, and 4th interdigital areas; and hypothenar area¹⁰

Ridge counting: Ridges are often counted between triradius and centre or core of the pattern The ridge counts most frequently obtained is between triradii a and b and is referred to as the a–b ridge count. •

atd angle: This angle is formed by lines drawn from the digital triradius (a) to the axial triradius (t) and from this triradius to the digital triradius (d). The more distal the position of “t,” the larger the atd angle. Sometimes, accessory “a” or “d” triradii are present on the palm.

VI. TECHNIQUES FOR RECORDING PATTERNS

Fine quality fingerprints patterns are recorded using different methods as follows¹¹

1. **1.Transparent adhesive tape method:** Dry colouring pigments like chalk, ink or graphite are applied on hands. Strips of Scotch® tape is then used to duplicate the hand prints. The prints are recorded by a process called "Lifting". However, recording of the entire hand with accuracy can be a difficult
2. **2.Photographic method:** Polaroid camera is used to capture the magnified image that is formed based on the principles of total internal reflection It is expensive.
3. **3.Numerical method:** This method requires professional expertise in analysing fingerprints. Algorithm of synthesis of images of fingerprints is used to create all

possible arrangements of ridges called minutiae. The digital coding of the fingerprint helps in assessment and cataloguing all intricate patterns.

4. **4.Faurot inkless method:** Commercially available patented solution is used to record prints on sensitised paper. Shortcoming is availability.
5. **5.Biometrics method:** This procedure involves scanning of hands and palms with a video camera followed by digitizing the print features which are then subjected to analysis. It is an expensive technique

6.Inkpad method: The finger prints are recorded by pressing on the stamp pad turn by turn. The prints are usually smudged and there is loss of clarity.

6.The ink and roller method: This technique was reported by Cummins and Midlo.It utilises printer's ink, commonly known as duplicating ink. The ink is spread on a sheet with a roller, and fingers and palm are pressed onto the sheet. The ink smeared hands are then transferred on paper. This is an inexpensive and rapid method to register clear, smudge free fingerprints. These prints get dried easily and can be preserved for future use. Also, the ink can be easily removed after the procedure. It is most commonly employed to record fingerprints

VII. ADVANTAGES

- Minimally invasive technique,
- Cost -effective,
- Less discomfort to the patient
- Less chair side time
- Data collected remains unchanged lifelong and only minimum equipment's are required

VIII. LIMITATIONS

- Technique sensitive: Appropriate quantity of ink should be dispensed to avoid thick and thin prints
- Genetic deformity, Amputations, and Syndromes affect the registration process.

IX. APPLICATIONS OF DERMATOGLYPICS

Dermatoglyphics are of considerable importance in anthropology, criminology, medicine, chromosome abnormalities such as Trisomy 21, Turners syndrome, Klinefelter syndrome, and also plays a significant role in disease affecting the oral cavity.

X. DENTAL CARIES

Dental caries is a global problem. Earlier detection of dental caries will enable earlier preventive measures. Many studies have reported a significant association between dermatoglyphics and early stages of dental caries. Sharma and Somani¹⁴ reported that dental caries due to abnormality in tooth structures like alterations in the structure of dental enamel, tooth eruption and development may be reflected in dermatoglyphics patterns. A high significant difference in loops pattern and

microbial growth between the subject (caries) and control groups was also noticed. Padma et al¹⁵ in their study evaluated the dermatoglyphic variation and caries activity in deaf and mute children and found an increased frequency of whorl pattern in caries group and increased frequency of loops in caries free group. Chinmaya et al¹⁶ reported that central pocket whorl and twinned loops have an association with an increase in dental caries experience.

Malocclusion –

Malalignment of teeth in both the arches showed a significant variation in dermatoglyphics patterns. This association between Dermatoglyphics and dental occlusion is due to the fact that the development of dentition and the palate occurs during the same period as the development of dermal patterns. Tikare et al¹⁷ assessed the relationship between fingerprints and malocclusion among a group of 696 high school children aged 12-16 years and it revealed a statistical association between whorl patterns and class 1 and 2 malocclusions. However, Reddy et al¹⁸ concluded that arches were found at a higher frequency percentage in class I and class II div I malocclusions, but no significant increase in whorls was noted in class III malocclusions

Precancerous and cancerous lesion

Dermatoglyphics may be of immense clinical significance to segregate those individuals who are at an increased risk of developing these widespread diseases associated with considerable amount of morbidity and mortality. Venkatesh et al¹⁹ did a study to determine the dermatoglyphic pattern in subjects with leukoplakia and oral squamous cell carcinoma and found that among 30 patients diagnosed with leukoplakia, 30.7% had whorls, 6.3% had loop and arch type of finger prints and in oral squamous cell carcinoma patients it was found that 60.7% had loop, 32.3% had whorl, and 7% had arch pattern of fingerprint. Gupta and Kharjodkar²⁰ in their study to analyse the palmar dermatoglyphics in Squamous Cell Carcinoma concluded that an increase in frequency of arch and ulnar loop patterns on fingertips, and decrease in frequency of simple whorl patterns on fingertips, decrease in frequency of palmar accessory triradii on right and left hand. Ganvir and Gajbhiye²¹ suggested that predominance of whorl type of fingerprint pattern would serve as a candidate screening marker for susceptibility to oral squamous cell carcinoma and oral submucosa fibrosis. Munishwar et al²² observed a significant increase in loop pattern among gukta chewers with OSMF when compared to the control group. It was thus concluded that subjects with more number of loop patterns are more prone to develop OSMF as compared to those with other patterns. Punith et al²³ in their study on dermatoglyphics also concluded a significant increase in percentage of whorl pattern in OSMF subjects as compared to control group Hence, dermatoglyphics can be used in this modern era to forecast the future of squamous cell carcinoma and oral submucosis, without much intervention.

Bruxism

Bruxism is the involuntary gnashing, grinding or clenching of teeth. Habitual non-functional forceful contact between occlusal tooth surface can be also studied by using dermatoglyphics. Polat et al²⁴ reported an increase in frequency of

whorls and a decrease in frequency of ulnar loops in bruxism patients. There was lower frequency of atd angle, and no significant difference between the total finger ridge counts (TRC) and a-b ridge counts.

Cleft lip and palate

Craniofacial defects such as cleft lip and cleft palate are the most common of all the birth defects. In humans the development of primary palate and lip is completed by 7th week of intrauterine life and secondary palate by 12th week of intrauterine life. The dermal ridges develop between 6th week of gestation and reach maximum size between 12 and 13 weeks²⁵. Mathew²⁶ in his study on significance of dermatoglyphics in children with oral clefts found an increase in ulnar loop patterns in distal phalanges of ten fingers and an increase in 'atd' angle in oral cleft children. Dziuba²⁷ observed an increase in frequency of ulnar loops and arches and consequent decrease of whorls.

Dermatoglyphics in Patients with Special Needs

A comparative study done among 100 children (50 healthy, 50 mentally challenged) reported an increased frequency of loops and increase palmar crease line were observed among mentally challenged children²⁸

Application In Periodontal Disease

Dermatoglyphics serve as an early forecasting tool in periodontal disease, as genetics play a key role in the onset of periodontitis. Numerous qualitative and quantitative methods have shown inheritance of dermatoglyphics to have great resemblance among monozygotic twins and reasonably strong inheritance among siblings and parents. A study performed by Yilmaz et al²⁹ on 36 early onset periodontitis patients and 20 adult periodontitis patients and 20 periodontally healthy individuals observed that, offspring of chronic periodontitis patients have a high prevalence rate of periodontal breakdown, suggesting a strong familial influence.

Disturbances in the ectodermal layer may manifest itself in both development of skin ridges and the tooth with its periodontium and create a link between dermatoglyphics and anomalies of tooth and periodontium. Hence dermatoglyphics can be used with other diagnostic methods for early detection of patients with distinct group of periodontal disease.³⁰

A Comparative study done by M. Atasu et al⁸ among periodontally healthy subjects and patients with periodontitis, observed that patients with juvenile periodontitis, has decreased frequency of twinned and transversal ulnar loops on all fingers, a decreased frequency of double loops on all fingers and an increased frequency of radial loops on the right second digits of the patients with rapidly progressing periodontitis (RPP), and the increased frequencies of concentric whorls and transversal ulnar loops on all fingers of the patients with adult periodontitis (AP). An increased frequency of triradii on the palms of the patients with Juvenile Periodontitis (JP), increased frequencies of IV and H loops and triradii on the palms of the patients with RPP and an increased frequency of triradii on the soles of the patients with JP were also found. This is also in accordance to the study conducted by Babitha et al³⁰

Soumya et al³¹, reported significant increase in the whorl pattern in chronic periodontitis patients. Among the whorl pattern,

central pocket whorl pattern was significantly increased. And the second most common pattern found in the chronic periodontitis patients was the loop pattern. Among the loop pattern, ulnar loop pattern was found to be increased. However, Kranti K at al³³ in their study stated that in spite of ulnar loop pattern being the commonest in both periodontally healthy and periodontally diseased individuals the findings were not significantly coherent. These studies have proved in formulating counselling messages based on dermatoglyphic pattern prevalent among young generation and their possible stimulation to determine the young people's likelihood to develop chronic periodontitis.

XI. CONCLUSION:

In Periodontology, Dermatoglyphics can be used as a potent bio-indicator for predicting the susceptibility of various diseases like chronic periodontitis due to its genetic nature and wide spread familial tendencies. It also provides a window of hope in establishing more non-invasive techniques and procedures in early diagnosis of periodontal diseases. However, long term studies involving wider range of subjects need to be conducted to help in determining the sensitivity and specificity of the current studies so that dermatoglyphics can be also used as a tool for educating and counselling potential patients about their likelihood to develop various periodontal diseases at a later stage in life.

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TABLE 1- Types of Arches

a)Simple or plain arch	Ridges that starts on one side and ridge then slightly cascades upward . A consistency of flow can be observed in this pattern
b)Tented arch	Composed of ridges that starts on one side of finger and flows out to other side in similar pattern.

TABLE 2- Types of Loops

a) Ulnar loop(Lu)	composed of ridges that open on the ulnar side.
b) Radial loop(Lr)	composed of ridges that open on the radial side.

TABLE 3- Different Forms of Whorls

a) Plain/simple/concentric whorl–	Simplest and commonest form of whorl. It composed of ridges that make a turn of one complete circuit which are arranged as a succession of concentric rings or ellipses.
b)Central pocket whorl	a pattern containing a loop within which a smaller whorl is located. These whorl ridge make one complete circuit and may be oval, spiral or any variant of circle They are also classified as ulnar or radial according to the side on which the outer loop opens.
c)Lateral pocket/twinned loop pattern	Pattern composed of interlacing loops
d) Accidentals/complex patterns	These are patterns that match the characteristic of particular whorl subgrouping.

TABLE 4

Tri-radius:	It is formed by the confluence of three ridge systems. Geometric center of triradius is called as tridial point. It forms an angle of 120 degree with another
Core	It is surround by fields of ridges that turn back themselves at 180 degree
Radiant:	They emanate from the tri-radius and enclose the pattern area

FIGURE 1

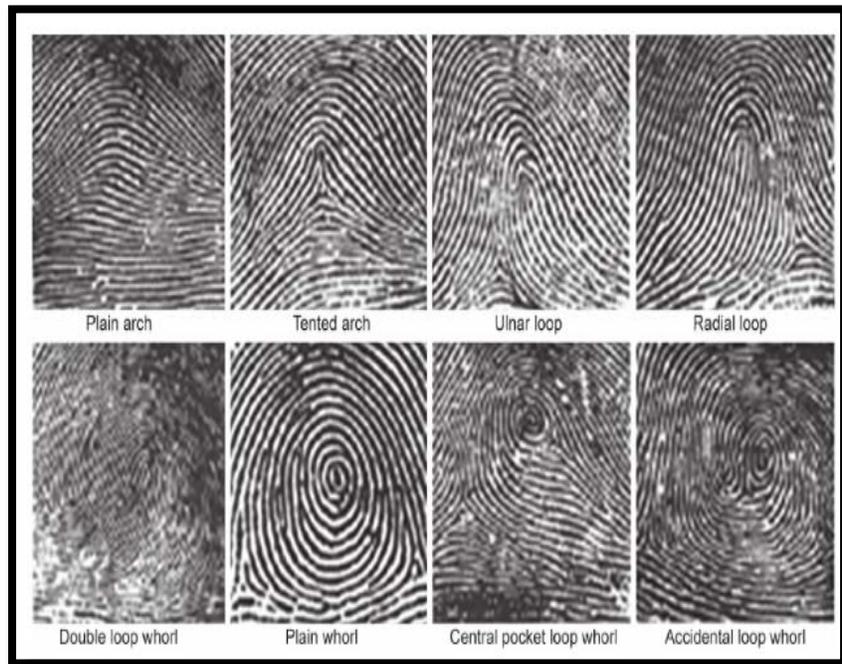


Figure 1: Finger Prints Patterns And Classification-FBI Identification Division-1957

Relational Thinking Process of Middle School Students with Gender

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DOI: 10.29322/IJSRP.9.08.2019.p9208
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9208>

Abstract- The ability to think relationally in solving problems is an important goal of school. This is the ultimate goal of teaching that students will be able to make connections between concepts and apply concepts or algorithms in a flexible, accurate, efficient, and appropriate way to solve problems. This research is based on students' difficulties in relational thinking in solving mathematical problems. The purpose of this study was to investigate the relational thinking of students from two eighth grade students in solving problems. They were selected from twenty students with mathematical ability tests and based on sex, the subjects obtained in this study were 2 students of different sexes and had the same mathematical abilities. Then they were interviewed based on their work from the assignment given. When solving problems, male subjects are able to draw problems, determine the core structure of the problem, analyze key elements of the problem. Meanwhile, the female subject knows about concepts that can be used to help the problem, but she does not look for key elements of the problem and she does not know how to determine the solution. These results can contribute to mathematics teachers by helping students use relational thinking in solving problems.

Index Terms- Relational Thinking, Relational Thinking Process, Gender

I. INTRODUCTION

Thinking and solving problems are two things that are difficult to separate. Thinking is a mental activity experienced by someone if they are faced with a problem or situation that must be resolved. Butterworth and Thwaites (2013) state that "when we talk of thinking as a skill we are referring to higher-order activities, such as analysis, evaluating and explaining; and challenges in problem solving and evaluating complex arguments (p. 6). Thinking includes the activity of analyzing, evaluating, and explaining, and for challenges such as problem solving and solving math problems.

Soedjadi (1999: 138) argues that "mathematics is one of the basic sciences, both its applied aspects and reasoning aspects have an important role in efforts to master science and technology". This means that to a certain extent, mathematics needs to be mastered by all Indonesian citizens, both the application and the mindset. That is an important reason why mathematics needs to be taught at every school level, besides that mathematics also plays a role in efforts to develop and train the sharpness of students' thinking in solving problems, especially problems in daily life. Based on the experience of the researcher while teaching at school, students often lack an understanding of the meaning of the story given. Students often cannot associate information that exists in the story matter or with the knowledge they have before. Because of the low relational understanding of students, this also affects students' relational thinking. This means that relational thinking has an important role in helping students understand mathematical problems.

Relational thinking is very important for students. Molina, Castro, & Ambrose (2005, p. 3) stated "This thinking of having a significant number of fundamental mathematical ideas includes relations between different representations of numbers and operations between them". Relational thinking is very important in mathematics because many basic mathematical ideas contain the relationship between the representation of different numbers and the operations between these numbers. Dumas and Hummel (2005, p.73) state "A fundamental aspect of human intelligence is the ability to acquire and manipulate relational concepts. Examples of relational thinking include our ability to appreciate analogies between seemingly different objects or events. This means that the fundamental aspect of human intelligence is the ability to acquire and manipulate relational concepts, one of which is relational thinking. Relational thinking is the ability to understand the analogy between seemingly different objects or events and apply abstract rules in new situations. Thus relational thinking is a mental process that is characterized by building linkages between the elements of information provided with prior knowledge and knowledge of the properties or structure of mathematics in solving mathematical problems.

Hejny, Jirotkova & Kratochviova (2006) states in relational thinking, students create a picture of the problem in their mind as a whole, analyze to find the core structure, and look for some important elements or relationships to build a resolution strategy, whereas those who do not think relationally, students activate several procedures in his mind after identifying the problem

In solving mathematical problems between male and female junior high school students is different. This is because the mindset between male and female students is not the same. This is consistent with what Branata said (in Asmaningtias, 2008, p. 3) which says that women are generally better in memory and men are good at logical thinking. In addition, it is seen that the mathematical abilities between male and female students are also different. As said Macooby and Jacklin (in Soenarjadi, 2011, p. 5) between men and women have the same mathematical abilities during elementary school (SD) until the beginning of adolescence. Starting at around the age of 12-13 years male mathematical skills increase faster than women. Krutetski (in Nafi'an, 2011, p. 574) also explained that differences in male reasoning abilities were superior to women and men had better mathematical and mechanical abilities than women. This difference is not evident at the primary school level but becomes more apparent at a higher level.

II. METHOD

Subjects

To determine the subject of the study, one class was given a test of mathematical ability to see the abilities of students who were equal, and grouped by sex. the next step is chosen by 2 students who have equivalent and different-sex math skills.

Instruments

The main instruments in this study are the researchers themselves and supporting instruments which include audiovisual recorders, mathematical ability tests, mathematical problem-solving assignments and interview guides.

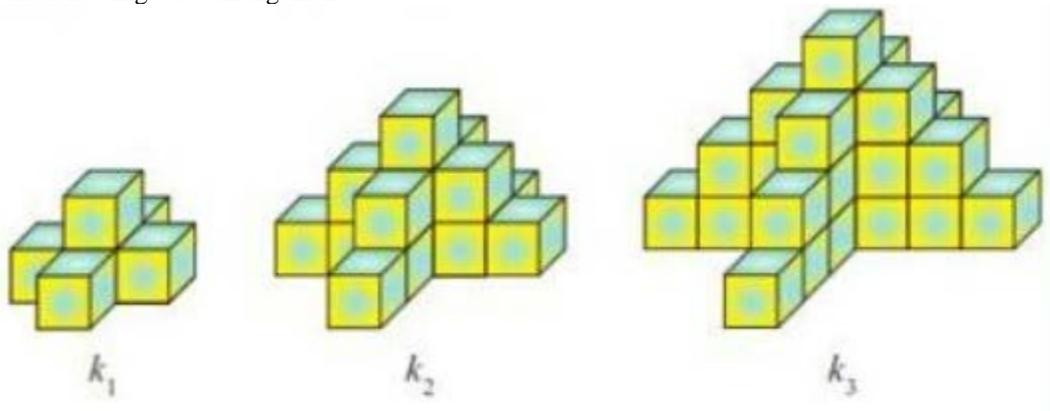
1. Test of mathematical abilities

This test was built by adopting National Final Examination items for elementary schools in Indonesia. Multiple choice forms have been changed to a description of the problem in accordance with the 2013 curriculum content standards for eighth-grade students. The test consists of 5 questions. The prepared examination sheet has been validated by elementary school math teachers (who have received certification) and 2 mathematics education lecturers. Based on the results of the validation, the test sheet is ready for use.

2. Test problem solving

test questions made by the researchers themselves. The tests produced were then validated by certified mathematics teachers from elementary schools and 2 mathematics education lecturers. Validation is in terms of content and use of language. Based on the results of the validation, the test sheet is ready for use. the following problem-solving test questions.

Follow the following cube arrangement!



The number of cube arrangements in k_1 , k_2 , k_3 , and so on increases with the arrangement pattern as in the picture above.

a. Specify many cube arrangements in the next pattern (k_4)

b. Specify many cube arrangements in k_{10} .

c. If the arrangement is painted, how many cubes are painted on two sides? (k_4 & k_{10})

3. Interview Guide

An interview guide was developed to help uncover the subject's relational thinking process when they face mathematical problems.

III. RESULT

Relational Thinking Process Students Male

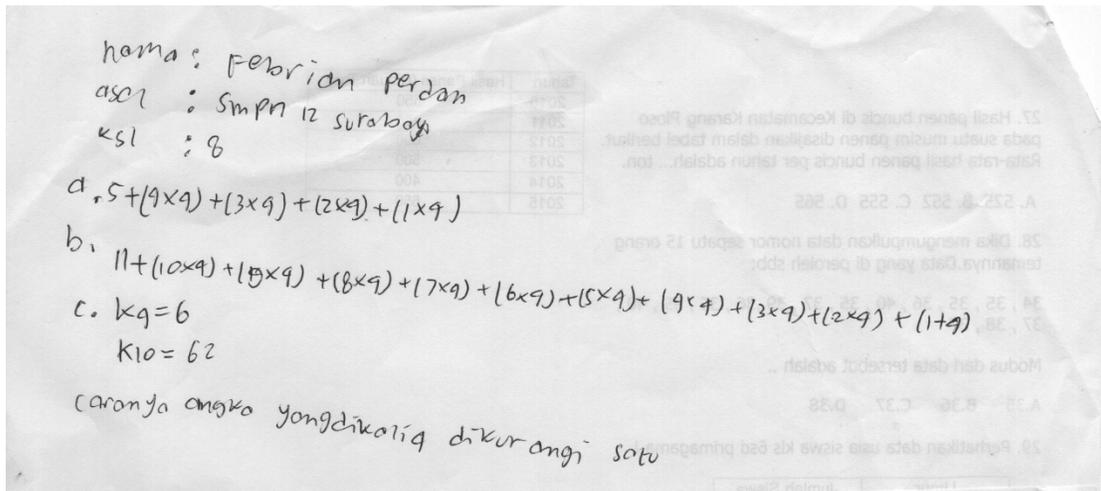


Figure 1. Test Results Of Male Subjects In Solving Mathematical

Based on test results and interview results, in the aspect of making a picture of the problem, the male subject identified the information in the problem. He ignores information that is considered as a supplement because the information has no connection with other information so it is not used in solving problems.

Then, the male subject connects information with the knowledge that is owned and related to the problem given. He connects previously possessed knowledge in interpreting the problems he receives. Furthermore, from the relationships obtained, he has a picture of the problem.

Furthermore, the male subject determines the core structure of the problem. The male subject find the relationship between different parts of the problem and the knowledge they have to solve the problem.

In the aspect of looking for the key elements of the problem, the male subject found a relationship between information obtained with the same sign as with the division operation. In solving problems, male subjects find and use relationships in problems rather than just doing all calculations. This is consistent with what Molina & Ambrose (2006, p.1) says that "when students employ relational thinking, the sentence by focusing on the relativity of numbers in the equation instead of performing all the computations". the male subject made a connection in the problem, he did not apply known procedures to solve the problem.

In the aspect of developing a problem-solving strategy, the male subject makes the steps that lead to solving the problem shown by the male subject by looking for new/additional information first and using that information to solve the problem. the male subject estimates the method to be used for the problem-solving step. In the aspect of implementing the problem-solving strategy, the male subject answers the question with the strategy that has been made.

Relational Thinking Process Students Female

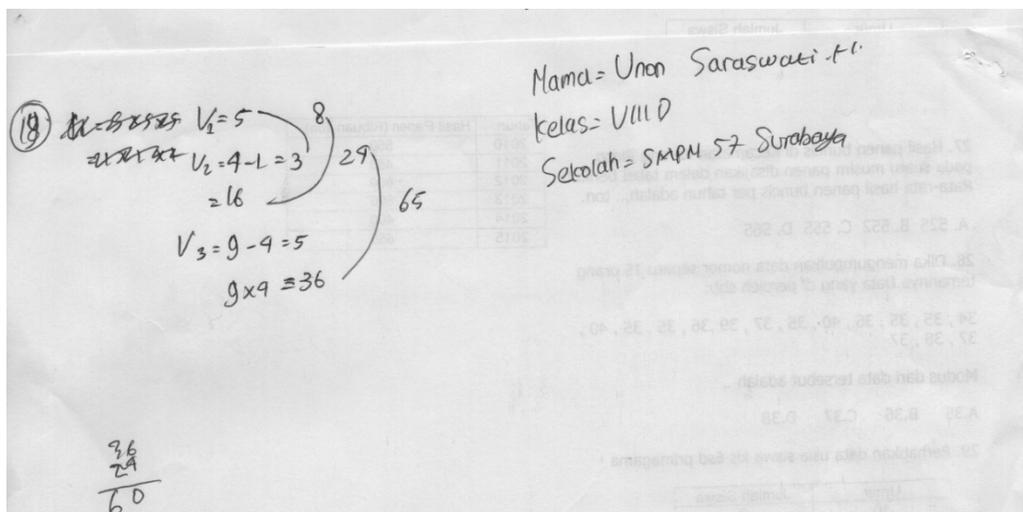


Figure 2. Test Results Of Female Subjects In Solving Mathematical

Based on test results and interview results, in the aspect of building a picture of the problem, the female subject identified information in the problem. the female subject knows all the information on the question either known or asked. the subject of women relates information to the knowledge that is owned and related to the problem given, indicated by linking information with his knowledge of the procedure of completion of comparable worth and reversing value.

In the aspect of determining the core structure of the problem, female subjects find a relationship between different parts of the problem or between information and knowledge they have to solve problems. the female subject connects some information to find new information.

In the aspect of looking for the key elements of the problem, the female subject used a procedure she knew to solve the problem without knowing the procedure was obtained. female subjects do not find the key elements or core relationships of mathematical problems. In the aspect of making a problem-solving strategy, female subjects use procedures that are known to be related to the problem to make a problem-solving strategy. Whereas in the aspect of implementing the problem-solving strategy, the female subject answered the strategy questions made by applying the sequential steps or procedures that have been determined.

IV. CONCLUSION

The male subject fulfils all aspects of relational thinking, namely making a picture of the problem, finding the core structure of the problem, finding key elements, developing strategies, and implementing strategies. while the female subject fulfils four of the five aspects of relational thinking, which the female subject does not do is the aspect of looking for key elements. the female subject does not look for core relationships or key relationships that exist in mathematical problems, she only applies some known procedures to solve problems.

ACKNOWLEDGMENT

Thank you for the Primagama Education Institute Kutisari Surabaya and Surabaya State University providing assistance so that research can be done.

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Fibrosis stage of benign and malignant lesions in the liver based on Metavir with reticulin and trichrome massons staining

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DOI: 10.29322/IJSRP.9.08.2019.p9209

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9209>

Background : Liver fibrosis is a healing process in progressive chronic liver disease. For years, fibrosis was considered irreversible. Over the past three decades, liver cirrhosis has been accepted as a reversible condition. Histologic levels of fibrosis is the main thing in evaluating liver damage, it is also useful for predicting responses to antiviral treatment and also in predicting the endpoint of fibrosis to be able to continue into cirrhosis and end-stage liver complications.

Materials and Methods : Paraffin blocks from 22 patients with benign and malignant liver disease were given reticuline and trichrome massons staining and then assessed for fibrosis stage using the Metavir scoring system.

Results : Each staining gave the same results which were dominated by F3 fibrosis stage which was 9 cases (40.91%). Stadium F0 was not found in this study. Stage F1 in 1 case (4.54%), stage F2 in 7 cases (31.82%) and stage F4 in 6 cases (27.27%). Benign lesions in the liver in this study were dominated by F4 in 3 cases (42.86%) of a total of 7 cases and 9 cases of primar malignant lesions in the liver were dominated by F3 in 4 cases (44.44%). Metastasis lesion was found in 6 cases (27.27%) and in this study were dominated by F3 in 3 cases (50%).

keywords : fibrosis, liver, reticulin, trichrome massons

I. INTRODUCTION

Liver fibrosis is a central pathological healing process in progressive chronic liver disease. For many years, fibrosis was thought to be irreversible. The first notion on the regression of liver fibrosis appeared in the medical literature in 1979, when Perez-Tamayo, analyzing the activity of liver collagenase, presented data supporting that cirrhosis could be reversible. During the last three decades, fibrosis has been widely accepted as a dynamic process with a strong potential for significant resolution. Substantial evidence originated from data showing that successful treatment of the underlying liver disorders, could reverse fibrosis and probably even cirrhosis.¹

Liver fibrosis is a significant health problem, which can ultimately lead to end stage cirrhosis and hepatocellular carcinoma. A wide spectrum of chronic liver injuries, including viral hepatitis, cholestatic liver diseases, alcohol abuse, non-alcoholic steatohepatitis, and nonalcoholic fatty liver disease, can

cause chronic hepatic inflammation and deregulated wound healing process in the liver, which give rise to fibrosis. Liver fibrosis is characterized by excessive extracellular matrix (ECM) deposition and fibrous scar formation. The destruction of the normal liver architecture by fibrous scar and the loss of hepatocytes can prevent the liver from its physiological functions and in the end, result in liver failure.² In Indonesia, chronic liver disease caused by hepatitis viruses (B, C and D). Eighty percent of patients with liver disease, especially those caused by the hepatitis C virus, develop into chronic from mild symptoms that can progress to liver cirrhosis by 20%, and 4% towards long-term liver cell carcinoma.³ World Health Organization (WHO) in 2014 reported that liver disease ranks the eighth most cause of death in Indonesia with a mortality rate of 3.49%, which is around 48,858 people.⁴

II. MATERIAL AND METHODS

A. Patients and samples

This is cross sectional study was conducted on biopsy and surgical specimens which diagnosed benign and malignant lesions in liver were included. The specimens were collected and stored at the laboratory of anatomical pathology of universitas sumatera utara and unit of anatomical pathology in Haji Adam Malik General Hospital in Medan, North sumatera, Indonesia.

B. Reticuline and trichrome massons

Reticuline and trichrome massons staining was performed in 22 paraffin blocks using formalin-fixed and paraffin-embedded tissue sections. Reticulin staining is a special coloring used to show reticular fibers. Reticulin will stain type III collagen The silver metal is able to settle on reticular fibers, and this can be visualized using silver salt. Initially salt will be oxidized by potassium permanganate. Next, metallic silver will be formed from ammonia silver nitrate solution, and will settle as a brownish deposit on the target structure. Formaldehyde, is a strong reducing agent, which will accelerate this process.

Furthermore, when the toning process with gold chloride, silver metal is transferred to a more stable gold compound, which leads to more intensive results. Furthermore, nonspecific silver will be bonded with sodium thiosulfate. In trichrome massons staining method, three dyes are used selectively for staining collagen fibres, muscles, erythrocytes and fibrin. The principle of

trichrome stain is that the smallest molecular size dye stains the less permeable tissues. However, if a large dye molecule is capable in penetrating the tissue, staining will take place in the rate of the smallest molecule. The tissue is initially stained with Biebrich Scarlet (acid dye), which binds to the acidophilic components. Collagen fibres will be stained blue, nuclei stained black and cytoplasm, muscle and erythrocytes stained red. The tissue sections were independently examined by three researchers, including two pathologist.

III. RESULTS

The majority of samples were retrieved from male in 14 cases (63.64%) and 8 (36.36%) from female. The mean (SD) age at diagnosis was 44 ± 13,09 years. Most of the 34 patients were primer malignant lesion in liver in 9 cases (40.91%). (Table 1).

Table 1. Clinicopathological characteristic

characteristic	(n)	Percentage (%)
age		
0 - 10 years	2	9,09
11-20	1	4,54
21-30	2	9,09
31-40	2	9,09
41-50	5	22,73
51-60	7	31,82
61-70	2	9,09
71-80	1	4,54
sex		
male	14	63,64
female	8	36,36
lesions		
benign	7	31,82
primer malignant	9	40,91
Metastasis	6	27,27

This study was approved by National Ethics Committee Medical faculty of Universitas Sumatera Utara.

In this study we was found that fibrosis stage based on metavir using retikulin and trichrome massons staining gave the same results. Each staining was dominated by F3 fibrosis stage in 9 cases (40.91%). Stadium F0 was not found in this study. F1 stage was found in 1 case (4.54%), stage F2 in 7 cases (31.82%) and stage F4 in this study were found in 6 cases (27.27%) (table 2).

Table 2. distribution of fibrosis stage based on metavir with retikulin and trichrome massons staining

Fibrosis stage	retikulin [n /(%)]	trichrome massons [n /(%)]
F0	0	0
F1	1 (4,54%)	1 (4,54%)
F2	6 (27,27%)	6 (27,27%)
F3	9 (40,91%)	9 (40,91%)
F4	6 (27,27%)	6 (27,27%)
total	22 (100%)	22 (100%)

Distribution of fibrosis stages in this study showed that in male there were 14 cases (63.64%). In both stains found the most

C. Metavir scoring system

In assessing fibrosis the Metavir system is relatively simple, categorizing the fibrosis stage in 5 scale levels, namely the scale of 0 to 4. The Metavir system categorizes the fibrosis stage in 5 scale levels namely scale F0 to F4. Fo if no fibrosis was found, F1 if fibrosis was limited to the portal, F2 if portal fibrosis was found with little septic fibrosis, F3 if fibrosis was found at a clear septa, F4 if fibrosis was found at septa and extends to the center.⁵

fibrosis stage in male were F2 and F3, each of which was 5 cases (35.71%). In female we were found eight cases (36.36%) and the most were in 4 cases (50%) (table 3).

Table 3. distribution of fibrosis stage based on metavir by sex

sex	retikulin					trichrome massons				
	F1	F2	F3	F4	total	F1	F2	F3	F4	total
male	0	5	5	4	14	0	5	5	4	14
female	1	1	4	2	8	1	1	4	2	8
total	1	6	9	6	22	1	6	9	6	22

Based on the type of lesions in this study it was divided into 3 types, there were benign liver lesions , primary malignant lesions of the liver and liver metastatic lesions. The results of this study showed that the fibrosis stage in benign lesions in the liver was mostly found in F4, namely as many as 3 cases (42.86%) of a total of 7 cases encountered. This is found to be the same in both reticular staining and trichrome masson. Primary malignant lesions in the liver in 9 cases (40.91%) of the total cases were found. The most fibrosis stage found in stage F3 in 4 cases (44.44%) and the group of liver metastatic lesions found in 6 cases (27.27%) in this study. The most fibrosis stage was stage F3 in 3 cases (50%). The least encountered fibrosis stage is stage F4 in 1 case (16.67%). And in this study no F1 stage was found in malignant lesions that metastasized to the liver. (table 4.)

Table 4 distribution of fibrosis stage based on lesions type

lesions	retikulin					trichrome massons				
	F1	F2	F3	F4	Jumlah	F1	F2	F3	F4	total
benign	1	1	2	3	7	1	1	2	3	7
Primer malignant	0	3	4	2	9	0	3	4	2	9
Metastasis	0	2	3	1	6	0	2	3	1	6
Total	1	6	9	6	22	1	6	9	6	22

stage fibrosis	H&E	RETIKULIN	TRICHROM MASSON
F1			
F2			
F3			
F4			

Figure 1. Fibrosis staga F1,F2,F3,F4 in HE, retikulin,and trichrome massons

IV. DISCUSSIONS

Fibrosis is a characteristic feature of accumulation extracellular matrix (ECM) which leads to scar tissue formation and will eventually cause organ dysfunction.⁶ In Indonesia, especially chronic liver disease caused by hepatitis viruses (B, C and D). Eighty percent of patients with liver disease, especially those caused by the hepatitis C virus, develop into chronic symptoms ranging from mild to can progress towards liver cirrhosis by 20%, and 4% towards long-term liver cell carcinoma.⁷ According to Nur Aisyah's research at RSU Dr. Pirngadi Medan in 2002-2006 there were 669 patients with liver cirrhosis. From 251 patients there were 56.6% of patients who had a history of hepatitis.⁸ From the recent research, it was found that the most common cause of fibrosis was nonalcoholic fatty liver disease (NAFLD), which is around 77%. This is much higher than fibrosis caused by hepatitis C which is only about 8% and liver disease which is only caused by alcohol by 8%. Poynard et. al., in the study found that liver fibrosis was generally caused by alcoholic and non-alcoholic fatty liver disease (66%), NAFLD 13%, 9% alcohol, 6% HCV, and 6% other.⁹ In this study the diagnosis of hepatitis was only found in two cases (9.1%) of a total of 22 cases examined for fibrosis stage.

Malignancy cases were the highest in the study, which amounted to 15 cases (68.18%) which were dominated by cases of hepatocellular carcinoma in 5 cases (22.73 %). The average age of patients with liver disease in this study is 44 years with standard deviation 13.09. which was dominated by male in 14 cases (63.64%). This is not much different from the study of Maria L et. al., who conducted the Prevalence of Liver Fibrosis and Its Association with Non-invasive Fibrosis and Metabolic Markers in Patients with Unhealthy Obesity with Vitamin D

Deficiency of 46 cases of liver biopsy found that the average age was 42 years with a standard deviation of 13 years.¹⁰ Fung J et. al., who conducted a study of 1315 patients found that 319 patients (34%) had severe fibrosis. He also found that the overall prevalence of severe fibrosis in patients with hepatitis B in the older age group was seen to increase by 34%. Severe fibrosis in patients aged <25 years is seen as 20% and increases to 81% in patients with patients aged > 65 years.¹¹ Poynard et. al., analyzed 1,312 patients with positive hepatitis C and confirmed by PCR examination from 3 health centers (Paris n 537, Marseille n 601, Bordeaux n 174) found that the average age is 48 years and 58% are male.¹²

Male and female ratio in this study were found to be 7: 4 with a percentage of male in 63.64% cases. This is slightly different from the study of Fung J et al., Found that the ratio of male and female was 39: 42%.¹¹ Research what Maria L et. al., is dominated by women which is as much as 80% of the total cases.¹⁰ This may be caused by factors of habits and lifestyle of the people in this research area and also because of the different number of samples.

In this study both staining reticuline and trichrome massons found that F3 had 9 cases (40.91%) of 22 cases which was encountered in the age range of 51-60 years, in 4 cases out of a total of 7 cases of F3. Stage F4 only found in 6 cases (27.27%) of 22 cases in this study. Most stages F4 are found in the age range of 41-50 years in 2 cases. Stadium F2 in this study found as in 6 cases (27.27%) and the most in the age range 51-60 years in 2 cases. This is slightly different from previous with Maria L et. al., found that of the total cases 30% showed significant fibrosis (\geq F 2) with 9% representing advanced fibrosis (F3) and 4% representing cirrhosis (F4).¹⁰

Benign lesions in the liver in this study found in 7 cases (31.82%) both in reticuline and trichrome Massons staining found F1, F2, F3 and F4 fibrosis respectively 1 (14.28%), 1 (14, 28%), 2 (28.57%) and 3 (42.86%) cases. Poynard et. al., who observed the distribution of natural fibrosis stages in patients with chronic hepatitis C who had liver biopsies of 2235 cases. The prevalence of fibrosis was F0 10%, F1 36%, F2 21%, F3 15%, and F4 18%. While patients who were reconfirmed with the Polymerase Chain Reaction (PCR) examination of 1312 cases he found the prevalence of fibrosis stage was 11% for F0 (n 141), 40% for F1 (n520), 22% for F2 (n 295), 16% for F3 (n 208), and 11% for F4 (n 148).¹² This is probably due to the fact that the number of samples in this study was only 22 cases, and it can also be because early detection of fibrosis in liver disease using biopsy is still minimal in the institutions where this research was conducted.

In this study 15 cases (68.18%) of malignancy were found. Six cases (40%) of them were metastatic cases from other places to the liver. Fibrosis stage in malignancy cases in both reticuline staining and Trichrome Massons staining was dominated by F3, in 7 cases out of 15 malignancy cases (46.66%). F2 in 5 cases (33.33%) and F4 remaining 3 cases (20%). In this study, most fibrosis stage in benign lesions was found in stage F4 and most malignant lesions was stage F3. This shows that in this study fibrosis trips in benign lesions continued and did not receive good treatment so that the fibrosis stage to be able to continue into cirrhosis and end-stage liver complications. Cirrhosis. And in this study most of malignant lesions was stage F3 this

indicates that malignancy should not be preceded by cirrhosis (F4) malignancy can take place when the liver does not have fibrosis or at the time of fibrosis at a low stage Radisky et. al., states that increasing the expression of MMP matrix metalloproteinase can stimulate fibrosis, tumorigenesis, and also the development of tumors by inducing extracellular matrix especially in transdifferentiate epithelial cells and causing myofibroblast to be activated. This connection provides a new perspective on the development of micro-fibrosis and tumor environments.¹² Fibrosis is strongly associated with cancer which affects tumorigenesis, metastasis and inhibits drug delivery to the tumor. Early detection of fibrosis provides a great opportunity for the management of fibrotic disease.¹³

V. CONCLUSION

In this study, the use of reticulin staining and staining of trichrome massons showed no difference in assessing fibrosis stage using the metavir scoring system. The most common fibrosis stage in this study is stage F3. Most cases are in the sixth decade of life and more men are found with a ratio of 3.5: 2. In this study, fibrosis stage in benign lesions was found in stage F4 and in most malignant lesions found was stage F3. Fibrosis is also associated with cancer which affects tumorigenesis, metastasis and inhibits drug delivery to the tumor.

COMPETING INTERESTS

The authors have no relevant financial interest in the products or companies described in this article.

ACKNOWLEDGMENT

The authors are grateful thank for all the spirit criticals to the other pathologists, Lubis MND, Lukito JS, Alferraly TI, Delyuzar and all of the medical staff in Anatomical Pathologic Laboratory at Faculty Medicine in Universitas Sumatera Utara. And thank to Savitri E, The radiolog for your contribution in this study.

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Adaptive Reuse of Historic Buildings to Promote Social Values: The Case Study of Bagamoyo District in Tanzania

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DOI: 10.29322/IJSRP.9.08.2019.p9210

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9210>

ABSTRACT:

A growing body of opinion suggests that historic buildings promote different values to communities through adaptive reuse. The government of Tanzania has allowed historic buildings in Bagamoyo to be reused to promote sustainability in the community. This paper examines how adaptive reuse of historic buildings helps to promote social values the society cherishes and seeks to promote. The data were collected using a survey research designed to allow respondents to express their own understanding of how adaptive reuse of historic buildings impacts on promoting different values attached to historic buildings especially social values. The findings indicate that adaptive reuse helps to promote social values which are social interaction, change of attitude, change in lifestyle, and change in behavior of the society. Although these social values have been acquired differently by each way of adaptive reuse, restoration seems to be important in promoting change in attitude towards preservation and conservation so as to promote economic values. However, generally from relative score algorithm through average mean of their scores if both ways are combined, they show that adaptive reuse is better to promote social values above cultural values by 1.04 but below economic values by 0.94. Regression analysis indicates that most key players are interested to adopt these historic buildings when there is a chance to promote social values which will help them to also generate economic values and increase more profit and acceptance of their project in the society.

Keywords: *Adaptive Reuse, Historic Buildings, Historic Building Values, Relative Score Algorithm*

I. INTRODUCTION

Historic buildings have become an important element as iconic to the city and need to be conserved [1]. Adaptive reuse is the process that retains as much as possible of the original building while upgrading the performance to suit modern standards and changing user requirements [2].

Adaptive reuse of historic buildings has been an important strategy to preserve historic buildings which acts as a symbol of heritage and as an effective strategy to improve the sustainability of existing buildings [2-6].

Adaptation has been seen as a way to improve social values as well as economic values in many countries [7]. Consequently, it is asserted as a strategy to promote sustainability but it's remarkable to see to what extent it will be able to improve social values because many investors and developers are interested in economic values to gain profit from adaptation and reuse of historic buildings rather than social values [8].

Adapted building will not completely match a new building in terms of performance, although the shortfall should be balanced against the gains in social value. The life expectancy of an existing building may also be less than a new alternative

despite any improvements that adaptation may inject [9]. Old buildings also express the continuity of human society as they are symbolic of their permanence, and as expressive of the deep roots of society as a late Graeme Shankland, an architect and planner, once said that “a city without old buildings is like a man without a memory [10].

Social values have become difficult to capture because a myriad of investors prefer more economic values in case of location, site, special character and neighborhood factors which mostly influence economic benefit and avoid diminished of potential market due to intense competitive pressure from other investors [8, 11].

For example in developed countries, in the case of Ontario, Canada, older buildings are important aesthetic, cultural and economic resources but in many jurisdictions hundreds of historic buildings have been demolished because developers and bankers argued that the cost of adapting them for new uses is too high but this is the only way for investors to make a reasonable profit from the use of the land [11]. In Tanzania adaptive reuse of historical building is argued to improve preservation in an effort to prevent undue deterioration of heritage features. Many historical buildings in Bagamoyo have experienced rapid deterioration of building materials caused by lack of maintenance, climatic condition, ageing of materials, use of incorrect or faulty materials for repair, poor workmanship and inherent structural design defects [12]. Barriers and challenges of adaptive reuse have allowed a good number of historic buildings in Bagamoyo to fall into a state of disrepair and dereliction [13]. However, the adaptive reuse of a few old buildings in the same area like Old Post Office has proved to be an important component in the revitalization of the neighborhood. Though modifications have been done, but the dynamic heritage features through which the buildings have passed can still be observed [14]. Although social values are essential parts to the community, most key players tend to ignore social values when preserving the dynamic heritage features of historic buildings.

II. LITERATURE REVIEW

Adaptive reuse is a conversion of a building to undertake modified change (Douglas, 2006). Adaptive reuse is like giving the buildings the second life when they may be previously underutilized [15, 16]. Changing building from underutilization to different purpose has become necessary to preserve heritage buildings [15]. When done well, adaptive reuse can restore and maintain the heritage preservation and restoration of historic buildings which actually increase their historic and cultural values [9]. However, many investors decide to demolish heritage building rather than preserve them based on their economic values with little regard for other values, sustainability and their historical importance to the community [17]. Adaptive reuse and the conservation of heritage buildings play a critical role for obtaining significant economic, cultural and social benefits to the communities [11, 18 - 21]. Adaptive reuse doesn't just concern about economic values, but it also provides social and environmental to the community [15]. Therefore having a large number of vacant or derelict buildings has negative impact to the society and provides an environment for crime and other antisocial behaviors [17].

Although it's problematic to determine the values [22] of adaptive reuse of historic buildings numerous investors and developers still make their decision about adaptive reuse with consideration of higher profitability and high rate of return on their capital investment asset while important issues associated with the environment and social values are given less priority. In particular the adaptive reuse has been identified as a process that can significantly improve the financial, environmental and social performance of existing building assets [15]. The process of adaptive reuse can be used as a strategy to change the need of owners and occupiers and the community in general [4, 9].

Sustainable development through adaptive reuse raises the importance of building stock as economic, social and cultural capital that should not be wasted [15, 23]. However adaptive reuse is often perceived by some as expensive and sometimes requiring substantial and costly refurbishment [15, 24]. Regardless of the cost adaptive reuse of the building has a major role to play in sustainable

development of community both socially, economically and environmentally [25]. [8, 18, 21] adopt the views that few of the out-dated features of historic buildings will ever match current sustainability standards which means building owners see no socio-cultural, physical and economic value benefits of embracing adaptive reuse of historic building and this leads to diminished potential market of the adaptive reuse of old buildings.

In the case of developed countries [26] confirms that Australia heritage buildings form an integral part of Australia social capital. Within Australia conserving heritage buildings provides significant economic, cultural and social benefit [9]. Heritage buildings provide a valuable glimpse of the past and therefore should be conserved for future generations [25]. The strategy that promotes environmental, social, cultural and economic sustainability of buildings of historical significance to be adapted and reused rather than demolishing them has become a very relevant topic in developed countries [3; 17].

Adaptive reuse when applied to heritage buildings not only retains the building, but conserves the efforts, skill and dedication of the original builders [6, 17]. The outcomes of adaptive reuse should include improvement in the material and resource efficiency (environmental sustainability), cost reductions (economic sustainability) and retention (social sustainability) [27]. Adaptive reuse also needs to conserve the heritage value of prestigious, monumental or historical significant values of buildings [23]. The practical outcome of adaptive reuse and the conceptual values of conservation support the reuse of heritage buildings as a sustainability strategy [28, 22 and 29].

Adaptive reuse not only involves the preservation and restoration but also conservation [30] that aims to safeguard the quality of values of the resources [31]. Conservation and preservation share a concern about adaptive reuse. While conservation is associated with the protection of material, historical and design integrity of historic buildings through carefully planned interventions, preservation refers to the set of activities aimed to prolong the usable life of historic properties with little changes to the

original state [32, 33]. The preservation often talks about “value” of historic properties: the social values, the cultural values, aesthetic values, urban context value, architectural value, historic value, and the value of a sense of place. But one of the strongest arguments for preservation ought to be that; a historic building has multiple layers of values to its community [34]. The desire to preserve must ultimately be a rational economic and commercial choice and not just a consequence of legal and land use planning controls [31]. Historic buildings are part of the real estate market (economically) and as such they need to be left alone to adjust their prices to profitability in a free market economy; such argument ignores the social needs of the community and positive externalities from historic preservation [35].

Even in fast developing countries like Malaysia, many historic buildings have not been well conserved, thus most of them are in poor condition [36]. Likewise in developing countries like Tanzania most historic buildings are in poor condition and others are beyond repairs [12, 30]. To address the problem adaptive reuse is seen as an important strategy to reduce demolition waste and extend the useful life of the building, encourage reuse of the embodied energy and also provide significant environmental, social and economic benefit to the community [37]. The study by [38] indicates that indeed adaptive reuse is slow in developing countries but can offer economic, social and cultural benefits to their environment and is one approach to sustainability.

It is the fact that adaptation is affected by owners’ more interests in economic values more than social values [39]. The owners of historic buildings, mostly demand for economically viable adaptation to gain more return on investment for adaptive reuse of historic buildings [40, 41]. The owners and developers need to change their mind when making decisions because adaptive reuse can be used as a strategy to achieve both economic values and social values to the community, even though the process can be costly expensive for developers and owners due to heritage and conservation requirements [4, 9 and 22].

Adaptive reuse helps to conserve the architectural, social, cultural and historic values [2]. Historic buildings have an important role to play in stimulating economic growth supporting local communities and accounting for social values [42]. The sense of the past and promotion of the harmony of individual and social life in the areas concerned are realized by conservation [43]. Adaptation of historic value will help to improve both cultural and economic values associated with cultural heritage [44].

III. RESEARCH METHODOLOGY

The data presented in this paper were collected using a survey research designed to allow

respondents to express their own understanding of the impact of adaptive reuse of historic buildings on promoting different values attached to historic buildings especially social values. The questions were open ended revolving around the process of adaptive reuse to promote values of historic buildings i.e. social values, cultural values and economic values. Thereafter the responses were classified on a five level “categorical” scale based on interpretative approach. Indeed the values were categorized to be on a “Likert” scale, in such a way that the values attached to them were so different to reflect a continuum of the same phenomenon. Table 1 explains the codification of survey responses from individual.

Table 1: Codification of Survey Responses

S/No.	Interpretative Code	Responses		
		Social Values	Economic Values	Cultural Values
1.	Very Bad	Social interaction, attitudes, behaviours, technical knowledge (skills)	Use: space value, aesthetic value, environmental value, tourism, architectural value Non use: Historic legacy, uniqueness value	Cultural beliefs, stories, customs, intergeneration values
2.	Bad	Social interaction, attitudes, behaviours, technical skills	Space value, aesthetic value, architectural value, environmental value	Cultural beliefs, stories, customs, intergeneration values,
3.	Normal	Social interaction, attitudes, behaviours, technical knowledge	space value, aesthetic value, architectural value uniqueness value	Cultural beliefs, stories, customs, intergeneration values,
4.	Good	Social interaction, attitudes, behaviours, technical skills, actions	Space value, aesthetic value, environmental value, tourism, architectural value, uniqueness value	Cultural beliefs, stories, customs, intergeneration values,
5.	Very Good	Social interaction, attitudes, behaviours, technical knowledge (skills)	space value, aesthetic value, architectural value, Historic legacy	Cultural beliefs, stories, customs, intergeneration values,

IV. DATA COLLECTION

Data collected was mainly primary data collected directly from first hand experience. The data was collected from key players of adaptive reuse which are both investors and developers from both private owned and government owned, and individuals around those historic buildings with purposive

sampling technique to select the required responded to ensure objectivity of the study is made [45].

V. DATA ANALYSIS

Relative score algorithm and Pearson’s correlation coefficient was used to evaluate the degree of relationship among variables. Relative score

algorithm was used to determine which way of adaptive reuse is better than another way where the value with the highest score of 1 was considered the best on that way. Pearson’s correlation coefficient was used to analyze the relationship between dependent variable and independent variables whereby +1 means strong relationship and -1 means weak relationship and 0 means there is no relation between adaptive reuse and that factor.

Relative score algorithm results encompassing ways of adaptive reuse which has an influence on different values associated with historic buildings are shown in Table 2. The best score is 1 representing the best way of adaptive reuse though generally the average mean of the relative score was calculated to show which values are best performed with the both ways of adaptive reuse. The scores under 1 have been below the relative score, but they also seem good in different ways among the three ways of adaptive reuse.

VI. RESEARCH FINDINGS

Table 2: Relative score algorithm; ways of adaptive reuse

Adaptive reuse	Values	Values	Mean Score	Ranks	Relative score	Ranking	Overall Rank	Average mean
Preservation	Cultural Values	stories	2.07	5	0.84	3	7	2.34
Preservation	Cultural Values	symbolic value	2.38	8	0.96	5	13	
Preservation	Cultural Values	local meaning value	2.57	13	1.04	7	19	2.59
Conservation	Economic Values	Uniqueness value	1.54	1	0.62	1	1	
Restoration	Economic Values	aesthetic value	1.92	3	0.78	1	1	2.42
Preservation	Economic Values	integeneration value	1.98	4	0.80	2	4	
Preservation	Economic Values	architectural values	2.14	6	0.87	4	10	2.42
Restoration	Economic Values	tourism	2.38	7	0.96	2	4	
Conservation	Economic Values	Recreation	2.43	9	0.98	2	4	2.42
Preservation	Economic Values	historic legacy	2.46	11	1.00	6	16	
Conservation	Economic Values	aesthetic value	2.48	12	1.00	3	7	2.42
Restoration	Economic Values	space value	2.84	16	1.15	4	10	
Restoration	Economic Values	economic value	2.87	17	1.16	5	13	2.42
Preservation	Economic Values	Environmental value	3.00	18	1.22	9	20	
Preservation	Economic Values	Income level	3.08	19	1.25	10	21	2.42
Conservation	Economic Values	Environmental value	3.16	20	1.28	5	13	
Conservation	Economic Values	Income level	3.23	21	1.31	6	16	2.42
Restoration	Economic Values	Environmental value	3.31	22	1.34	6	16	
Preservation	social Values	customs	1.84	2	0.74	1	1	2.42
Restoration	social Values	Attitude	2.46	10	1.00	3	7	

Conservation	social Values	Action	2.66	14	1.08	4	10	
Preservation	social Values	Attitude	2.75	15	1.11			1.04
			2.47					0.94

Indeed, Table 2 results clearly explain the relationship between the values of historic buildings and ways of adaptive reuse. It seems that restoration is the best way among the other ways to promote one of the social value which is changing the attitude of the individual about the process of adaptive reuse through restoration of historic buildings, and conservation is the best way to promote one of economic value which is aesthetic value of the building to ensure that the building looks nearly as it was during the construction or appears better whereas preservation helps to protect the historic legacy of a building.

But coming to the overall performance of both ways to understand which values the adaptive reuse protects above the other ways, the average mean of relative score was calculated and then the comparison was made for both social values,

economic values and cultural values. For social value the average mean of a relative score was 2.42, the average mean of a relative score for economic values was 2.59 and the average mean of a relative score for cultural value became 2.34 which by interpretation, both ways promote social values above cultural value by an average mean of 1.04 but below economic value by 0.94. This indicates that the adaptive reuse ways help to promote social values in the society, though, according to the individual’s response it’s below economic values and above cultural value.

Correlation was calculated to show the relationship between adaptive reuse and historic building values on how key players (investors and developers) of adaptive reuse are mostly interested in adaptive reuse and understand which values are mostly important to them as shown in Table 3.

Table 3. Definition of variables.

Variable	Description of variables
Adaptive Reuse	Adaptive reuse
A.V	Aesthetic value
Unique	Uniqueness value
Inco.V	Income level
So.I(actions)	Social interaction
Envi.Value	Environmental Value
Recre.va	Recreation value
Eco.V	Economic value
Tourism.A	Tourism attraction value
Space.V	Space value
Attitude	Attitude
Symbolic	Symbolic value
Stories	Stories value
Historic.L	Historic Legacy value
Loc.Meang	Local meaning
Intege.V	Intergeneration value
Customs	Customs
ARC	Architectural value

Table 4 shows that the correlation between the values range from -1 to +1 whereby -1 is perfectly

negative linear relation and + 1 is perfectly positive linear relation and 0 means there is no linear

relation. However, upon computation most values exhibited both positive and negative linear relationships with adaptive reuse. The Table 4 shows that adaptive reuse has a strong positive relation in promoting economic value by 0.88 and also has a strong positive relation with aesthetic value by 0.63. Social interaction has a strong positive relation to adaptive reuse where most ways of adaptive reuse help in promoting social interactions and highly positive correlation with attitude by 0.85. However, it seems to have a low negative relation with recreation value and tourism

attraction by -0.08 and -0.10 respectively. Other values also have negative correlation which are as follows: symbolic (-0.10), stories (-0.09) historic legacy (-0.06) and customs (-0.02). Key players of adaptive reuse are mostly likely to be involved in adaptive reuse because it's likely to promote social values in the society which is mostly important because as the society accepts the activity and also helps to promote social values, many individuals will be interested to accept the activity and this will increase their profit.

Table 4: Relationship between adaptive reuse of historic buildings and values associated with historic buildings

Adaptive Reuse	A.V	Unique	Inco.V	So.(actions)	Envi.Value	Recre.va	Eco.V	Tourism.A	Space.V	Attitude	Symbolic	Stories	Historic.L	Loc.Meang	Intege.V	Customs	ARC	
Adaptive Reuse	1.00																	
A.V	0.63	1.00																
Unique	-0.22	-0.10	1.00															
Inco.V	0.17	-0.09	-0.10	1.00														
So.(actions)	0.65	-0.04	0.32	0.11	1.00													
Envi.Value	0.42	0.27	0.07	0.05	0.24	1.00												
Recre.va	-0.08	0.03	0.61	-0.12	0.21	0.28	1.00											
Eco.V	0.88	-0.14	-0.12	0.57	-0.06	0.18	-0.10	1.00										
Tourism.A	-0.10	0.00	0.25	-0.03	0.45	0.09	0.06	-0.12	1.00									
Space.V	0.27	-0.06	0.00	0.43	0.34	0.26	0.04	0.32	0.31	1.00								
Attitude	0.85	0.10	0.23	-0.05	0.88	0.20	0.24	-0.12	0.18	0.18	1.00							
Symbolic	-0.10	0.19	0.03	-0.12	-0.07	0.09	0.16	-0.15	0.09	-0.10	0.18	1.00						
Stories	-0.09	-0.13	-0.08	0.05	0.10	0.00	-0.20	-0.11	0.09	-0.11	0.08	0.08	1.00					
Historic.L	-0.06	-0.04	0.10	-0.06	-0.16	-0.06	0.02	-0.14	-0.14	-0.28	-0.08	0.22	0.07	1.00				
Loc.Meang	0.04	0.17	-0.29	-0.24	0.03	0.00	-0.11	-0.20	0.08	-0.08	0.00	0.09	0.09	-0.11	1.00			
Intege.V	0.80	0.17	-0.32	-0.16	-0.04	0.02	-0.20	-0.05	-0.08	-0.16	-0.08	0.06	0.12	-0.08	0.47	1.00		
Customs	-0.02	0.14	-0.13	-0.09	-0.17	0.05	-0.10	0.00	-0.14	-0.19	0.05	0.24	-0.08	0.10	-0.02	0.31	1.00	
ARC	0.22	-0.08	0.02	0.28	0.40	0.22	-0.11	0.29	0.37	0.68	0.07	-0.20	0.14	-0.33	0.01	-0.05	-0.12	1.00

Significance of adaptive reuse to promote values of historic building

The study has indicated that adaptive reuse is an effective strategy to influence many values in the society through different ways. Although the process of adaptive reuse influences a myriad of social values, individuals in the society have shown the impact addressed by adaptive reuse as follows (Table 5).

Social interaction

Most survey respondents (49 percent) showed that complete restoration to adaptive reuse is a very

good way to increase the social interaction in the society because individuals living near the historic buildings interact together through works associated with adaptive reuse. On the other hand only 7 percent of respondents did not agree, and believed that adaptive reuse is the worst strategy. Furthermore, most respondents expressed sincere appreciation to the government that decided in 2010 to restore old market and gave it to individuals to work at that place for their artistic activities; the move that increased the social interaction among the individuals working there and those living around the market.

Attitude

Individuals in the society believed that the process of adaptive reuse has changed their attitude over historic buildings, whereby most of the buildings were left without development and ended up in bad condition beyond repair. For example, Old Boma and Old Market were once believed to belong to the government and not for the purpose of the community, but only after the restoration of these buildings the individuals' attitudes changed and believed that these buildings can help the society through many ways by providing employment opportunities like the case in point of old market. This change of views was supported by 51 percent of the respondents who agreed that adaptation is a better method and only 7 percent explained is a bad method to promote social values because a few number of people are involved in the exercise.

Customs

Majority of people living in the area believed that, though adaptive reuse is not a very good method to change the customs of individual, but believed it is a good method to conserve historic buildings. Only 30 percent of the respondents believed adaptive reuse to be a very good method to promote customs, 56 percent agreed that it is a good method to promote customs and only 5 percent said it is the bad method to promote customs and none said it is a very bad method and this shows that adaptive reuse has an impact on promoting customs in the society though not in a very good way but in a good way anyway.

Economic values

These comprise both use and non-use values. Non-use values are the values individuals are willing to pay to obtain them though they might also benefit indirectly rather than directly [46]. These are values which are kept for the future generation where the use of today will not compromise the use of future generation [47]. The respondents had an opportunity to rate the significance of adaptive reuse on both use and non-use economic values as explained below:

Aesthetic values

This is part of economic value found in non-use values whereby many respondents in the field agreed that adaptive reuse has an impact on aesthetic value. 39 percent agreed that adaptive reuse is a good method to promote aesthetic value and only 10 percent of the respondents explained it as a bad method.

Respondents confirmed that the level of tourism has been increasing day by day and most of them gave the reason that the historic buildings are adaptively reused through different ways, such as restoration, preservation and conservation. 48 percent of the respondents agreed that the process of adaptive reuse has shown the significance of increase of tourists in the district of Bagamoyo and only 7 percent said it is a bad strategy.

Space value

Space value is the value given to the buildings after the process of adaptive reuse, whereby, according to respondents buildings which have been given space value for other activities in the case study area are Arabic tea house which is used as offices for the municipally and acts as a department of education in Bagamoyo district, Old Post Office which is now a Millennium Hotel, Old Market used as a market of arts, Mwambao primary school used as a primary school, Old Fort used as an office for management of all historic buildings, and Caravan Serai used as an office of antiquity department. 25 percent of respondents agreed adaptive reuse is a good approach to promote space value, 20 percent of them said is a bad strategy because most of the space provided is not of benefit to the individuals, except in few cases like Old Market building and Mwambao primary school which have positively benefited them. Many respondents suggested that citizens need to be given chance to invest in those buildings to promote social values instead of non-indigenous developers and investors who are only interested in making profits.

Environmental value

The environment around the historic buildings which undergo adaptive reuse benefits individuals through reduction of waste and reuse of materials. 38 percent of respondents believe that environment value has increased, and is in very good state, but

26 percent of them said adaptive reuse doesn't promote environment value. The case in point is of people working in Old Market building who explained that the environments are in very bad condition, because of absence of social services like toilets in the place and very poor infrastructure. Likewise, the environment condition around Old Boma is very poor because the building has been put at risk through neglect for a long time without any improvement.

Recreation purpose (non-use value)

The recreation purpose is one of the non-use values, whereby individuals are willing to pay to enjoy the view and visiting these historic buildings after adaptive reuse. Many respondents explained that they are mostly interested to visit these historic buildings after adaptive reuse. 43 percent of the respondents expressed their attraction to adaptive re-use of historic buildings like the Old Boma which is under renovation and once finished it will be the best building in Bagamoyo and majority will be attracted to visit it.

Income level

Appropriate adaptive reuse of historic building can result in generation of income. However 33 percent of the respondents believe that adaptive reuse is a very bad method in promoting income level because most of the buildings that undergo adaptive reuse do not save the individuals in the society, but rather benefit the developers and investors, together with the government. Only 32 percent of the respondents believe it's the very good method to increase their income.

Cultural values

These are values which are passed from one generation to another generation and are preserved and kept in the society; these are explained below.

Symbolic value

Many historic buildings in Bagamoyo feature a variety of symbols mostly displayed in various

forms of carving on doors and windows representing the skills and wisdom of the traditional craftsmen. Many respondents in the region of 41 percent believe that the adaptive reuse is the very good method to protect these symbols and only 7 percent of the respondents say it's the bad strategy. A particular building cited by many respondents is Caravan Serai which is meticulously conserved with historic symbols that remain as the legacy and history of the slave trade.

Historic legacy value (option value)

Adaptive reuse of historic buildings can help buildings create a distinct historic legacy, identity and character. Many respondents in Bagamoyo believe that if the historic buildings are kept in good condition they will remain a legacy to the coming generation and will be reminders of different stages of life experience they have passed through. 41 percent of the respondents believed adaptive reuse is the best strategy to promote historic legacy value and only 5 percent of the respondents believe that it is the bad strategy.

Intergeneration value

52 percent of the respondents explained that adaptive reuse is a good method, but is not a very good method because they believe that the buildings will continue to decay and in the future there will be no building left. Only 3 percent of respondents said adaptive reuse is not a good method to preserve the value.

Architectural value

Architectural value refers to the look, feel and functionality of the design of the building. 42% of the respondents agreed that adaptive reuse is the very good and good method to promote architectural design, style and material and none of the respondents said it is the bad process and this is due to the reason that historic buildings have remained for so long in the way they were left by the colonies in terms of design, style and material.

Table 5. Summary of significance of Adaptive reuse of historic buildings on values.

VALUES	TOTAL	Very Good(%)	Good (%)	Normal (%)	Bad (%)	Very Bad (%)	TOTAL	Total Weight Score	Relative Importance Index(RII)	Rank
Attitude	59	51% (30)	10% (6)	25% (15)	7% (4)	7% (4)	100%	235	0.7966	6
Customs	61	30% (18)	56% (34)	10% (6)	5% (3)	0% (0)	100%	250	0.8197	3
Social interaction	61	49% (30)	20% (12)	16% (10)	8% (5)	7% (4)	100%	242	0.7934	7
Aesthetic value	61	11% (7)	39% (24)	39% (24)	10% (6)	0% (0)	100%	215	0.7049	11
Tourist Attraction	61	48% (29)	33% (20)	11% (7)	2% (1)	7% (4)	100%	252	0.8262	2
Space value	61	23% (14)	25% (15)	20% (12)	13% (8)	20% (12)	100%	194	0.6361	14
Uniqueness value	61	11% (7)	57% (35)	31% (19)	0% (0)	0% (0)	100%	232	0.7607	10
Environmental value	61	38% (23)	13% (8)	16% (10)	7% (4)	26% (16)	100%	201	0.6590	12
Recreation purpose	61	43% (26)	33% (20)	11% (7)	7% (4)	7% (4)	100%	243	0.7967	5
Symbolic value	61	41% (25)	26% (16)	25% (15)	2% (1)	7% (4)	100%	240	0.7869	8
Historic legacy	61	41% (25)	30% (18)	15% (9)	10% (6)	5% (3)	100%	239	0.7836	9
Intergeneration value	60	30% (18)	52% (31)	10% (6)	5% (3)	3% (2)	100%	240	0.8000	4
Income level	60	32% (19)	23% (14)	12% (7)	0% (0)	33% (20)	100%	192	0.6400	13
Architectural value	59	42% (25)	42% (25)	8% (5)	7% (4)	0% (0)	100%	248	0.8407	1

VII. CONCLUSION

This explanatory study has managed to reveal valuable findings that are important to the key players of adaptive reuse which are investors and developers with more values to consider during making decision about adaptive reuse of historic buildings and how individuals in the society respond to the changes. The study finds that, if done properly, adaptive reuse of historic buildings can have a significant positive impact on the economic socio-cultural, and economic, values. The values which are mostly important to the individual about adaptive reuse are those that they help to promote social interaction among the society, change attitude, improve lifestyle, increase tourism attraction, increase aesthetic values as well as

architectural values. The adaptive reuse of historic buildings, however, requires a fundamental shift in how people in the local communities are tacitly involved in creative acts of adaptation.

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Economic Growth and Unemployment Rate: An Empirical Study of Nepalese Economy

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DOI: 10.29322/IJSRP.9.08.2019.p9211

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9211>

Abstract - This paper investigates the relationship between the unemployment rate and economic growth in Nepal. Gross Domestic Product (GDP) at constant price has been used as an indicator of economic growth. The data regarding GDP and unemployment rate were collected from World Bank database for the study. Correlation and Regression analysis were used to study the nature and degree of effect of economic growth on unemployment rate. It was found that there is a strong negative correlation between economic growth and unemployment rate. Also, it was found that GDP accounts for 48.6% of cause of change in unemployment rate. The findings are in line with the Okun's law.

Index Terms— Unemployment; Economic Growth; Gross Domestic Product; Okun's Law.

INTRODUCTION

Persistent increment in unemployment rates have become burning issues for most of the developing economies today. However, unemployment is pervasive and is experienced by all economies of the world in some form and degree. While looking at the global scenario, unemployment statistics show that 4-6 per cent of the total working population of the USA, UK, Japan, China and India are unemployed. In the Middle East and North Africa, unemployment remains the highest (Acharya, 2014). According to the ILO (2018), 192 million workers are jobless in the world, and the numbers are rising much faster than new jobs are being created. Besides, after the recent Global crisis, there are strong doubts about that unemployment is related to economic growth such that economic growth does not create employment as much as it did before [Barışık et al. (2010) and Demirgil (2010) as retrieved from Aksoy (2013)]. Unemployment rate is often seen as an indicator of the efficiency and effectiveness of an economy to absorb its labor force and of the performance of the labor market. (ILO, 2013). Thus, reducing unemployment and achieving a high rate of

economic growth have become the foremost priorities of each developed and developing economies currently.

According to Nepal Labor Force Survey- 2017/18, for a person to be considered unemployed, three criteria must be met simultaneously: the person must be completely without work, currently available to work, and taking active steps to find work (National Planning Commission Central Bureau of Statistics, 2019). The unemployment rate is calculated by expressing the number of unemployed persons as a percentage of the total number of persons in the labor force. And the labor force, also known as the economically active population, is the sum of the number of persons employed and the number of person unemployed (International Labour Organization, 2013). Thus, the measure of the unemployed percent needs the measure of both employed and unemployed. Economic growth is another indicator of welfare of a country. According to Phan (2006) economic growth is an increase in overall output of an economy in a given period. Thus, it can be understood as an increase in GDP or GNP or personal income in a given period. Economic growth reflects a quantitative change in an economy.[as retrieved from Manh et al. (2014)]

If employment and growth rates are considered, Nepal is seen performed poorly on both growth and employment indicators. Growth in the last 35 years (1975-2010) has been merely 4 per cent on average, with agricultural and non-agricultural sectors growing at a rate of 2.5 and 5.6 per cent respectively (Khanal et al., 2012). During the last three years (2010-2013), the growth rate has remained almost the same, with further deceleration in the growth of the non-agricultural sector at 4.8 per cent on average (NPC, 2013). The performance of the employment sector has been even poorer. Unlike the growth of employment at a rate of 2.7 per cent during the period of 1981 to 1991, such a growth rate has decelerated to just 0.66 percent during the period 2001-2011 (CBS, 2012).

Nepal is seen putting in a lot of effort to decrease unemployment.. When a new government comes to power, the main agenda becomes creation of employment opportunities.

Unemployment is a headache to all governments. (Acharya, 2014) Prioritization of employment generation in different national plans, policies and program such as Karnali One Family One Employment-2006, Youth Self-Employment - 2008 and Prime Minister Employment-2019, establishment of employment notice centers, provision of sector-specific and micro-level skills and enterprise development, focused group training and income generation program, etc are some of the few to mention. The irony, however, is that despite the increased focus on productive employment in recent years, unemployment and underemployment have emerged as the biggest problems today (ILO, 2013). When the facts are analyzed, no progress on the line can be seen. National Labor Force Survey (NLFS)-I estimated that 1.8 percent or 178.0 thousand people aged 15 years and above were unemployed in the year 1998/99 whereas it was estimated to have increased to 2.1 percent or a total of 252.8 thousand during NLFS-II for the year 2008/09. And now the latest labor force survey indicates the unemployment rate has risen to 2.3 percent with semi-unemployment rate of 30 percent. Similarly, the youth underemployment rate is 35.8 percent. (National Planning Commission Central Bureau of Statistics, 2019). With such increment in the unemployment situation, it is quite difficult to manage the economy. Adverse labor market conditions have resulted in very high labor mobility and migration, both internal and external, in search of jobs and employment opportunities. One in each four households (25.42%; 1.38 million households) reported that at least one member of their household is absent or is living out of country. Total number of absent population is found to be 1,921,494 against 0.76 million in 2001. The highest proportion (44.81 percent) of absent population is from the age group 15 to 24 years (CBS, 2012). Gil-Alana (2010) has identified that public attitude is positively influenced by governmental responsibility. It has also been described that due to higher long term unemployment rate, people have more negative attitude towards governmental provision for unemployment.

Thus, this study is conducted with aim to study the effect of economic growth on unemployment rate in Nepal post 1960. Also, the study will test whether the case of negative relationship between economic growth and unemployment, as stated by the Okun's law holds true for Nepalese context or not.

II. LITERATURE REVIEW

Based on a number of country case studies, there is a growing realization that job creation is necessary for boosting living standards, raising productivity and fostering social cohesion, leading to a country's overall development (WB, 2012). Many recent studies have broadly concluded that the pattern of growth taking place in most of developing countries has been detrimental to enhancing employment led inclusive growth and development. (Khanal D. R., 2015) It has also been

conceded that job creation and inclusive growth are imperatives that resonate today in every country in the world - be it small, large, advanced, emerging, developing, post-conflict or resource rich (IMF, 2013)

With respect to studies regarding the relationship, Okun's Law stands as the strongest dominant foundation. Okun (1962) established a relationship between economic growth and unemployment and put forward: GDP decrease by 3 percent point as unemployment rate increase 1 percent point over the natural rate of unemployment. And till date, Okun's Law has gained wide acceptance in the literature too.

Seyfried (2003) when examined the nature of the relationship between employment and economic growth in the ten largest states of United States, found that though economic growth has a positive and significant impact on employment growth, some of the effects take a few quarters to be fully felt. It is because persistence in employment growth plays a major role as well. Thus, economic growth may have to occur for a period of time before it can have a noticeable impact on the labor market.

Akter (2017) tested the relation between unemployment and economic growth using a panel data covering four South-Asian countries (India, Pakistan, Nepal and Bhutan) including Bangladesh for the time period 1990-2010. The study found that the economic growth has significant effect on unemployment and there is a negative relationship between economic growth and unemployment.

In a similar study conducted in Belgium, it was estimated that, in terms of deviation from their respective trends, a 1 % rise in GDP brings a 0.5 % increase in employment. (Burggraeve et al., 2015).

Another study's findings from Turkey showed that the relationship between growth and employment varied within the industries and supported the jobless growth phenomenon. The results showed the economic growth in Turkey only creates employment in the manufacturing, and the tourism and commerce industries. Also the findings point out that employment increase creates economic growth rather than economic growth creates employment. (Aksoy, 2013).

A research results in Vietnam also showed that there really exists a relationship between employment and economic growth. The results also revealed that the employment elasticity of economic growth are -0.49; 0.55 and 0.66 for agriculture, manufacturing and service sectors respectively and 1.71 for Vietnamese economy as a whole in the period. (Mạnh et al., 2014)

Apart from foreign literatures, the study in Nepalese economic perspective reveals the similar findings to the study. To mention, few of them are:

Acharya (2014) cited that there exists a positive relationship between economic growth rate and creation of employment

opportunities. As economic growth increases, employment also increases.

After empirical study in Nepalese perspective, Khanal (2015) states : in parallel, with a decelerated average growth rate in sectors such as manufacturing, trade, restaurants and hotel perceived as high employment generating sectors, employment elasticity has reduced to 0.18 (2001-2011) from 0.60 (1991-2001). The decomposition analysis also shows that during 1991-2001, changes in both, employment and labor productivity played a key role in the growth process. During 2001-2011, however, declining employment contributed to an increase in labor productivity and thereby growth to some extent. Quantitative analysis examining each sector’s contribution to the level of employment growth and rate changes further reveals that during 1991-2001 the rate of change in employment growth was higher (4.5 percent) as against growth in levels (2.7 per cent). However, during 2001-2011, the employment rate change declined by 10.5 percentage points as against growth in employment levels by 0.6 per cent. The results thus show that with employment becoming precarious in recent years, people have been compelled to seek foreign employment.

III. RESEARCH METHODOLOGY

This study aims to study the effect of economic growth on unemployment rate in Nepal post 1960. This study is based on exploratory research design. Data for the study has been collected from secondary sources such as: different National and International survey reports, Census reports, previous articles, news, etc. For the purpose of the study, the data on economic growth and unemployment rate has been considered. Okun’s Law is tested to check the effect of unemployment on economic growth. Correlation and Regression techniques are applied for studying relationship between unemployment and economic growth. SPSS v20 was used for the analysis of the data.

The following model is considered for the study:

$$\text{unemp rate} = \beta_0 + \beta_1 \text{ecogwth} + \varepsilon$$

where,

unemp rate is the dependent variable and ecogwth is the independent variable. Here, unemp rate indicates the annual unemployment rate and ecogwth indicates the annual Gross Domestic Product at constant price. Likewise, β_0 is the y-intercept; β_1 the slope and ε is the error term.

As per Okun’s Law, following hypothesis is proposed for the study:

H1: There exists negative relationship between unemployment rate and economic growth.

IV. RESULTS

Table I: Descriptive Statistics

	N	Minimum	Maximum
GDP	59	103878795300.00	881798253100.00
UER	28	1.25300	1.88699
	N	Mean	Std. Deviation
GDP	59	330058579747.45	220461847404.88
UER	28	1.60917	.18374

GDP: Gross Domestic Product, UER: Unemployment Rate

The above table-I illustrates the descriptive characteristics of the data. The minimum value of GDP is 103878795300.00 while the maximum is 881798253100.00. Similarly, the minimum rate of unemployment is 1.25300 and the maximum is 1.88699. The mean GDP, indicator of economic growth is 330058579747.45 and standard deviation is 220461847404.88. Likewise, the average Unemployment rate is 1.60917 with standard deviation of 0.18374.

Table II: Test of Correlation between GDP and UER

		GDP	UER
GDP	Pearson Correlation	1	-.697**
	Sig. (2-tailed)		.000
	N	59	28
UER	Pearson Correlation	-.697**	1
	Sig. (2-tailed)	.000	
	N	28	28

** . Correlation is significant at the 0.01 level (2-tailed).

Table-2 shows the correlation between dependent variable, GDP and independent variable, UER. It shows that there exists a negative correlation (-0.697) between GDP and UER at 1% level of significance. This implies that increment in value of GDP results in decrement in unemployment rate and vice-versa. Thus, it proves the alternative hypothesis is valid.

Regression analysis was performed with GDP as an independent variable and unemployment rate as a dependent variable to test the degree of impact of economic growth on unemployment rate. Based on the findings of regression analysis, as shown in Table 3.3, R-square is 0.486. This means the model is capable of explaining about 48.6% of the variability of Unemployment Rate. This result is

complimented by adjusted R square value of 0.466 i.e. 46.6% which is in essence the proportion of total variance that is explained by the model.

Table III: Regression Analysis

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.697 ^a	.486	.466	.1342854410692 10		
a. Predictors: (Constant), GDP						
Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.990	.081		24.590	.000
	GDP	-7.646E-013	.000	-.697	-4.955	.000
a. Dependent Variable: Unemployment rate						

Here, p-value of Gross Domestic Product coefficient is 0.000 which is less than 0.01. So, hypothesis is accepted at 1 percent level of significance. This indicates that the economic growth has a negative significant impact on Unemployment rate of Nepal.

V. CONCLUSION

This paper has examined the relationship between economic growth and unemployment rate in Nepal through use of correlation and regression analysis. The empirical analysis shows that economic growth has a negative impact of on unemployment rate. The finding is in line with the Okun’s law too. An implication of the finding is that in order to bring down the problem of unemployment in an economy, the focus should be on boosting the economic growth.

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Deep Learning for Pedestrian Detection

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DOI: 10.29322/IJSRP.9.08.2019.p9212

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9212>

Abstract- Pedestrian detection has so far worked efficiently using four basic important components namely: feature extraction, deformation handling, occlusion handling, and individual or sequential classification proposed in existing methods. This paper has primarily concentrated on collective basic deep learning on each of these factors using and advancing a new deep neural network architecture. In the aforementioned paper, the advanced neural architecture is compared with the current models including the Caltech benchmark dataset and ETH dataset to examine the results and accuracy.

Index Terms- Articulation, Occlusion, Convolution.

I. INTRODUCTION

- **O**ne most decisive concern in automotive defense, robotics, and intelligent video surveillance is Pedestrian detection. The basic problem is caused by immense variants of pedestrians in clothing, lighting and background articulation and reflection, along with day-night deviation.
- For solving related ordeal difficulties a range of interrelated components is required.
- First feature - Capturing immense discriminative data relating to pedestrians. Haar-like features consisting of SIFT and HOG are contemplated with robust nature for intra-class variation and remain sensitive to inter-class variation.
- Second feature - Articulation of human parts like torso, head, and legs needed to be handled by deformation models. A highly efficient state-of-the-art distorted part-based model is articulated with constraint.
- Third feature - Occlusion handling approaches led to determine the existence of a pedestrian in a window and in the end, the classifier decides whether the pedestrian is a window.

RELATED WORK

Deep models have been shown to be more potential and to achieve dramatic progress in pedestrian detection of computer vision than shallow models. This focuses on learning features, learning contextual data, and managing occlusion.

The primary characteristics used to detect pedestrians are

- HOG
- Hair-like characteristics
- Dense SIFT

To begin with, arranging color highlight as:

First-order color characteristics such as **-color histograms**

Second-order color features such as **as-CSS (color-self-similarity)**

Third-order characteristics such as **co-occurrence attributes**

Texture characteristics such as **-LBP**

Other characteristics such as **as-variance descriptor, depth, segmentation outcomes, 3D geometry, and combinations.**

The capacity to manage deformation increases detection efficiency as pedestrians have non-rigid deformation. For managing the translational motion of components, deformable part-based models are used. The size shift and rotation of components are simulated to manage more complicated articulations and the combination of part appearance and articulation kinds is simulated.

Some of the techniques in which results of blocks or components are taken as input for estimating visibility are suggested for managing occlusion. Many boosting classifiers that **are linear SVM (support vector machine), intersection histogram kernel SVM], multiple kernel SVM, structural SVM, and probabilistic models are used for classification**

methods. All these classifiers are tailored to the training data, but these characteristics are manually built. Optimally, descriptive statistics could be used to guide the learning of features. If the valuable information was lost during extraction of the feature, during classification it cannot be retrieved.

II. METHODOLOGY

Overview of the proposed deep model

In this model:

- From the first convolution layer, filtered information maps are acquired. This layer converts the picture information of the 3-channel input with $9*9*3$ filters and 64 map outputs are used for each filter response(x), i.e. activation function $\tanh(|\tanh(x)|)$ and absolute value rectification. Features maps are acquired by average pooling of 64 filtered data maps using $4*4$ Boxcar filters with $4*4$ sub-sampling steps.
- From the second convolution layer, part detection maps are acquired. This layer converts function maps with 20-part filters of various dimensions and 20-part detection maps outputs.
- Part results are acquired from 20 part tracking maps that used a handling layer of deformation. This layer produces 20 pieces of results.
- The accessibility reasoning of 20-parts is for estimating the label y; i.e. whether or not a specified window contains a Pedestrian.
- Detection windows are taken into height 84 as well as width 28 pictures in which the height of the pedestrians is 60 and with as 20.

There are three channels in the input picture information.

- The first channel is the $84*28$ Y-channel picture after converting the picture to the YUV color space.
- In the YUV color space, the 3-channel $42*14$ images are concatenated into the $84*28$ size channel with zero paddings.
- Four $42*14$ edge maps are linked to the third channel of size $84*28$.
- Three edge maps in the YUV color room are acquired from the 3-channel pictures. Using the Sobel edge detector, the magnitudes of horizontal and vertical edges are calculated. The fourth edge map is acquired by selecting from the first three edge maps the highest magnitudes.
- Image data is converted to $64*9*9*3$ filters and pooled on average to obtain 64 feature maps. The functionality maps will then be processed through the second convolution layer as well as the deformation layer to acquire 20 part scores. Eventually, the

reasoning model for visibility is used to predict the label y for detection.

III. EXPERIMENTAL RESULTS

On the Caltech dataset and ETH dataset, the suggested framework is assessed. To save computation, a detector that uses HOG+CSS and Linear SVM is used at both training and testing phases to prune applicant detection windows. Approximately 60,000 training samples are used to train the profound model that are not pruned by the detector. The execution time needed by our profound model at the test point is less than 10 percent of the execution time needed by the most sampled HOG+CSS+SVM sensor. Learning frequency with batch size 60 is set in the deep learning model as 0.025.

IV. RESULTS OF CALTECH TEST DATA SET

Because Caltech-Test is the biggest among frequently used datasets, on this dataset we explore various profound model designs.

Design of layers:

By feeding the extracted features straight into a linear classifier, a one-layer CNN (CNN-1layer) is acquired. A two-layer CNN (CNN-2layer) is built by converting the extracted characteristic maps with another convolutionary layer and another pooling layer. The addition of more convolutionary and pooling layers at the top of the CNN two-layer does not enhance output.

Design of the input channel:

Results of the experimental investigation were from input channel impact if the input information has only the first picture of the Y-channel, the average error rate is 47%. The incorporation of the second color image channel with reduced resolution decreases the rate of missing by 5%. Including the third channel of edge maps, a further 3%.

Joint Learning:

This decreases the rate of missing. UDN's first convolutional and pooling layers match the extraction step of the function. Thus, either manually constructed or pre-learned, the output of the two layers can be substituted by any other characteristics.

•LatSvm-V2 with a 63 percent miss rate, designs the HOG function manually and then learns the model of deformation. The reasoning of visibility is not regarded.

- DN-HOG, with a missing rate of 53 percent, fixes the HOG as well as the distortion model and then learns the model of visibility.

- UDN-HOG, with a missing rate of 50 percent, fixes the HOG functionality and then learns the deformation and visibility layers together with UDN. The distinctions between DN-HOG and UDN-HOG are whether models of deformation and visibility are learned together. With an error rate of 47 percent, UDN-HOGCSS fixes the HOG+CSS feature and learns the deformation and visibility layers together with UDN. The additional CSS function decreases the rate of missing compared to UDN-HOG by 3%.

- UDN-CNN Feat, with a missing rate of 44 percent, first understands and fixes the function extraction layers using the CNN-1 layer, and afterward explores the distortion and visibility together. In this situation, the deformation and visibility of the function extraction is not jointly taught. By using the characteristics learned from CNN-1layer, UDN-CNN Feat decreases the miss rate by 3 percent compared to UDN-HOGCSS.

- UDN-Def Layer, with a speed of 41%, learns characteristics and deformation together. The theory of visibility is not used.

- UDN learns characteristics, deformation and visibility together. Its level of missing is 5% smaller than the feat of UDN-CNN. The connection among deformation, visibility and learning of features therefore obviously enhances the mode's detection capability.

V. RESULTS OF ETH DATA SET

We adopt the training set frequently taken by state-of-the-art methods (including the highest performing methods on ETH) to use the INRIA training dataset to train UDN for a reasonable comparison on the ETH dataset. After the pruning of the HOG+CSS+SVM sensor, there are about 60,000 negative samples and 2,000 beneficial samples from the INRIA Training dataset.

VI. GAPS IN CURRENT SYSTEM

- As the characteristics are combined for better outcomes but the weather and light background are not recognized and are not taken into account.

- The research concentrated primarily on the identification of pedestrians, but not all ages are regarded and also the height of individuals was not primarily concentrated on.

- Applications where pedestrian detection is primarily used, such as accident-prone circumstances and other traffic control

measures, but this study article did not focus on the condition of cars and the technique of pedestrian detection of such cars.

VII. CONCLUSION

This article proposes a unified profound model that learns four elements for pedestrian detection together – extraction of features, handling deformation, handling of occasions and classification.

- Joint learning achieves the greatest performance on publicly accessible datasets by interacting with these interdependent parts, outperforming current best-performing methods by 9% on the biggest Caltech dataset.

- Detailed experimentation studies obviously demonstrate that the suggested fresh model can improve the power of each part when all components work together. By incorporating the deformation layer, which has excellent flexibility to integrate different approaches to managing deformation, we enrich the profound model. We expect even greater enhancement in the future job by training our UDN on much bigger training sets.

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Development of Learning Devices Intructured Inquiry Model With Brainstorming Strategy To Improve Creative Thinking Ability Of Basic School Students

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DOI: 10.29322/IJSRP.9.08.2019.p9213

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9213>

ABSTRACT

This study aims to produce science learning device products such as Syllabus, Learning Implementation Plans (RPP), Student Worksheets (LKS), Student Teaching Materials, and Valid, practical and effective Test Sheets structured inquiry models with Brainstorming strategies to improve thinking skills creative elementary school students. This research was carried out using a 4-D model, namely the stages of defining, designing, developing, disseminating and testing in the fourth grade of Nginden Jangkungan Elementary School 1/247 2018/2019 academic year with One -Group Pretest-Posttest Design. The data analysis technique uses quantitative and qualitative descriptive analysis techniques. The results showed: 1) valid, according to the assessment of the three validators with valid categories, 2) practical, according to the assessment of the two observers seen from the activity of students increasing at each meeting and the implementation of RPP, 3) effective, seen from the significant differences between the results of the pretest and posttest tests of students' creative thinking and positive responses of students. Based on the results of data analysis, it can be concluded that the development of inquiry learning model tools is structured with valid, practical, and effective brainstorming strategies to improve the creative thinking skills of elementary school students.

Keywords: Development of Learning Devices, Structured Inquiry, Brainstorming Strategies, Creative Thinking.

I. Introduction

Everyone is required to have the ability and skills to operate technology, the ability to collect and process information, the ability to cooperate, the ability to innovate, and the ability to have a career in this global era. In this regard, the world of education is required to be able to make various adjustments and changes. Efforts that can be done are with 4C, namely: (1) *Critical Thinking and Problem Solving*; learning based on a problem so that students are able to think of an original solution to the problem. (2) *Creativity and innovation*, learning that must condition students to create innovation and develop their creativity. (3) *Communication*, learning that adheres to constructivism theory. (4) *Collaboration*, the learning process carried out in groups so as to be able to provide and receive advice from other people (Ministry of National Education, 2006).

4C efforts carried out by the Ministry of National Education need to be trained and applied to elementary school students. Some of these abilities must be trained and possessed by every student with the aim that students have strong competitiveness in the global world and survive between competition in all the increasingly stringent fields. Among these efforts there is a creative attitude that is basically owned by everyone, but not everyone is able to develop these abilities. Creative thinking is a thinking skill that creates a new idea. This is supported by Sudarma's statement (2013) which states that creative thinking is an ability that gives birth to a product in the form of creativity and a new creative idea or idea about something. Creative thinking means looking at things from different aspects and different points of view that are different. The ability to think creatively has a big influence on learning. Research conducted in Jakarta by

Supardi (2014) shows that creative thinking has a positive influence on student learning achievement. creative thinking is also listed in Law No. 20 of 2003 which has the aim of developing the position of students to become human believers who fear God, have noble character, knowledge, health, skillful, creative, and independent.

Based on the results of observations and interviews in schools about science subjects, students have not been able to connect between the material explained in school with daily life, students are less active in learning, difficulty developing the ability to think creatively in teaching and learning, and still fixated on the material delivered by the teacher. Some teachers revealed that they were not used to using innovative learning models that could actually create a more interactive and enjoyable learning environment. This is in accordance with the opinion of Puspita (2010) that one of the problems that occur in education in Indonesia is the weak learning process. Tukan (2010) states that the weakness of the learning process in our country is because it emphasizes more on silent student vocal teachers which means that during learning students are not encouraged to develop their thinking skills and rely more on material memorization.

The results of the interview imply that the implementation of learning in the classroom, especially science subjects, still often uses conventional methods such as lectures and discussions even though many science materials require experiments. The method used by the teacher makes students less active so students have difficulty concluding the concept of learning, students only listen to the explanation from the teacher. The right learning model in science learning is a learning model that is characterized by discovery learning, requires techniques or tools that can stimulate students to be involved in learning. this is consistent with Carin (2009) 's opinion that learning activities should be related to ways to find out about nature systematically, so that science is not only mastery of a collection of knowledge in the form of facts, concepts, or principles but also involves the process of discovery. Learning through discovery allows students to gain knowledge and skills through experience so that it helps students understand and master concepts. Things that are found by students during learning are expected to help students to achieve the expected understanding of the concept.

Fun, creative and innovative learning can encourage and motivate students to master the learning material, therefore the teacher must choose the right learning methods and strategies so that the teacher can deliver learning material effectively and in accordance with the student environment. The learning model that fits the needs of students above is a structured inquiry learning model. The teacher's role in the structured inquiry learning model is to select topics, questions and provide material and work procedures. In the learning process students are required to analyze the results and draw conclusions from scientific activities that have been carried out (Ismunandar, 2013).

Teachers as role models for students in schools must master and be able to apply varied learning models and are able to increase the active role of student learning in learning. This is in accordance with the research from Handriani et al. (2015) which uses one model that provides opportunities for students to interact actively, namely applying a structured Inquiry model. In applying structured inquiry methods, students are required to discuss in groups, interact together, make observations, and experiment with teacher guidance. In making observations students work to find answers to these problems. Through the application of structured inquiry methods students can construct understanding and the interrelationship between the material they learn and the real world they face. Thus students will more quickly and easily receive subject matter so that they will get better learning outcomes.

The application of appropriate teaching methods will have a positive impact on learning activities. In addition to the structured Inquiry model, there are studies from Romadhoni et al (2014) that use brainstorming strategies. The brainstorming method allows students to be more productive and create a fun learning atmosphere. Student productivity through the development of problems solved or creative expressions of opinion allows students to understand the material in depth and subsequently shown by good learning achievement. With the conditions for each idea put forward, each member should not be criticized beforehand, making the brainstorming method expected to be able to create a more pleasant learning atmosphere, so as to increase students' interest in learning.

Based on the problems that have been presented, the researcher offers a learning model that can involve active students in the learning process and can train students' creative thinking skills, so it is expected that in the end it can improve science learning outcomes, using structured inquiry models with Brainstorming strategies. The structured inquiry model is an inquiry activity where questions and procedures are still determined by the teacher, but students produce an explanation supported by the evidence that has been collected. This method is used because according to the cognitive development of students who are in the concrete operational stage (Piaget's theory) where fourth grade students are at the age of 7-12 years. The structured inquiry learning model equipped with brainstorming or brainstorming strategies is expected to improve and enhance students' creative thinking skills. Students can think creatively in solving problems in inquiry so that learning is more meaningful. After that students can express their creative ideas from each group through a brainstorming strategy. Research conducted by Handriani et al. (2015) on structured inquiry

and Romadhoni et al. (2014) on brainstorming explained that the model and strategy were appropriate to be used to improve students' creative thinking skills that had an impact on their learning outcomes. The difference in this study with previous research is that researchers combine structured inquiry models using brainstorming strategies because inquiry or discovery models that require students to be active are more perfect if accompanied by brainstorming strategies that make students work together with friends and discuss, and dare to make a deal when collect various kinds of ideas.

This study aims to have a decent learning device with a structured inquiry model with a brainstorming strategy that improves the ability to think creatively in elementary school students. The benefits of this study are the availability of structured inquiry learning models with brainstorming strategies for schools, teachers, and students who can help improve the creative thinking skills of grade IV elementary school students on the material nature of light and optical devices.

II. Method

This research is a development research that aims to develop products. The development model used is a 4D model consisting of *define, design, develop, and disseminate* and tested in the fourth grade of Nginden Jangkungan Elementary School 1/247 2018/2019 academic year with *One-Group Pretest-Posttest Design*.

Data collection techniques used to measure the validity, practicality, and effectiveness of learning devices developed with structured inquiry models with brainstorming strategies in the form of syllabus, lesson plans, teaching materials, worksheets, observation sheets, questionnaires, and tests. While the analysis of the validity of structured inquiry model learning devices with brainstorming strategies is done by converting the average validation results according to suggestions and criticisms from the validator. Furthermore, it was tested to 30 elementary school students in fourth grade of Nginden Jangkungan Elementary School 1/247 to find out the feasibility and content of the learning device products that will be given to students. The analysis of the practicality of learning devices is obtained from the results of the average implementation of RPP and student activities, which are subsequently converted into predetermined criteria. While the effectiveness of structured inquiry learning model tools with brainstorming strategies can be measured based on the results of students' creative thinking tests and student responses to learning.

III. Result and Discussion

The results of the development of structured inquiry learning model tools with light material brainstorming strategies and their nature to improve the creative thinking skills of elementary school students can be said to be feasible including valid, practical and effective. The following are the results of the validation of syllabus, lesson plans, teaching materials, worksheets, and tests of creative thinking skills obtained from the three validators, including:

A. Learning Tool Validation

1. The developed syllabus is assessed by three validators as can be seen in the graph below.

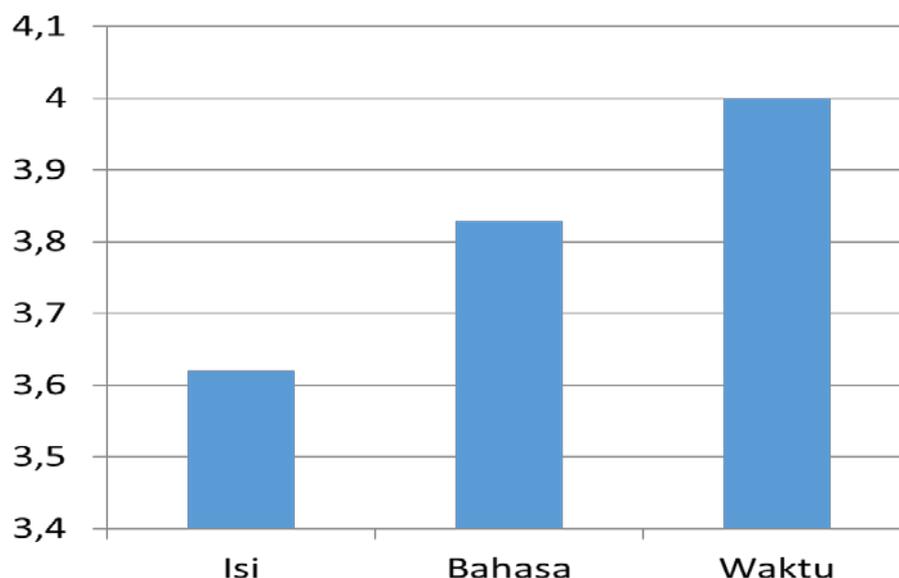
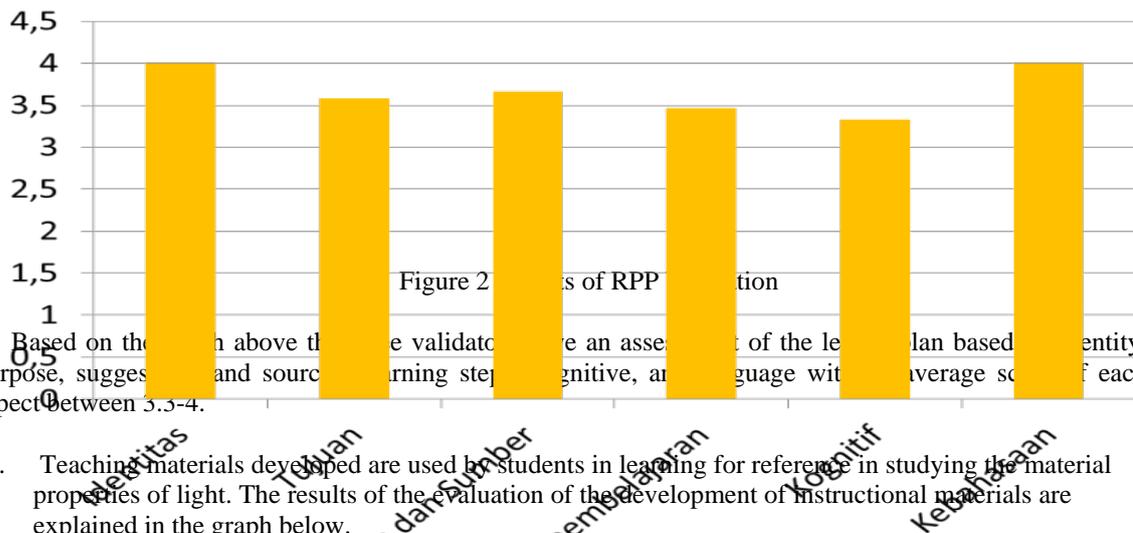


Figure 1 Results of Validation of Syllabus

Based on the graph above the three validators gave an assessment of the syllabus based on content, language and time with an average score of each aspect between 3.62-4.

- The RPP developed was validated by three expert validators to get advice before the RPP was tested. Validation results can be seen in the graph below.



Based on the graph above the three validators gave an assessment of the lesson plan based on content, purpose, suggestions and sources, learning steps, cognitive, and language with an average score of each aspect between 3.3-4.

- Teaching materials developed are used by students in learning for reference in studying the material properties of light. The results of the evaluation of the development of instructional materials are explained in the graph below.

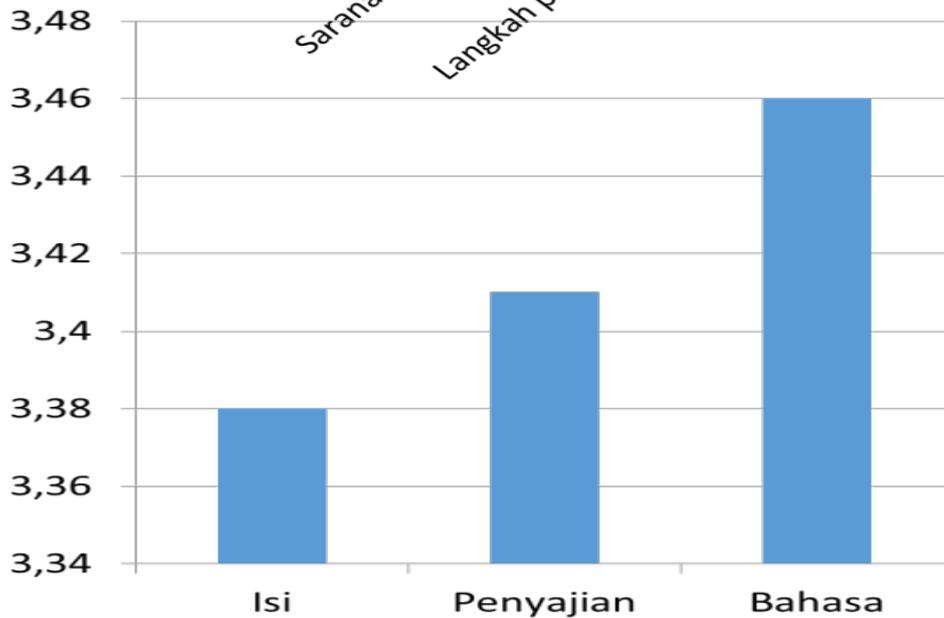


Figure 3 Results of Validation of Teaching Materials

Based on the above graph the three validators gave an assessment of the Teaching Materials based on content, presentation, and language with an average score of each aspect between 3.38-3.46.

- LKS validation is carried out by experts who are competent in light material. The results of the LKS validation can be seen in the graph below.

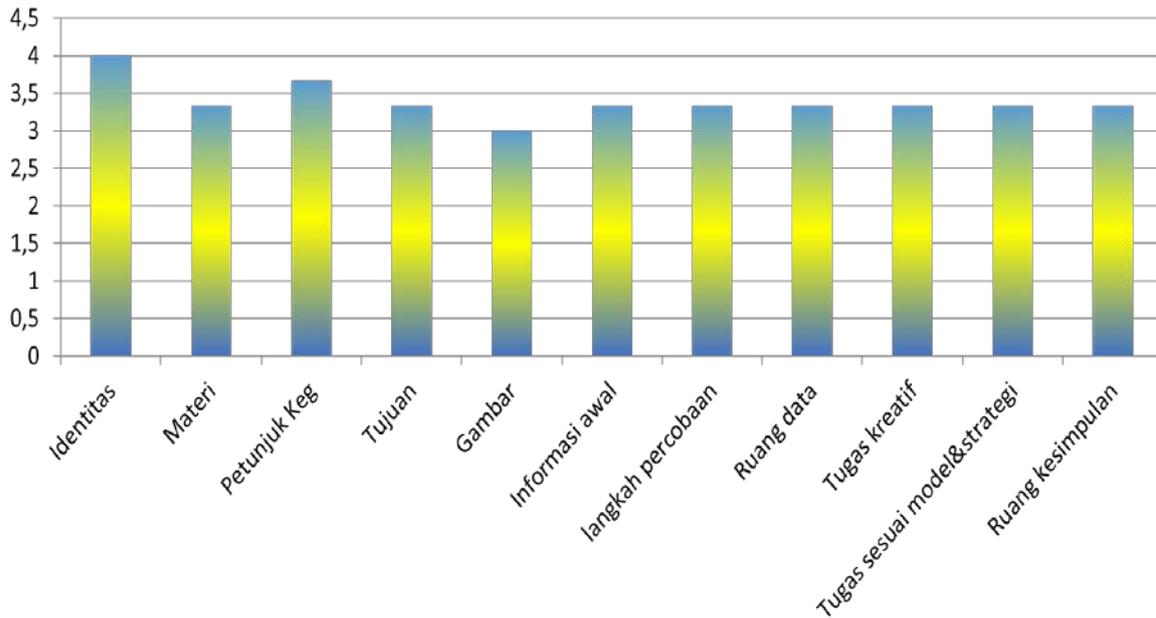


Figure 4 Results of Student Worksheet Validation

Based on the above graph, the three validators gave an assessment of the worksheet based on identity, material, activity indicators, objectives, images, initial information, experimental steps, observation data space, creative assignments, appropriate models and strategies, and conclusion writing spaces with average scores. average for every aspect between 3-4.

- The creative thinking ability test sheet is validated by 3 validators. The validator provides opinions or suggestions on the description test which includes creative thinking criteria namely originality, smoothness of fluency, and elaboration. The validation results of each aspect of creative thinking get an average score of 3.33-3.67 like the graph below.

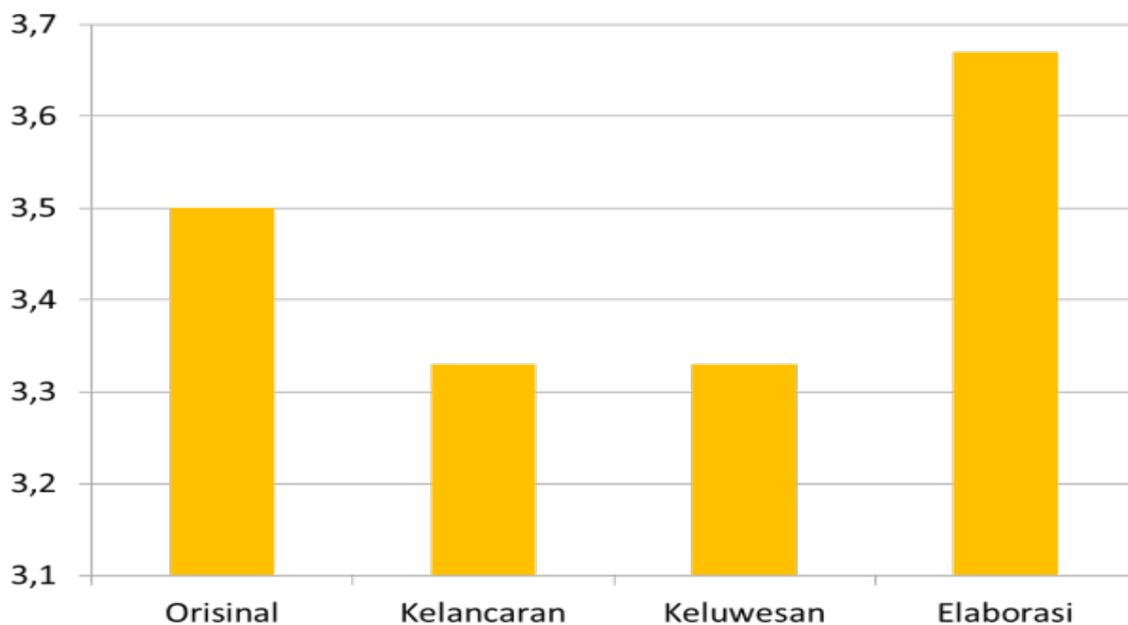


Figure 5 Results of Test Validation

B. Practicality of Learning Devices

Learning tools are said to be practical seen from 2 aspects, namely student activity and implementation of learning. The student's implementation and activities were assessed through a trial given to 30 fourth grade students of Nginden Jangkungan Elementary School 1/247 and observed by two observers.

1. Results of the Implementation of the Learning Plan

The results of the implementation of learning get a percentage of 79% -90%

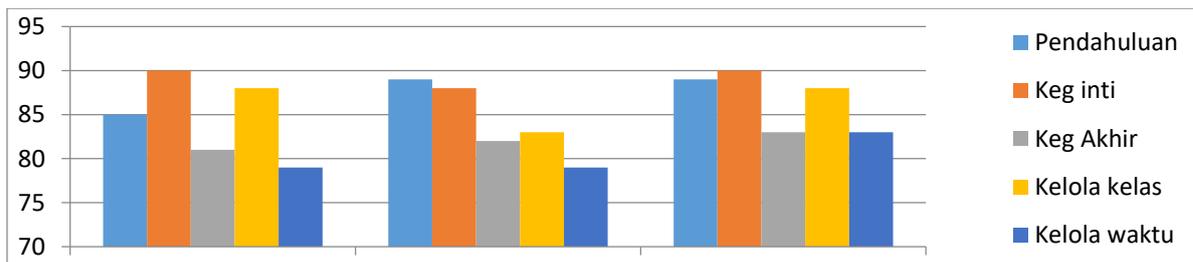


Figure 6 Learning Outcomes Results

2. Results of Observation Analysis of Student Activities

The results of observational analysis of activities that were assessed and observed by two observers during the learning took a percentage between 75% -96%

C. Effectiveness of Material Teaching Learning Materials with a Contextual Approach

1. Student Response

The responses and opinions of students about a learning that has been done is an understanding of student responses. Student responses are presented in the form of questionnaires and given after learning is complete. The results of students' responses to learning using structured inquiry models and brainstorming strategies with percentage details that answered "yes" between 73% -90% while answering "no" between 10% -27%.

2. Test of Creative Thinking Ability

The creative thinking ability test is in the form of a description of 9 questions given to 30 students before being given treatment (pre-test) and after being given treatment (post-test). Data obtained at pretest as many as 28 students were not completed and 2 other students were declared complete with a score above 70. In the posttest activity there was an increase, all students scored above 70.

Based on the results obtained in the pretest-posttest activities that the value obtained by students between the pretest and posttest values increased. Improvement in the test of creative thinking ability can be seen from N-Gain which is in the medium and high category.

Table 1 Student Creative Thinking Ability

No	Thinking Aspects Creative	Pretest Average	Criteria	Posttest Average	Criteria	Completeness		N-Gain	Info
						Pre test	Post test		
1	Originality	49	Less Creative	77	Very Creative	TT	T	0,55	Medium
2	Flexibility	74	Creative	96	Very Creative	T	T	0,85	High
3	Fluency	55	Creative	86	Very Creative	TT	T	0,69	Medium
4	Elaboration	44	Less Creative	79	Very Creative	TT	T	0,63	Medium

Based on the table above, the results of tests of students' creative thinking abilities are at the average N-Gain score of 0.55-0.85 with the moderate category on the three creative aspects and the high category on the aspect of flexibility

IV. Discussion

The validity of the learning device developed was seen from the analysis and assessment of three validators. Validator analyzes, provides suggestions / input for improvement and assessment on each learning device developed. A device is said to be used if the device meets criteria that are feasible, practical, and effective (Nieven, 1999). In addition, according to BSNP (2006), a device is deemed feasible and valid in accordance with the criteria, meaning that the device is arranged in a complete and systematic manner so that learning becomes fun, inspiring, interactive, and motivates students to be active in learning. The validation results of the learning device developed in detail are explained as follows.

Learning Implementation Plans that have been developed as a guide for teachers in providing learning using structured inquiry models with brainstorming strategies to improve students' creative thinking skills in accordance with the opinion of Sugiyono (2006) that is learning through logical, objective, logical, and rational observation and recording processes in learning and interaction activities to achieve a goal. RPP is assessed or validated by three validators. The results of the assessment of the RPP described in table 4.1 consist of three discussions, namely the presentation of content, language, and time allocation with a total of 11 statements that scored between 3.33-4. After the discussion process, improvements were made to the lesson plan according to the validator's suggestions. Some of the improvements made in the RPP are replacing the formulation of indicators, namely the triggering word into a more operational word so that it is easy to measure or evaluate student activities by replacing them with decisive words. Another improvement is about the stages of structured inquiry model activities that have not been too visible in learning. the stages of structured inquiry model activities are also adapted to several aspects of creative thinking which include the ability to find new ideas known as fluency in thinking, being flexible in developing an idea or flexibility, having a fast and responsive response to certain situations or original, and thinking in detail or elaboration to make it more visible in learning.

The results of the validation of Student Teaching Materials (BAS) developed, are presented in table 4.2 with three discussions, namely about content, presentation, and language getting scores between 3.33-3.67 with a total of 19 statements included in the valid category according to the adapted assessment from Ratumanan and Laurens (2015) which showed that the score was included in the valid category with a slight revision. The three validators gave approval that the teaching materials developed could be used in the study with several revisions. Some of the improvements or revisions suggested by the validator are the fonts used should be replaced so that they are more clearly read by elementary school students, it is recommended to present the images in each experimental step both experiments about the nature of light and about making optical devices, and need diagram or explanation of human processes seeing an object around it. According to Nieven (1999) in developing material in a teaching material must be adjusted to the level of knowledge of students.

Other learning tools that are validated after RPP and teaching materials are Student Worksheets (LKS). LKS developed based on a structured inquiry model with a brainstorming strategy was measured by three expert validators presented in table 4.3 getting valid results with scores between 3-4 with a total of 11 statements. LKS given to students consists of four LKS. LKS 1 contains the experimental activities of light properties propagating straight and penetrating clear objects that stimulate students to think creatively solve problems that occur related to events in everyday life about light that propagates straight, students also must determine objects that can be penetrated by light an observation table. The next LKS, which is LKS 2, contains experiments on the nature of light that can be reflected and decomposed. In this learning activity students are given several mirrors which are included in a flat, concave and convex mirror. Students are stimulated to express their creative ideas when distinguishing the results of shadows on the three mirrors. The activity carried out by the students is to prove that light can be described by making bubbles from the liquid soap that is seen with the sun's heat. LKS 3 contains student activities about the last nature of light, namely light can be refracted. Problems in daily life about refraction of light are presented in the LKS and make students with the group discuss seeking solutions to problems. The last LKS is a four LKS about making a simple optical instrument (kaleidoscope). The selection of kaleidoscope as an optical instrument that will be made by students with the group is because this is a new thing for students. Previously students were only taught how to make a color spectrum and use a periscope on light material explanations. The kaleidoscope that is made combining the properties of light can be reflected.

Suggestions given by the validator on LKS one to four are at each stage of the steps in the LKS should be given a picture so that students are more interested and can understand clearly when conducting experiments with their groups. LKS used contains experiments that must be done by students and groups that can improve their creative thinking skills. In this learning activity students are expected to be active in each activity. Students also have to build collaboration with groups and express creative ideas that will later be agreed upon in filling out the questions contained in the LKS. The activity in learning science lies in two aspects, namely the aspect of acting and active thinking. Science learning in schools is centered on students and emphasizes the importance of active learning which will change the opinion that teachers always provide information and become a source of knowledge for students (NRC, 1996).

The results of the assessment of the syllabus are presented in table 4.4 which is considered valid with a score between 3.33-4 by three validators. The syllabus is given a very good rating because it gets 4 more scores than the score 3. Score 4 is obtained because researchers have linked KI and KD in the subjects, the activities presented in the syllabus already contain the outline of student activities, time allocation has been adjusted to the material, the use of language is easy to understand and in accordance with EYD. The validated syllabus can be directly used in research without revision. The syllabus prepared is also in

accordance with Permendikbud No. 54 of 2013 concerning Competency Standards for Primary and Secondary Education Graduates.

The next component of the learning device after the RPP syllabus, LKS and teaching materials is a test of creative thinking skills described in table 4.5. The test sheet was developed to find out the students' creative thinking skills after the inquiry model was structured with a brainstorming strategy. This test is given before and after teaching and learning activities. The creative thinking ability test sheet is used to determine the ability of students to think original, smooth, flexible, and detailed. In addition, tests are also arranged to provide training and motivate students to find knowledge by themselves. This is supported by the opinion of Schunk (2012) which explains that students need to be trained, get feedback, obtain tinjauan and explanations, and get motivations that affect learning. Assessment was carried out in the form of pretest and posttest.

Tests given to students are in the form of descriptions. Each question contains aspects of creative thinking. The test of creative thinking ability uses a description of the questions that students can answer freely and broadly according to their imagination and opinions. In some questions requires student answers more than one answer so students can write various creative ideas about solutions to problems that are in the question. Assessment of the answers to each question ranges from 1-4 according to the existing assessment criteria and is given a score of 0 if the student does not provide an answer to the question. The creative thinking aspects of originality, fluency, and flexibility consist of each of the 2 questions, while the elaboration aspects have 3 questions with the total test questions being 9 questions.

The results of the validation assessment of the creative thinking ability test by three validators are presented in table 4.5 by getting a score between 3.33-3.67 which is included in the valid category and can be used without revision. The validator only gives suggestions on the presentation of the images contained in the test questions. It should be clearer by enlarging the size. Creative thinking tests are arranged according to the environment around students that are often found and found so students are not familiar and can apply new knowledge gained in everyday life. Problem solving or learning like this requires conceptual understanding so students can do what they have learned in real life (Anderson and David, 2001).

Based on the description above, the results of the assessment of RPP, BAS, LKS, syllabus and creative thinking ability tests are valid, so that they can be used in research with several improvements and improvements to the selection of letters that fit elementary school students, choosing the appropriate operational verbs on the indicator so that it is easy to take measurements or assessments, present images and diagrams in the process of seeing an object, present images at each step of the experiment, show steps for activities that use a structured inquiry model with brainstorming strategies for each learning activity, and time management that must be correct really noticed because all activities contain experiments.

The next discussion about learning devices after validity is practicality. The practicality of structured inquiry learning models with brainstorming models was analyzed through the implementation of RPP and student activities during learning. The results of the analysis of the implementation of RPP meetings 1, 2, and 3 obtained a well implemented category and were very well presented in tables 4.6 to 4.8 with a percentage of 75% -100% in each activity. The activities observed consisted of 5 research focuses, namely preliminary activities, core activities, final activities, classroom management, and time management. During the learning process, researchers are observed by two observers. Observers have the duty to observe carefully whether the learning activities carried out by the researcher are appropriate or not in accordance with the lesson plan. This is in accordance with the opinion of Sugiyono (2016) a process of observation and recording that is systematic, logical, objective, and rational regarding various activities in the form of thoughts and in interactions to achieve certain goals. Observers try to observe whether there are learning activities that appear and do not appear, or learning activities that are only discussed quickly and not too detailed by the researcher. The results of observations that have been made indicate that learning activities are appropriate, all activities have arisen, researchers are coherent in teaching, and can manage the class well. This is in accordance with a study by Sari et al (2015) on the Implementation of Guided Inquiry Combined with Brainstorming Activities to Improve Integrated Science Process Skills in Biology Learning in eleventh grade students of MIA 2 Karanganyar Senior High School 1. This research proves that by applying the inquiry model and brainstorming helps students understand science concepts or material by the way they directly find out their knowledge by conducting experimental activities in groups that work together to solve a problem by discussing and mutually agreeing.

Activities carried out by observers in addition to observing the activities of the teacher or researcher are observing student activities. Student activities observed include student attitudes that arise when learning takes place. Observers give an assessment of the activities of students who actually observe the teacher when giving explanations, students who actively ask or answer the questions of the teacher, students who are not active during learning, students who immediately complete the task given, students who can work with groups, and students who want to come up with creative ideas during learning. the results of assessment of student activity by two observers are presented in tables 4.9 to 4.11. in the table data obtained is high and

very high student activity in receiving learning with a percentage of 75% -96% in each activity in accordance with the criteria delivered by Riduwan (2010). They carry out learning activities according to the focus of research that supports them to be active, work together and play a creative role in solving problems in daily life related to the subject matter of light.

A good learning tool is seen in terms of validity, practicality, and effectiveness. The effectiveness of learning devices can be analyzed from the results of student responses and the results of tests of creative thinking skills. Questionnaire for student responses is given at the end of the lesson, namely at the third meeting of each class. Questionnaire for student responses was filled by 30 students who were the subjects of the study. The results of student responses are presented in table 4.12 with details of the percentage that answered "yes" between 73% -90% while answering "no" between 10% -27% in statements relating to the implementation of learning. In accordance with Riduwan's assessment criteria (2010) the results of student responses belong to the strong and very strong category of learning. They were interested in structured inquiry model learning with brainstorming strategies because the model and strategy jasmine students gave rise to creative ideas in the form of opinions which were grouped together and discussed to be agreed upon. Students also feel that learning with these models and strategies is easy to understand especially given a companion book, which is student teaching materials that have been given interesting colors and images so that students are more interested and motivated to read them. Learning carried out by students with structured inquiry models with brainstorming strategies is very fun to increase student motivation for activities carried out high by marked positive responses given by students. This statement is in line with the opinion expressed by Kurl Kelvin (Sanjaya, 2014) that factors that can encourage individuals to behave because of the motivation that arises because there are benefits of certain attractions.

The effectiveness of a device can also be seen from the results of students' creative thinking tests. The results of the students' creative thinking ability test presented in table 4.13 show students have creative thinking skills with an average gain of 0.44-0.93 which is included in the medium and high categories. there was an increase in the results of the students' creative thinking test at the pretest and posttest. Students who get the complete score are students who get a score of more than 70. At the pretest there are two students who complete from 30 students, while in the post all students get a complete category. The low level of creative thinking ability of students who were asked on the pretest questions because students had not obtained the question information. In addition, students are also not used to solving problems that require themselves to think creatively. Another factor that causes the low level of creative thinking of students at pretest is because students do not have direct learning with them looking for answers from experiences done by students, so that there is a difference of understanding in working on a problem. The test uses a structured inquiry model with a brainstorming strategy that consists of 9 problem questions, each of which contains aspects of creative thinking including, original, flexibility, fluency, and elaboration. N-gain calculation is not only done on students but also on aspects of creative thinking presented in table 4.14. The original aspects, fluency, and elaboration get moderate gain while the flexibility aspect gets high gain. The average score of n-gain aspects of creative thinking is between 0.55-0.85. This is in accordance with research by Kadir et al. (2017) on the Implementation of Open-Inquiry Approaches to Improve Students' Learning Activities, Responses, and Mathematical Creative Thinking Skills combined with research by Romadhoni (2014) on the Effectiveness of Applying Brainstorming Methods to Improvement Interests and Economic Learning Achievements of Grade X Students at YPKK 3 in Sleman. The results of this study indicate that by applying the inquiry model and adding brainstorming strategies to science learning make students improve imagination, creativity, and work together in solving problems.

V. Conclusion

After doing the research, it can be concluded that the structured inquiry learning model with appropriate brainstorming strategies is used in terms of its validity, practicality, and effectiveness as well as improving students' creative thinking skills. The advice that can be given is if you want to improve your ability to think creatively, use a structured inquiry model with brainstorming strategies that have been proven to improve the creative thinking skills of elementary school students. If using a structured inquiry model learning tool with a brainstorming strategy, time preparation and management needs to be considered, because the learning involves experimental activities and requires considerable time. Research needs to be conducted for the wider trial subjects in the use of structured inquiry model learning tools with brainstorming strategies

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Effect of phosphate fertilizer application on manganese adsorption by some soils in Borno state

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DOI: 10.29322/IJSRP.9.08.2019.p9214

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9214>

Abstract-The study was carried out to investigate the effect of phosphate fertilizer application on manganese (Mn) adsorption. Composite sandy loam and loam soil samples (0-20 cm) were collected from Dalori and Gongulong and analysed for their texture and chemical properties. Mn adsorption experiment was carried out. Loamy soil collected at Gongulong was moderately acidic in reaction, moderate in electrical conductivity (EC), high in base saturation, moderate in organic carbon, low in available phosphorus, and low in DTPA extractable Mn. While sandy loam soil collected at Dalori is neutral in reaction, low in EC, high in base saturation, low in organic carbon and low in DTPA extractable Mn. For sandy loam soil, there was no definite trend in the equilibrium Mn concentration with and without phosphate (P) fertilizer treatment, with increasing application of Mn concentrations. There was however no difference in the amount of Mn adsorbed by the soils when P fertilizer was added. For loam soil, there was no definite trend in the equilibrium Mn ion concentration of the soils with increasing application of Mn levels to the soils with and without P fertilizer treatments. There was however an increase in the amount of Mn adsorbed by the soils. There was no difference in the amount of Mn adsorbed by the soils when P fertilizer was applied. Data were fitted into Langmuir and Freundlich equations. Loam soil without P conformed to Langmuir equation, while for Freundlich isotherm, loam soil with P treatment conformed to the equation. The results showed that maximum adsorption (b) for loam soil without P was 0.99mg/g and binding strength (K) of -214.92 ml/ μ g. While for Freundlich, the adsorption constant (K) and (n) were 1.28 and -0.21 respectively. This study have revealed that there is no observable effect on the amount of Mn adsorbed by the soils after P fertilizer was applied and on the other hand do not reduce bioavailability of Mn in soil.

Key words: Manganese, Adsorption, Phosphate, Freundlich, Langmuir.

Introduction

Manganese (Mn) is a naturally occurring element that is found in rock, soil, and water. Manganese (Mn) is present in the soil in greater quantities than other trace elements, with the exception of iron. It is ubiquitous in the environment and comprises about 0.1% of the Earth's crust (Siegel and Siegel, 2000). Manganese is present in soil as a result of mineral weathering and atmospheric deposition, originating from both natural and anthropogenic sources. There are three possible oxidation states of manganese in soil, namely Mn(II), Mn(III) and Mn(IV). The divalent ion is the only form that is stable in soil solution, while Mn(III) and Mn(IV) are only stable in the solid phase of soil (McBride, 1994). The bioavailability of Mn in soils is generally adequate at pH < 6.5 but it becomes significantly lower in soils with higher pH values (Ducic and Polle, 2005).

Manganese is used in plants as a major contributor to various biological systems including photosynthesis, respiration, and nitrogen assimilation. Manganese is also involved in pollen germination, pollen tube growth, root cell elongation and resistance to root pathogens. It also serves as electron storage and delivery to the chlorophyll reaction centers (Diedrick, 2010; Millaleo *et al.*, 2010).

Manganese deficiency symptoms, which often look like those of iron deficiency, appear as interveinal chlorosis on the young leaves, and sometimes tan, sunken spots that appear in the chlorotic areas between the veins. Plant growth may also be reduced and stunted. Manganese deficiency can occur when the pH of the growing medium exceeds 6.5, because it is tied up and unavailable for uptake. Manganese toxicity symptoms begin with the burning of the tips and margins of older leaves or as reddish-brown spots across older leaves. Severe toxicity may result in spots becoming more numerous and larger, forming patches on the older leaves. At pH levels below 5.5, manganese is very soluble and toxicity symptoms are probable (EdBloodnick, 2015).

Adsorption is another potential process controlling bioavailability of manganese in soil. Adsorption is the accumulation of gases, liquids, or solutes on the surface of a solid or liquid. It is the process by which molecules of a substance, such as a gas or a liquid, collect on the surface of another substance, such as a solid. The molecules are attracted to the surface but do not enter the solid's minute

spaces, as in absorption (AHDSS, 2014). Adsorption of Mn has been shown to conform to the Langmuir or Freundlich isotherm (Willett and Bond, 1995). Adsorption increases with increasing pH, due to the increased hydrolysis species of Mn^{2+} that is preferably adsorbed and increased negative charge on the exchange complex (Reddy and Perkins, 1976).

In well aerated soils, phosphates are of major importance in controlling the level of micronutrients in soils and they are a limiting factor in the soils of arid and semi-arid regions of the world. For optimum utilization of manganese by the crops, knowledge of behavioural interaction of phosphate fertilizers and manganese is essential. Information on adsorption characteristics of manganese as affected by phosphate fertilizers in soils are scarce in literature despite its relative importance as essential micro nutrient. Therefore the objective of this study is to determine the effect of application of 100ppm phosphorus on manganese adsorption by some soils in Borno State.

Materials and Methods

Sampling site

The study was carried out with the soils of Borno state with coordinates 11°30'N 13°00'E and about 350m above sea level (Encyclopedia, 2013). with annual mean rainfall and temperature of 650mm and 32°C. The soils of Borno State vary in colour, texture, structure, physico-chemical and other essential characteristics from the hilly south to the northern dune landscape (Nigerian Wiki, 2008). The vegetation is a mixture of Sudan Savannah and Sahel Savannah dominated with Acacia species (Nigerian Wiki, 2008).

Soil Sampling and Handling

Composite sandy loam and loam soil samples (0-20cm) were collected from two different locations namely; Dalori (11.78574°N and 13.27079°E) and Gongulong-Lawanti Agricultural Area (11.89629°N and 13.19534°E). The soils were air dried, ground to pass through 2mm stainless steel sieve and the texture was confirmed in University of Maiduguri Soil Science laboratory and used for routine physico-chemical properties determination and for the adsorption experiment.

Manganese adsorption experiment

2g of soil was weighed into series of plastic bottles. 25mls of double strengthed manganese concentrations (0, 50, 100, 150, and 200 ppm) were added to the bottles. 5mls of 1000 ppm P was added to the appropriate bottles. 20mls of 0.02M $CaCl_2$ was added to the bottles containing P and 25mls to those without P. The final concentrations of manganese were 0, 25, 50, 75 and 100 ppm and the final strength of $CaCl_2$ and P were 0.01M and 100 ppm respectively. The bottles were shaken with WS-2 100A

SERADON platform shaker at 27°C at 400rpm for one hour and equilibrated for 24 hours and Mn concentrations in equilibrium solutions were determined using uv smart spectrophotometer. The amount of adsorbed Mn was calculated by the difference between Mn added and that

remained in the equilibrium solutions multiplied by soil solution ratio. The obtained results of adsorption experiments were tested with Langmuir and Freundlich adsorption equations. Langmuir equation is as follows:

$$X = \frac{kbC}{1+kC}$$

Where C and X are the equilibrium ion concentration and the amount of ion adsorbed and the constants b and k which are related to adsorption maximum and binding strength of the adsorbent. Using the Langmuir isotherm, a graph of C/X against C was plotted where the slope (1/b) and intercept (1/Kb) from which both binding energy (K) and maximum adsorption (b) were found.

Freundlich adsorption equation is as follows:

$$\text{Log } X = \text{Log } K + n \text{ Log } C,$$

Where X is the amount of substance adsorbed per unit weight of adsorbent, C is the equilibrium concentration of the adsorbate, K and n are constants. Using Freundlich isotherm, a graph of Log X versus Log C was plotted giving a straight line from which the slope(n) as adsorption intensity and intercept (Log K) can be used to obtain the adsorption constant (K) by taking the antilog for soils that have conformed to the model.

Results and Discussion

The particle size of the soil sample collected at Gongulong had 47.10% sand, 43.20% silt and 9.70% clay with textural class of loam and soil at Dalori contained 64.60% sand, 28.20% silt and 7.20% clay and with textural class of sandy loam (Table 1).

Table 1: Particle size distribution of the soil samples

Soil sample	Sample Location	%			Textural class
		Sand	Silt	Clay	
1	Dalori	64.60	28.20	7.20	Sandy-loam
2	Gongulong	47.10	43.20	9.70	Loam

Loamy soil collected at Gongulong was moderately acidic in reaction, moderate in electrical conductivity (EC), high in base saturation, moderate in organic carbon, high in calcium, very high in magnesium, moderate in potassium, high in sodium, low in available phosphorus, and low in DTPA extractable Mn. While sandy loam soil collected at Dalori is neutral in reaction, low in EC, high in base saturation, low in organic carbon, low in calcium, high in magnesium, low in potassium, high in sodium, low in available phosphorus, and low in DTPA extractable Mn as in Table 2.

Table 3 shows the results obtained from adsorption studies. There was no adsorption of Manganese (Mn) as to the treatments with 0 level Mn. But amount of Mn adsorbed increase with increase in Mn level from 25µg/ml to 100µg/ml for all the soils with and without phosphorus (P). For example in loamy soil from Gongulong without P when no Mn was applied there was no adsorption but when 100µg/ml level of Mn was applied, the amount of adsorbed

Mn was 2.50mg/g. This shows that as the Mn concentration increases Mn adsorption also increases in the soils.

There was no difference in amount of Mn adsorbed by soils with P and without P for both sandy loam and loam.

Table 2: Chemical properties of the 2 soil samples

SS	ST	SD (cm)	pH	EC (ms/cm)	Meq/100g Soil								%		P (mg/g)	av. Mn (µg/g)
					EA	Ca ²⁺	Mg ²⁺	K ⁺	Na ⁺	CEC	ECEC	BS	O.C			
1	SL	0-20	7.06	0.220	0.20	4.40	7.40	0.18	0.87	12.85	13.05	98.47	0.49	5.60	0.82	
2	L	0-20	5.85	0.268	0.20	10.20	11.00	0.40	1.39	22.90	23.19	99.14	1.21	15.40	0.84	

SS soil sample, ST soil texture, SD sampling depth, EC electrical conductivity, EA exchange acidity, BS base saturation, OC organic carbon, av. available

Table 3: Manganese adsorption data

Soil sample	Soil texture	Treatments	Initial Mn concentration (µg/ml)	Equilibrium concentration (µg/ml)	(C)	(X)	C/X	Log X	Log C		
					Equilibrium concentration-Zero concentration (µg/ml)	Amount of Mn adsorbed (mg/g)					
1	Sandy loam Without P	100	0	0.18	0.00	0.00	0.00	0.00	0.00		
		101	25	0.39	0.21	0.62	0.34	-0.21	-0.68		
		102	50	0.16	-0.02	1.25	-0.016	0.0969	1.70		
		103	75	0.46	0.28	1.87	0.15	0.27	-0.55		
		104	100	0.20	0.02	2.50	0.008	0.39	-1.70		
	Sandy loam With 100 ppm P	110	0	0.19	0.00	0.00	0.00	0.00	0.00		
		111	25	0.46	0.27	0.62	0.44	-0.21	-0.57		
		112	50	0.65	0.46	1.24	0.37	0.09	-0.34		
		113	75	0.14	-0.05	1.88	-0.027	0.27	1.30		
		114	100	0.09	-0.10	2.50	-0.04	0.40	1.00		
		2	Loam without P	200	0	0.25	0.00	0.00	0.00	0.00	0.00
				201	25	0.42	0.17	0.62	0.27	-0.21	-0.77
				202	50	0.22	-0.03	1.25	-0.024	0.0969	1.52
				203	75	0.43	0.18	1.87	0.096	0.27	-0.74
204	100			0.32	0.07	2.50	0.028	0.40	-1.15		
Loam With 100ppm P	210		0	0.05	0.00	0.00	0.00	0.00	0.00		
	211		25	0.01	-0.04	0.63	0.063	-0.20	1.40		
	212		50	0.62	0.57	1.24	0.46	0.093	-0.24		
	213		75	0.14	0.09	1.87	0.048	0.27	-1.05		
214	100	0.64	0.59	2.49	0.24	0.40	-0.23				

With regards to the equilibrium concentration, for sandy loam soil without P treatment and loam soil with P treatment, as concentration of Mn increases, the equilibrium concentration increase and then decreased with no observable definite trend. While for sandy loam soil with P treatment, as the Mn level increases, there was increase first and then decrease in equilibrium concentration as shown in figures 1 and 2.

Harter (1991), in a review of the subject, concluded that, adsorption isotherms have provided the majority of information about micronutrient adsorption by soils. For

Langmuir adsorption isotherm, only loam soil without P conformed (Fig. 3) while for Freundlich adsorption isotherm, only loam soil with P treatment conformed (Fig. 4) and these have agreed with the findings of Willett and Bond (1995) who concluded that adsorption of Mn has been shown to conform to the Langmuir or Freundlich isotherm. While sandy loam soil with P treatment and without P have not conformed to either of Langmuir or Freundlich isotherm and this may be due to their difference in adsorption behaviours that can be attributed to physiochemical properties of the adsorbents and the cation anion pairs,

solution pH, surface adsorption coverage as stated by Wang and Xing (2002).

Using the Langmuir and Freundlich equations, adsorption constants for loam soil without P and loam soil with P which conformed to the models were evaluated. The results showed that maximum adsorption capacity (b) for loam soil without P was 0.99mg/g and binding strength (K) of -214.92ml/ μ g. While for Freundlich, the adsorption constant (K) and (n) were 1.28 and -0.21 for loam soil without P. This study have revealed that there is no observable effect on the amount of Mn adsorbed by the soils after phosphate fertilizer was applied and on the other hand do not reduce bioavailability of Mn in the soils as to the findings of Ajouri *et al.*, 2004 who concluded that phosphorus induced micronutrients deficiency is not common to all soils, crop species and environmental conditions, but it has been proved in various soils and crops. Also John (1999) stated that phosphorus/Mn interactions can develop when soil Mn availability increases with higher soil P levels. On some soils this is believed partially due to increased soil acidity from high rates of P.

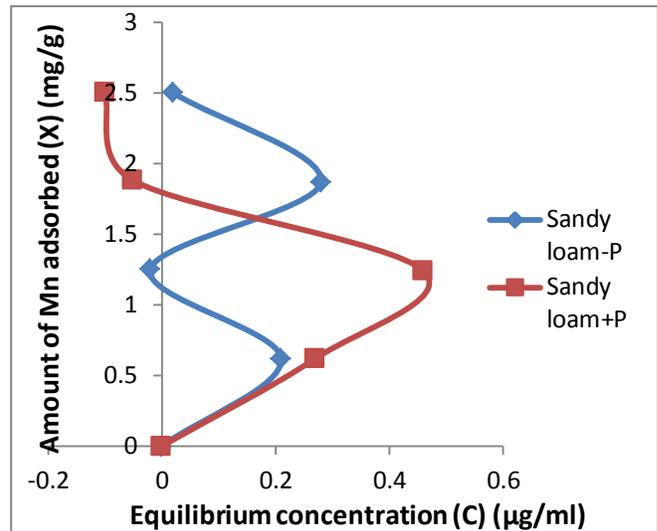


Fig. 2: Adsorption isotherm for sandy loam soil with P and without P

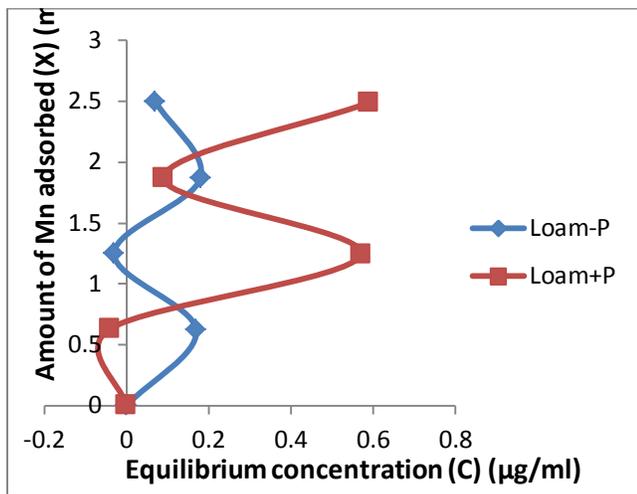


Fig. 1: Adsorption isotherm for loam soil with P and without P

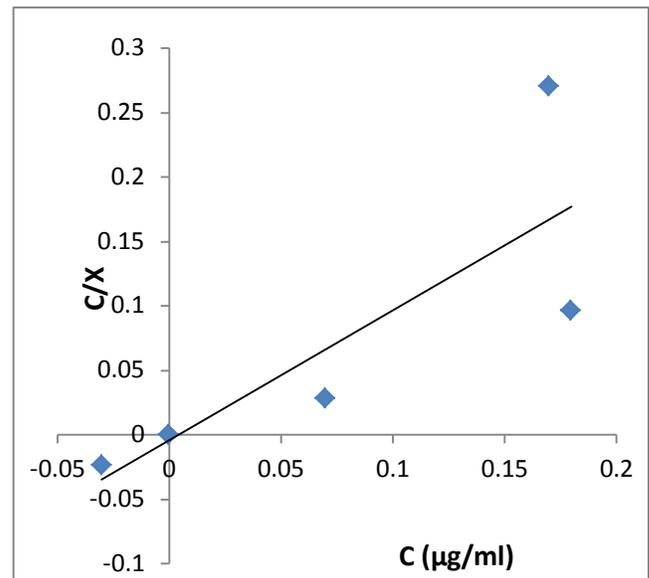


Fig. 3: Langmuir isotherm for loam soil without P

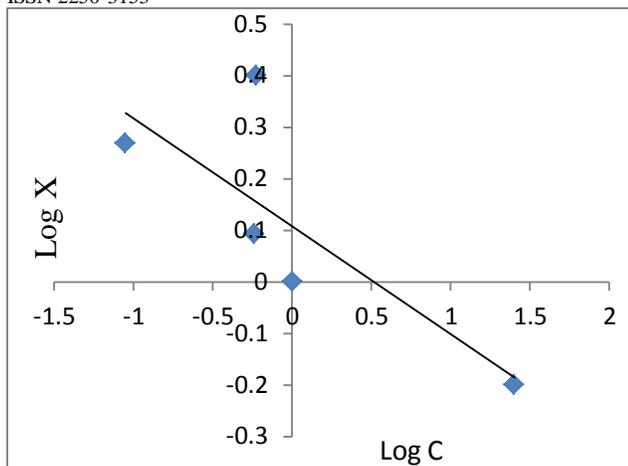


Fig. 4: Freundlich isotherm for loam soil with P

Conclusion

The application of $100 \text{ mg kg}^{-1} \text{ P}$ had no effect on the adsorption of Mn by both loam and sandy loam soils studied.

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Enhancements and Alternatives Proposed for Emergency Homing Devices

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DOI: 10.29322/IJSRP.9.08.2019.p9216

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9216>

Abstract- This paper deals with the problems faced by the current designs of aircraft-based emergency homing devices like ELTs (Emergency Locator Beacons) and ULBs (Underwater Locator Beacons). Particularly, it deals with issues like low battery life of the transmitters and remaining in a deactivated state even after a crash. Many alternative methods are proposed which can make the homing beacons more efficient.

Index Terms- Black box, Electronic Locator Transmitter, Search and Rescue, Underwater Locator Beacon

I. INTRODUCTION

There have been 1114 commercial airplane accidents since 2008 [1,2]. When an aircraft crashes, specialized hardware, namely a black box, is responsible for protecting the flight data recorder (FDR) and cockpit voice recorder (CVR), which is used to collect information about flight instruments and pilot's interaction just before the crash. This information is crucial to ascertain the cause of the crash and improve safety in aviation. According to EUROCAE, the black box is made to withstand extremely high pressures of over 3400 g and temperatures of about 1000 deg C [3]. In addition, the black box also has integrated ULB (Underwater Locator Beacon) for SAR (Search and Rescue) operation, which are of acoustic pinger type and have varying amounts of range depending on weather conditions (2-5 km). Also, they usually transmit over the 8.8 or 37.5±1 kHz band and have an underwater transmission depth of 6096m. [4,5,6] Additionally, they have a life of about 30/90 days, after which the signal begins to degrade and the output decreases as a result [6].

To transmit such emergency signals when crash happens in land area, ELT (Emergency Locator Transmitter) is used. The International Civil Aviation Organization (ICAO) defines an ELT as equipment which broadcasts distinctive signals on designated frequencies and, depending on the application, may be automatically activated by impact or be manually activated [b]. ELTs are radio beacons carried on most aircraft so that in the event of an accident in a remote location the aircraft wreckage and its occupants can be located quickly by search and rescue (SAR) operations. Finding the aircraft wreckage quickly not only

increases the chance of survival of the occupants but also reduces the risk to pilots of SAR aircraft who commonly need to operate in marginal weather conditions and over mountainous terrain.

Over the years, there have been various cases of failure of ELT/ULB, two of which are Air France flight AF447 on June 1, 2009. It took 2 years and \$41 million dollars to recover the black boxes, because its location could not be pinpointed due to the low pinging frequency of one in 10 minutes. Another famous incident occurred on March 8, 2014, where Malaysia Airlines flight MH370 veered off course and reportedly crashed somewhere in the ocean. In this case, no pings were heard and the search was stopped after 5 years which was conducted by 26 countries and approximate cost of search operations was \$200 million dollars [7].

For this paper, we will focus on ELTs, as they have a much shorter life as compared to ULBs. However, the core technology used remains the same, and thus all ideas discussed in this paper will also be applicable to ULBs unless stated otherwise.

ELTs are of many different types, based on their application, some of which are-

Automatic fixed ELT (ELT/AF): An automatically activated ELT which is permanently attached to an aircraft.

Automatic portable ELT (ELT/AP): An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.

Automatic deployable ELT (ELT/AD): An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment capability is also provided.

Survival ELT (ELT/S): An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors [8].

II. BACKGROUND AND HISTORY

Before 1970, whenever a plane met with an accident in a remote area, it was very difficult to locate the plane and provide rescue operations to the survivors. Sometimes it took many days to find the location of the accident and quite a few times the plane was

never found. Because of this problem, a need was felt to develop a mechanism so that the plane can be located at the earliest in the event of an accident. For this it was decided to install a radio beacon called ELT (Emergency Locator Transmitter) in the plane such that in the event of an accident this ELT should get activated and should start emitting the radio beacon and by using this beacon the site of the accident can be quickly searched out and rescue operation can be performed at the earliest. The basic purpose of this system is to help rescuers to find survivors within the so-called "golden period" (the first 24 hours following an accident) during which the majority of survivors can usually be saved.

In 1970, the USA mandated to install Emergency Locator Transmitter (ELT) in all general aviation airplanes by December 30, 1973. These ELTs were operating at 121.5 MHz frequency, the designated international distress frequency. These ELTs were manufactured to the specifications of a Federal Aviation Administration (FAA) technical standard order (TSO-91) [9].

ELTs were originally intended for use on the 121.5 MHz frequency to alert air traffic control and other aircraft monitoring the frequency.

In 1982, a satellite-based monitoring system named COSPAS-SARSAT was implemented, to provide a better way to detect these distress signals. This satellite-based monitoring system was monitoring the distress signals at 121.5 MHz, 243 MHz, and 406 MHz radio frequencies. However, such a satellite-based monitoring system was receiving a high number of false signals at 121.5 MHz and 243 MHz frequencies. It was found that such false alert signals were mainly from old ELTs. In 2009, the international COSPAS-SARSAT satellite system discontinued satellite-based monitoring of the 121.5/243 MHz frequencies, in part because of a high number of false signals attributed with these frequencies. Satellite monitoring today utilizes the 406 MHz frequency only [10,11].

In USA Federal Aviation Administration (FAA) Issues Technical Standard Orders (TSO) which states a minimum performance standard for specified materials, parts, and appliances used on civil aircraft. Generally, these standards are followed by many countries.

- In 1985, a new TSO-C91A for ELT was issued, this was operating at 121.5 MHz frequency [9].
- In 1992, TSO C126 for ELT was issued, this was operating at 406 MHz frequency [12].
- In 2008, TSO C126a for ELT was issued, this was operating at 406 MHz frequency [13].
- In 2012, TSO C126b for ELT was issued, this was operating at 406 MHz frequency [14].

However, the International Civil Aviation Organization (ICAO) requires that ELTs carried in airplanes shall operate on both 121.5 MHz and 406 MHz. Though satellite system no longer identifies 121.5 MHz signal, it is useful for homing. [15,16]

Operation of an ELT:

Ideally, it is required that in the event of an accident, the ELT should get activated and should start emitting the radio beacons

at 406 MHz frequency signal and 121.5 MHz frequency signals periodically up to next 24 Hrs. or 48 Hrs. **For this, ELTs get triggered due to high g-force typical of airplane crash or temperature, whichever goes above the threshold first.**

The 406 MHz signal will be detected by the satellite network and its location can be estimated by satellite system using doppler triangulation or by GPS trilateration [10]. This location estimate will be provided to the Search and Rescue operation team and hence the survivors can be saved at the earliest (within golden hours).

Similarly, 121.5 MHz signal can be received by local ATC or nearby local observation center. This can help the Search and Rescue operations without satellite network.

Why the accident site cannot be located earliest despite having ELT:

The main reason for this is that **at about 40% of time ELT does not get activated** [17]. Hence no signal on 406 MHz frequency or 121.5 MHz frequency are available to be detected. Also, in some cases, the ELT gets damaged in the accidents mainly due to fire or due to the force of impact.

Issues with the present form of ELTs:

Airframe mounted ELTs are designed to automatically activate following an impact typical of a collision. However, the effectiveness of airframe ELTs in aviation accidents has been questioned by accident investigation agencies and by the aviation community. A government organization, Australian Transport Safety Bureau (ATSB) has done the research investigation to identify the safety concerns regarding the operation of ELTs and presented data on the effectiveness of ELTs activating following an accident. In this research investigation, the ATSB identified safety concerns regarding the operation of ELTs and presents data on the effectiveness of ELTs activating following an accident.

ATSB found that ELTs function as intended in only about 40 to 60 percent of accidents in which their activation was expected.

Therefore, the main issue with the present form of ELTs is that in the majority of cases it doesn't get activated. In some cases, the ELT gets damaged in the accident.

Accidents and Incidents where ELT is not damaged but does not get activated [18]:

- AN 32, Indian Air Force, Jun 2019, Arunachal Pradesh, India, ELT did not get activated in the crash.
- Cessna 182P Skylane June 2012, Maryvale Station (near Cunnamulla), Queensland, the fixed fuselage mounted ELT did not activate during the impact.
- B190, Blue River BC Canada, 2012 - The impact forces had not been enough for the ELT to be activated.
- Piper PA-30 Twin Comanche, May 2001, Archerfield Airport, Queensland, the ELT did not activate as a result of the initial impact.

- Mooney M20J from Jandakot to Laverton, Western Australia, 1998 - ELT was not activated despite high G-force of the accident.

Accidents and Incidents where ELT was damaged [18]:

- S76, vicinity Moosonee ON Canada, 2013 - The wreckage, which was near to the departure airport, was not located for over 5 hours after the ELT failed to function. The ELT failure was attributed to the tail boom-sited external antenna being severed.
- E190, en route, Bwabwata National Park Namibia, 2013 - No distress calls were made and no signal was transmitted from the ELT after the crash. This was

III. ENHANCEMENTS AND ALTERNATIVES PROPOSED

Despite many different ways to mount the ELT, the failure of the ELTs to get activated in the event of accidents remains the main reason for ELT not being useful and not being able to provide the Search and Rescue operations within time to the survivors.

Hence below mentioned additional enhancements are suggested to increase the ELT effectiveness and locate the accident site, even if ELT was not activated on accident.

These enhancements are suggested keeping in view the requirements of civilian as well as defense planes. Kindly note that these enhancements suggested below are also applicable for Underwater Locator Beacons (ULBs) unless stated otherwise.

1. It should be possible to activate ELT remotely using Radio Frequency signals (RF) so that even if the ELT is not activated in the event of an accident it can be activated via radio frequency signals before the search operations begin. For this, ELT should be provided with the ability to listen passively at a designated frequency or frequencies. When an ELT receives the activation signal for its own ID, at that particular designated frequency, it should get activated and start emitting the emergency beacon signals at 406 MHz frequency (and 121.5 MHz frequency).

2. It should be possible to send these activation signals via any of the below-mentioned methods:

2.1 Local ATC signals.

2.2 RF signals from the Search and Rescue team during SAR operation.

2.3 Satellite return link of the system like COSPAS-SARSAT. This is useful when the area where the accident happened is not known at all or the probable area is too big for the signals mentioned in the options 2.1 and 2.2 above.

3. However, in respect of the planes whose operations are critical in nature like defense planes, remote activation of ELT via radio frequency signals as mentioned above may become a security issue. If someone wants to know the location of that plane, then it may activate the ELT of that plane by sending the activation signals to that ELT. Once the ELT starts emitting the radio beacon, the location of the plane can be easily detected

found to be due to a break in the coaxial cable which linked the unit to the external antenna.

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- MD83, en route, near Gossi Mali, 2014 - No signal was received from the ELT and it was found damaged at the crash site.
- C130J, en-route, northern Sweden 2012 - The ELT did not transmit and was found to have sustained major damage at impact.

even though the plane is operating normally. Hence ELT should be activated only on receipt of authenticated secure signals. It should be possible that such authenticated secure signal can be sent via any of the ways mentioned in point 2 above.

4. It should be required that one authenticated secure signal can be used only once. It should not be possible to re-use the same authenticated secure signal. This is required in view of the fact that these authenticated secure signals are sent via radio frequency, which can be easily captured off the air. If the restriction of using one authenticated secure signal only once is not imposed then it will be possible for the other entities to use such off the air captured signal to activate the ELT and locate the plane

It should be possible to activate ELT in any of the below mentioned ways

5.1 ELT can be activated such that ELT will keep on emitting the radio beacon for 24 to 48 Hrs. This is the normal way in which ELT is supposed to be activated in the event of an accident.

5.2 ELT can be activated such that ELT will emit one or two or some predefined number of beacons only. This mode will be useful when the search and rescue team will be activating the ELT during its search operation and such activation signals are sent from the device onboard with the search and rescue team. This will provide the efficient use of the battery in the case of accident and also, we can have the scope for more powerful beacons. This will also provide a longer battery life. Also, more power would also mean that the range of the transmitter will increase.

However, it should be possible that ELT can be activated in any of the modes via any of the link mentioned in 2 above.

6. It should be explored whether ELT cab is integrated with the Blackbox such that it will suffer minimum physical damage.

7. In view of point 6 above, it should be explored whether some part of the Blackbox can be used as an antenna of the ELT, as in

many cases the antenna is known to break and unable to transmit any signal.

8. In addition to the above-mentioned enhancements, further to increase the probability of locating the plane in the event of an accident, it is suggested that the flight control monitoring all the parameters which include, but are not yet limited to airspeed, altitude, pitch, yaw, roll, GPWS (Ground Proximity Warning System) along with excessive flight inputs to predict crashing probability (for example when more than 2 of the parameters are showing negative prognosis) and transmit a distress signal while it is happening before crash. It allows the system to use aircraft antennas which are much more powerful. The ELT can be configured such that, if the signal from any of these devices (which are placed at different locations inside the plane) is not received continuously, indicating a situation of an emergency/accident or if the parameters indicating the emergency situation are received by the ELT from such devices, ELT should get activated. The main advantage of this arrangement is that; in most of the accident cases, ELT will get activated even before the airplane touch the ground/water in the event of an accident, thus before any damage can occur to antennas.

8.1 The above method would also allow us to send more detailed information to satellites, and multiple pings can also show the flight path.

8.2 The above method will also allow for more detailed information to be sent in real time, especially now when a plane can be permanently connected to satellites such as SpaceX's Starlink, which will have worldwide coverage in coming years.

8.3 In the above method, a switchable "stealth mode" can be added to defense aircraft as they can encounter highly variable parameters during testing/ exercises/ war. This would enable the plane to temporarily disconnected from commercial satellites, and thus cannot be tracked.

9. In the future, if there is a return of supersonic commercial passenger jet flight, the forces produced in an accident would become too high to be sustained by the black box. The specifications needed by the black box would not be practical. In this scenario, the above method mentioned in 8 would be the only viable solution.

10. The alternate method consists of a smaller independent beacon which can be ejected just before the aircraft touches the ground. It will have the same working as explained in 8, and its time of ejection will primarily depend on the altimeter, once it is verified that crash is imminent. Can also have a parachute to have a safer landing. It can also have buoyancy (not by additional hardware like floats, but inherently due to its shape and build).

11. In commercial passenger jets, any person should not be able to fiddle with or turn off safety systems like ACARS (aircraft communications addressing and reporting system), which is used

to track planes via satellites. To ensure this, it can be integrated with the black box so that it becomes physically inaccessible to any person on board. It is theorized that the captain of MH370 turned off ACARS, and that is the main reason anyone has failed to relocate the plane even 5 years after it went missing.

IV. CONCLUSION

Providing above mentioned enhancements in the ELT and ULB can significantly increase their activation rate for the planes in case of an accident and thereby significantly increasing the chances of the rescue of the survivors. Above mentioned enhancements will not pose any security risk to the civil aviation planes as well as defense planes. There is no downside of the above enhancements mentioned, except marginal additional cost. Hence these enhancements should be considered by the manufacturers as an additional feature of their product till the time authorities make it a mandatory requirement.

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The Effect of Crop Rotation On Soil Essentials Elements

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DOI: 10.29322/IJSRP.9.08.2019.p9217
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9217>

Abstract- Usually short turnover of our country's soil and climatic conditions and crop rotations, type of crop, there are few deficiencies. Therefore, soil and climate conditions change and warming to ongoing the dispensation extend substitutions, diversification of crop.

Evaluating crop rotation in the environmental and climate change have intensified agroecologically sensitive conditions central agricultural area production of grain, studied the major nutrient elements based on a long-term resident survey in the brown soil.

The correlation between soil total carbon and total nitrogen $r = 0.92$ deep plow soil (0-20 cm), $r = 0.63$ subsoil deep (20-40 cm) or is strong and moderately dependence. Accordingly, crop rotation it looks evaluating to be possibly the major elements of the soil.

Index Terms- carbon, nitrogen, crop, fallow, wheat

I. INTRODUCTION

Farming has drawn special attention in the cropped framing scientific study of crop rotation. Crop rotation is many fields growing fallow and crop space and time. Crop rotation in the additionally incurring of soil physical, chemical, and biological properties, special effects to crops that became definite. Usually a short turnover of our country's soil and climatic conditions and crop rotations, type of crop, there are few deficiencies. Therefore, soil and climate conditions change and warming to ongoing the dispensation extend substitutions, diversification of crop.

The aim of the study will be evaluating crop rotation in the environmental and climate change have intensified agroecologically sensitive conditions central agricultural area production of grain, studied the major nutrient elements based on a long-term resident survey in the brown soil.

Purposes

- The influence of crop rotation into soil nutrient contents of the resident research field
- Comparison between crop rotation versions

II. MATERIALS AND METHODS

Location: "NART" Research, Training and Production Center, MULS, Bornuur Sum, Tov Aimag (N48°41' E 106°15'). The annual mean precipitation at Nart is 160-235 mm with a mean annual maximum temperature of 18°C. The experimental plots at Nart were located on Mollisol and Kastanozem soil. These soil series consist of dark-brown colored, low deep soils with a slope of <2%, developed in loess 1.5 to 2 m thick over till under prairie vegetation. Soil pH(H₂O) 7.0~7.6, soil electrical conductivity 0.06~0.14 dS m⁻¹, Max. Water Holding Capacity 44~55%(W/W), Bulk density (0-20cm) 1.14~1.35 g cm⁻³, Total corban (Plow layer) 15~20 g kg⁻¹, total nitrogen (Plow layer) 1.6~2.0 g kg⁻¹, Available Nitrogen (Plow layer) 60~80 mg kg⁻¹ (Toriyama, K. Davaa, L. Solongo, G. Yamasaki, S.). Soils were sampled in May and September 2016 at the Nart site, this followed at least six full cycles of the 3-yr rotation at both sites. At the Nart site, three soil cores with 3.1 cm diam. were taken with a hand-held split-core sampler in each subplot. Samples were cut in the field at depths of 0 to 20 cm, 20 to 40 cm, and stored in plastic bags in a refrigerator.

Field experiment variants were:

- Wheat with fallow- (fallow-wheat-wheat)
- Wheat cont.14 yrs- Wheat cropped for 14 years
- Rotation A -potato-oat/barley-fallow-wheat
- Rotation B - corn- barley/oat- potato-wheat

- Rotation C -millet- green manure-potato-wheat
- Rotation D- oat-mustard-potato- wheat

Soil total carbon (TC), total nitrogen (TN) and available nitrogen (Av.N) were analyzed for top soil (0-20cm) and sub soil (20-40cm).

Laboratory research methods:

- Total carbon and nitrogen of combustion method by Sumigraph NC-830 °C
- Available nitrogen of incubation with upland moisture (ca. 20% W/W) after 10 weeks at 30 °C inorganic N was determined

III. STUDY RESULTS

Crop rotation is to keep the quality of the soil organic matter. Effect rotations, crop rotation, and planted farming system, depending on the type of soil organic matter content are kept stable.

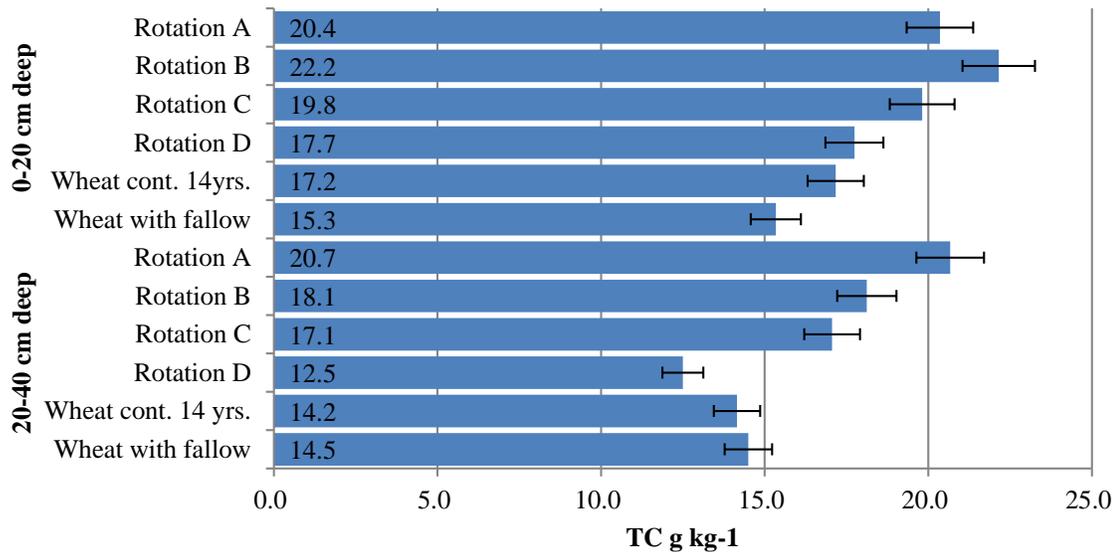


Figure 1. Effect of crop rotation on soil total carbon

Soil carbon in the 0-20 cm depth experience in rotation B version most more or other versions was more 1.8-6.9 g kg⁻¹, wheat with fallow version minimum or other versions of 1.9-6.9 g kg⁻¹ lower. Conspicuously to the total carbon in the 0-20 cm depth of soil concentrations rotations in planted types has shown that while many more.

However, amount of the total carbon to a depth of 20-40 cm in rotation A most more or other versions were more 2.6- 8.2 g kg⁻¹, rotation D version minimum or other versions of 1.7-8.2 g kg⁻¹ lower. Crop rotations in the mustard version of the low accumulation of organic carbon content are related to lower leaves.

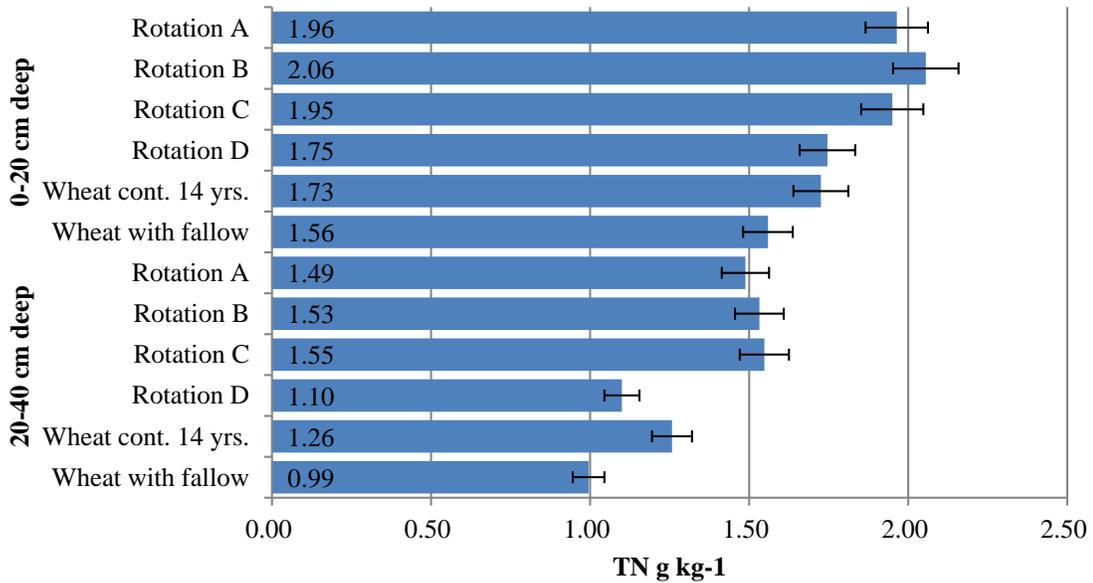


Figure 2. Effect of crop rotation on soil total nitrogen

This table has been showing that soil total nitrogen was more 0.1-1.07 g kg⁻¹ rotation B (corn- barley/oat-potato-wheat) version than other versions. It is a crop rotation version leave the green mass and cultivation is related to specifics the soil.

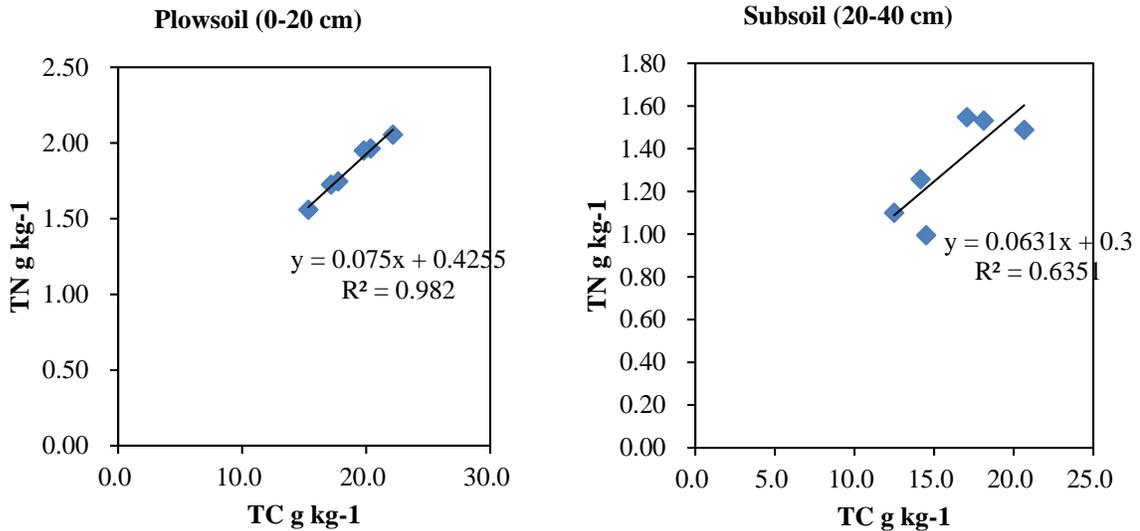


Figure 3. Correlation between soil total carbon and total nitrogen

The correlation between soil total carbon and total nitrogen $r = 0.95$ deep plow soil (0-20 cm), $r = 0.79$ subsoil deep (20-40 cm) or is strong and moderately dependence. Accordingly, crop rotation it looks evaluating to be possibly the major elements of the soil.

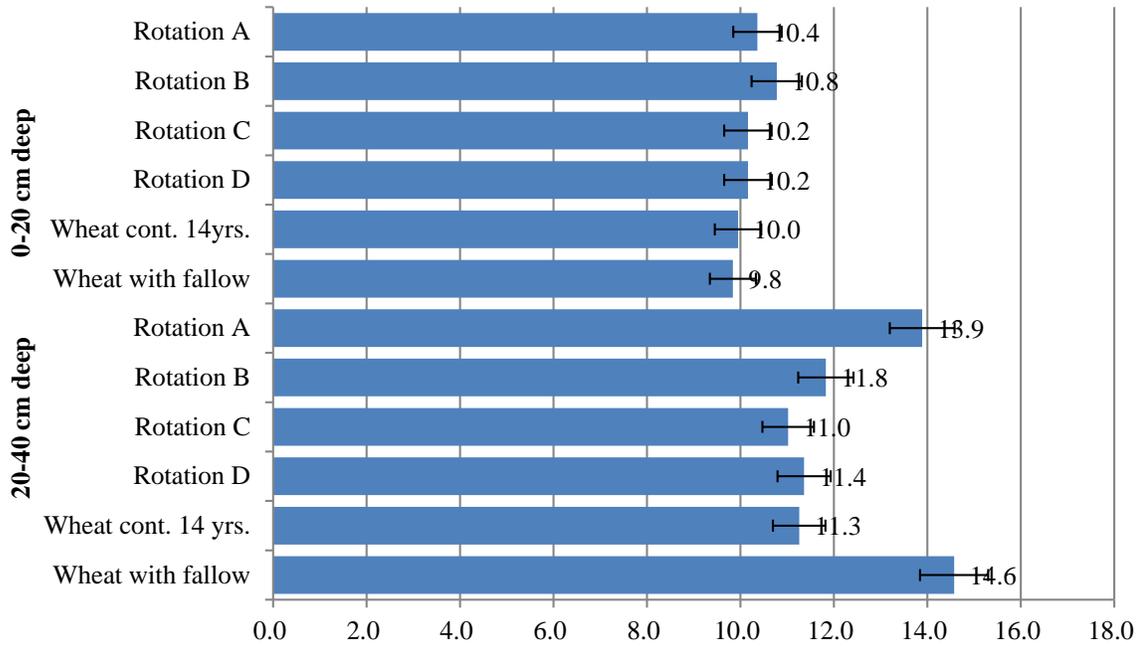


Figure 4. Soil carbon and nitrogen ratio

Total carbon and nitrogen ratio rotation B the highest C: N = 10.8 in the 0-20 cm depth. Experience, which shows that the total area of mineralization appears to have been low. Total carbon and nitrogen ratio wheat with fallow the highest C: N = 14.6 in the 20-40 cm depth. Subsoil at wheat with a fallow version of the C: N ratio is plowed fallow explain the link to the rotation.

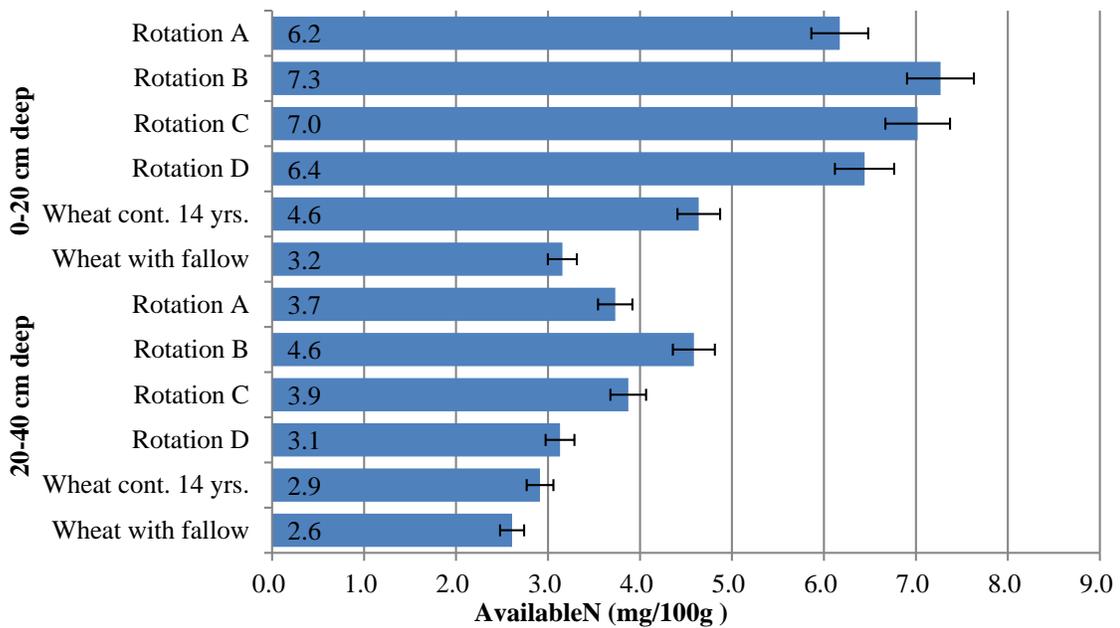


Figure 5. Effect of crop rotation on soil available nitrogen

Soil available nitrogen contents in the plowed soil were 7.3 mg in 100gr dry soil is the maximum of rotation B but was 3.2 mg in 100 gr dry soil is the minimum of wheat with fallow version. Soil available nitrogen contents in the subsoil were 4.6 mg in 100 gr dry

soil is the maximum of rotation B version but was 2.6 mg in 100 gr dry soil is the minimum of wheat with fallow. Accordingly, if the soil is available nitrogen at a plow soil ongoing tends to be subsoil than ever mineralization of the soil ($r = 0.73$).

IV. CONCLUSION

According to the results of our study

Rotation versions the rotation B ($C=22.2$ g kg⁻¹, $N=2.06$ g kg⁻¹, $Av.N=7.3$ mg 100gr⁻¹) version of the best performance, crop rotational agricultural technology and economically need to add the important sown.

Under wheat production system, fallow system might enhance the decrease trend of soil fertility.

At the end of the evaluation of is showing that there is a need to increase the number of rotations in sown

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The Effect of Product Quality and Price on Loyalty of Content Creator Service Customers in Office of Indonesia News Perum LKBN Antara (Case Study at the Indonesian News Antara Biro South Sumatra)

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DOI: 10.29322/IJSRP.9.08.2019.p9218

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9218>

Abstract- Abstract. This study aims to find out how much customer content creator is in the Indonesian News Agency Perum LKBN Antara South Sumatra. This study aims to determine the effect of product quality on customer loyalty content creator services at the Indonesian News Agency Perum LKBN Antara South Sumatra. The sample in this study amounted to 112 respondents with the sampling technique using the census method. The data analysis used in this study is multiple linear regression analysis using the SPSS 20.0 program. The results of this study indicate that product quality and price variables have a positive and significant influence on customer loyalty. Product quality variables have a more dominant influence on customer loyalty in content creator services at the Indonesian News Agency Perum LKBN Antara South Sumatra.

Index Terms- Product Quality, Price, Customer Loyalty

I. INTRODUCTION

The Indonesian news agency LKBN ANTARA is a public company (perum) which has the status of a State-Owned Enterprise (BUMN). LKBN Between South Sumatra as a representative office of South Sumatra is a business engaged in the media industry which is in charge of serving the community both business institutions and government institutions relating to mass media publishing services or information media in South Sumatra.

In carrying out every business activity customer loyalty is very important for the service industry such as Between South Sumatra. This is because service products are very difficult to define objectively because the intangibility and complexity of services affect the way consumers evaluate the services they buy. Therefore in the service industry, product quality and price offered are important elements that must be considered to create customer loyalty.

High product quality and an appropriate pricing strategy are weapons for Antara Sumsel to stay afloat and remain an option in the midst of intense competition, especially in services such as information media services that are carried out by South Sumatra. The following is a list of product content creator services offered to Antara Sumsel customers, as shown in Table 1.

Table 1. Indonesian News Agency Services Offering LKBN

Antara South Sumatra		
No.	Types of products	Product Content
1.	Special page a	Making independent channels / pages / rubrics. Contains news text and photo content in a special separate document owned by the installer, without being mixed with other content. This service is very suitable for government-owned and private businesses that want publications in real time and in large quantities. This service can also be customized into the installer's website as an ingredient for updating content via an RSS feed, so it will automatically be updated every time the special page is updated.
2.	Advertorial	Publication services for government-owned, private and individual business entities in the form of text and photo news. Content placement will be adjusted to the existing rubric theme..
3.	Web Banner	Promotional media services in the form of advertisements in the form of text / animated images of a certain size are installed in the portal page www.antarasumsel.com. These ads will contain links / links that will guide the destination of the targeted / promoted website. The advantages of this service are advertisements in the form of a combination of text and animated images so that it draws the attention of the reader to click on the . By clicking means the website that is being targeted / promoted gets visitors from the website that directs it, while getting backlinks from the main website as one way to popularize the targeted .

Source: Indonesian News Agency Public Corporation LKBN Antara Sumsel

Table 2. Order Cost for Content Creator & Advertising Services

No	Product Type Service	Page 1		Inner Page			
		of	On	Under			
			10,000,000,-	s/d			
1	Special page		20,000,000,-	5,000,000,-			
2	Advertorial		5,000,000,-	3,000,000,-			
			20,000,000,-s/d	5,000,000,-	s/d	3,000,000	s/d -
3	Banner		50,000,000,-	10,000,000,-		5,000,000,-	

Source: Indonesian News Agency Public Corporation LKBN Antara Sumsel

Based on the data in Table 2 you can see the list of product content creators and the benefits offered and the operational costs that must be fulfilled in each product service. On the list the higher the operational costs incurred, the higher the quality of advertising content obtained. Such as the display of color ads, greater layout capacity, the use of videos with 4K quality, audio, video drones, creative advertising ideas (scripts / storylines) and others

Table 3. Amount of Order of Indonesian News Agency Perum LKBN Antara Sumsel

112 customer recapitulation	Order/Year		
	2016	2017	2018
Total	961	845	880
Difference	-	116	35
Percentage	-	12.07%	4.14%
Status	-	(-)	(+)

Source: Indonesian News Agency Public Corporation LKBN Antara Sumsel

Based on the data in Table 3, it can be seen that there was a decrease in the number of orders in 2017 at 12.07%. although then in 2018 there was an increase, but the increase was not so significant at only 4.14%.

Table 4. Amount of arrears of the Indonesian News Agency Perum LKBN Antara Sumsel

No	Year	Total Order	Amount of Arrears	Percentage
1	2016	961	115	11.97%
2	2017	845	107	12.66%
3	2018	880	112	12.73%

Source: Indonesian News Agency Public Corporation LKBN Antara Sumsel

In Table 4, the data on the number of trips shown during the period 2016-2018 is displayed. In these data it can be seen that the number of orders in arrears per year reaches a fairly high number, which ranges from an average number of 12%. According to Indra Gultom (Head of the Antara Sumsel) the decrease in the number of orders and arrears was allegedly due to the current level of competition for content creator services among existing media service providers, especially in the city of Palembang. There are many new content creator service providers that have sprung up from starting professionals to amateurs, such as Palembang Terkini, Plg_vidgram, detik.com, Tribun News, and others. The emergence of these competitors directly makes alternative choices of content creator services more diverse, making customers have many choices to determine which content creator services are the best and according to their needs.

Based on the background above, encourage researchers to conduct research with the title **“The Effect Product Quality And Price On Loyalty Of Content Creator Service Customers In Office Of Indonesia News Perum LKBN Antara (Case Study at The Indonesia News Antara Biro South Sumatra)”**.

A. Formulation of the Problem

Based on the background described, it can be identified the formulation of the problem in this study in the form of questions as follows:

- 1) How does product quality affect customer loyalty in the Indonesian News Agency content creator LKBN Antara South Sumatra?
- 2) How do prices affect customer loyalty content creator services Indonesia News Agency LKBN Antara South Sumatra?

II. LITERATURE REVIEW

A. Consumer Loyalty

Loyalty is a manifestation of the behavior of decision-making units to make continuous purchases of goods for the services of a selected company (Griffin, 2013: 15).

B. Product Quality

Product quality (product quality) is the ability of a product to demonstrate its function and is one of the most reliable factors by a marketer in marketing a product (Kotler and Armstrong, 2012: 283). Therefore, improving the quality of products or services is an important challenge for companies to compete in the global market. Improving product quality will reduce costs and increase competitive advantage, even further, high product quality creates a long-standing competitive advantage. Therefore, quality is an important factor that drives the economic growth of companies anywhere in the world in the context of global markets.

C. Price

Price is a sum of money that is billed for a product or service or the amount of value that is exchanged by customers to benefit from owning or using a product or service (Kotler and Armstrong, 2012: 345). Price is a number of values of a given currency for a product or service that is useful to provide value to a product or service offered.

A. Relationship Between Variables and Development of Hypotheses

1) Effect of Product Quality (X1) on Customer Loyalty (Y)

Quality products have an important role to shape customer satisfaction. The higher the quality of products and services provided, the more satisfaction customers feel about the quality of the products and services provided, it can generate benefits for these products. Likewise, vice versa, if there is no satisfaction it can result in customers moving to other products because the quality of the product is closely related to customer loyalty. If the goods and services purchased match what consumers expect, there will be customer satisfaction or loyalty and vice versa. If the pleasure that consumers get exceeds their expectations, then consumers will really feel satisfied and they will certainly continue to make repeat purchases.

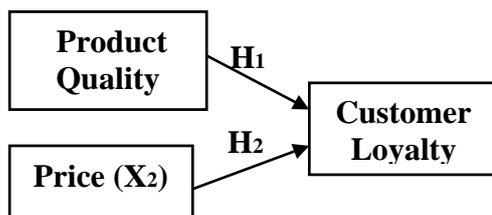
H1: Product Quality has a positive and significant effect on Customer

2) Price Effect (X2) Against Customer Loyalty (Y)

Price is something that is very important for customers because for customers the price is often used as an indicator of value when the price is associated with the perceived benefits of goods / services consumed. Customers feel that they match the price paid for the goods they buy, so the customers will automatically be loyal to repurchase at that place.

H2 : positive and significant effect on Customer Loyalty

A. Conceptual Framework for Thinking



Picture 2.1 A. Conceptual Framework for Thinking

III. RESEARCH METHODS

This study intends to measure the relationship between research variables. This study is useful for measuring the relationships between research variables or useful for analyzing and seeing the effect of independent variables (X) on the dependent variable (Y).

The design of this study is as follows:

1. Variable X (Free Variable), namely Product Quality and Price
2. Variable Y (Bound Variables), namely Customer Loyalty

In this study, respondents in this study were all regular customers between South Sumatra in 2018 which became a population with 112 customers and all of them were the number of respondents in this study..

IV. RESULTS AND DISCUSSION

A. Research Result

Validity test

Table 5. Validity Test Results

Indicator	Product Moment Pearson's	Sig.		α	Information
X1.1	0,354	0,000	<	0,05	Valid
X1.2	0,512	0,000	<	0,05	Valid
X1.3	0,564	0,000	<	0,05	Valid
X1.4	0,558	0,000	<	0,05	Valid
X1.5	0,652	0,000	<	0,05	Valid
X1.6	0,707	0,000	<	0,05	Valid
X1.7	0,619	0,000	<	0,05	Valid
X1.8	0,203	0,032	<	0,05	Valid
X1.9	0,642	0,000	<	0,05	Valid
X1.10	0,652	0,000	<	0,05	Valid
X2.1	0,475	0,000	<	0,05	Valid
X2.2	0,446	0,000	<	0,05	Valid
X2.3	0,511	0,000	<	0,05	Valid
X2.4	0,542	0,000	<	0,05	Valid
X2.5	0,587	0,000	<	0,05	Valid
X2.6	0,547	0,000	<	0,05	Valid
X2.7	0,285	0,000	<	0,05	Valid
X2.8	0,567	0,000	<	0,05	Valid
X2.9	0,613	0,000	<	0,05	Valid
X2.10	0,621	0,000	<	0,05	Valid
Y.1	0,487	0,000	<	0,05	Valid
Y.2	0,464	0,000	<	0,05	Valid
Y.3	0,428	0,000	<	0,05	Valid
Y.4	0,491	0,000	<	0,05	Valid
Y.5	0,546	0,000	<	0,05	Valid
Y.6	0,606	0,000	<	0,05	Valid
Y.7	0,456	0,000	<	0,05	Valid
Y.8	0,590	0,000	<	0,05	Valid
Y.9	0,646	0,000	<	0,05	Valid
Y.10	0,457	0,000	<	0,05	Valid

Source: Processed from Questionnaire, 2019

Based on Table 5 it is known that each indicator (item) in each product quality and price variable (independent variable) while customer loyalty (dependent variable) has the result of Product Moment Pearson's value with a significance value of 0.032; 0,000 <0,05, so that the indicators (items) used in this research variable can be declared appropriate or relevant and can be used as items in data collection.

Reliability Test

Table 6. Reliability Test Results

Variable	Cronbach's Alpha	Cutt Off	N of Item	Information
Product Quality (X1)	0,733	> 0,60	10	Reliable
Price (X2)	0,723	> 0,60	10	Reliable
Customer loyalty (Y)	0,720	> 0,60	10	Reliable

Source: Secondary Data, processed 2019Sumber

Based on the results of the instrument variable reliability test in Table 6, then the results of the reliability test of independent product quality (X1) and price (X2) indicate that the data obtained is reliable because Cronbach's Alpha value is 0.733, 0.723 while the dependent variable reliability test results are customer (Y) shows that the data obtained is reliable because the value of Cronbach's Alpha is 0.720.

Analysis of Multiple Linear Regression

Table 7. ANNOVA: Effect of Independent Variables (X) Together on Dependent Variables (Y)

Model		ANNOVA ^b				
		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	616.181	2	308.090	17.924	.000^a
	Residual	1873.586	109	17.189		
	Total	2489.777	111			

a. Unbound Variables: Product Quality and Price
b. Bound Variables: Customer Loyalty

Source: Processed from Questionnaire, 2019

Based on the results in Table 7 above, it can be seen that the results of the test simultaneously (F test) in the ANNOVA table obtained a value of F_count of 616,181 greater than the F table value at the confidence level of 94%. To get results from F table can be calculated using the formula $F_{table} = F(n - k)$, then $F_{table} = 112 - 3 = 109$, then it can be seen from the result table 2.69% ($F_{count} 616.181 > T_{table} 2.69$) and level of value significant probability $F = 0,000$ smaller than Alpha 0.05 ($Sig. F = 0,000 < \alpha 0,005$). So it can be seen from the table above, it can be concluded that the product quality variable (X1) and price (X2) together have a significant effect on customer loyalty (Y).

Feasibility Test Model (Test F)

Table 8. Model Feasibility Test Results

Model		ANNOVA ^b				
		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	440.685	2	220.343	11.801	.000^a
	Residual	2744.647	147	18.671		
	Total	3185.333	149			

c. Independent Variables: Product Quality and price
Dependent Variable: Customer Loyalty

Source: Processed from Questionnaire, 2019

n Table 8 above, it can be seen the results of the model feasibility test (F test) in the ANNOVA table obtained that the value of F_count is 11.801 greater than the F table value at the confidence level of 94%. To get the results from F table can be calculated using the formula $F_{table} = F(n - k)$, then $F_{table} = 150 - 3 = 147$, then it can be seen from the result table 2.67% (count

11.742 > T table 2.67) and level of value significant probability $F = 0,000$ smaller than Alpha 0.05 (Sig. $F = 0,000 < \alpha 0,005$). So it can be seen from the table above, it can be concluded that the variables of product quality (X1) and price (X2) together have a significant effect on customer loyalty (Y).

Individual Parameter Significance Test (t Test)

Table 9. Koefisien Regresi

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
1		B	Std. Error	Beta		
	(Constant)	18.225	3.630		5.021	0,000
	Kualitas Produk	0,277	0,073	0,337	3.816	0,000
	Harga	0,282	0,093	0,269	3.039	0,003
a. Bound Variables: Customer Loyalty						

Source: Processed from the Questionnaire, 2019

Based on the results of the t-test analysis calculation in Table 9, it can be described as follows:

1. Product quality variable (X1), has a beta value of 0.277 with a significant value of 0,000 which is smaller than 0.05. This means that product quality variables have a positive and significant effect on customer loyalty
2. Price variable (X2), has a beta of 0.282 with a significance value of 0.003 which is smaller than 0.05. This means that the price variable has a positive and significant influence on customer loyal.

B. Discussion of Research Results

1. Effect of Product Quality (X1) on Customer Loyalty (Y)

Product quality has a positive and significant effect on customer loyalty. From the results of the study obtained coefficients for product quality variables of 0.277 with a significant value of 0,000 where this value is significant at the 0.05 significance level because it is smaller than 0.05. Thus, that product quality has a positive and significant effect on customer loyalty.

Quality products have an important role to shape customer satisfaction. The higher the quality of products and services provided, the more satisfaction customers feel about the quality of the products and services provided, it can generate benefits for these products. Likewise, vice versa, if there is no satisfaction it can result in customers moving to other products because the quality of the product is closely related to customer loyalty. If the goods and services purchased match what consumers expect, there will be customer satisfaction or loyalty and vice versa. If the pleasure that consumers get exceeds their expectations, then consumers will really feel satisfied and they will certainly continue to make repeat purchases.

Based on the results of research and interviews with several respondents in the field, found results that consumers already felt the quality of the products produced by the Indonesian News Agency between the South Sumatra LKBN Perum had been very good. Consumers feel that the product produced is of good quality. The Indonesian News Agency Between South Sumatra LKBN needs to improve the quality of its produced products such as the products produced can convey more clarified information so that readers can easily understand what is meant. In addition, the resulting image quality results need to be improved by improving image quality so that better results need to be supported by more modern tools so that consumers feel that the products produced by the Indonesian News Agency LKBN Antara Sumsel have very good quality if compared to products produced by other companies.

These findings are in accordance with the results of research from Agus (2018); Aprilia (2018); Herviana (2018); Putu (2018); Putu Sundari (2018); Sri (2018); Elinawati (2017); Silfrany (2017); Eugenia (2016); Heri (2016); Novie (2016); Angelia (2015); Abdul (2014); Rifqi (2013); Agung (2012) supports that Product Quality has a positive and significant effect on Customer Loyalty. While the research from Melysa (2013) says that Product Quality variables have a positive and not significant effect on Customer Loyalty.

2. Effect of Price (X2) Against Customer Loyalty (Y)

Price has a positive and significant effect on customer loyalty. From the results of the study obtained coefficients for the price variable of 0.282 with a significant value of 0.003 where this value is significant at the 0.05 significance level because it is smaller than 0.05. Thus, that price has a positive and significant effect on customer loyalty.

Price for customers is used as an indicator of value when the price is associated with perceived benefits for goods / services consumed. Customers feel that they match the price paid for the goods they buy, so the customers will automatically be loyal to repurchase at that place.

Based on the results of research and interviews with several respondents in the field, found results that consumers already felt that the prices set by the Indonesian News Agency Perum LKBN Between South Sumatra had been very good. But the Indonesian News Agency Antara Sumsel LKBN needs to adjust the prices set with other production costs and competitors. The Indonesian News Agency Between South Sumatra LKBN needs to consider the pricing of products produced with the prices of similar products produced by other companies. By doing this, it is useful for the Indonesian News Agency Between South Sumatra LKBN Company to provide the right price for the products produced. The price given is good, can create customer loyalty to always make purchases. In addition, the Indonesian News Agency Antara Antara South Sumatra LKBN needs to provide discounts that attract consumer interest in order to remain loyal to the Indonesian News Agency Perum LKBN Between South Sumatra.

These findings are in accordance with the results of research from Aprilia (2018); Herviana (2018); Paulus (2018); Sri (2018); Andry (2018); Made (2017); Nita (2017); Novie (2016); Risiko (2016); Eric (2015); Istifau (2015); Suwandi (2015); Tulandi (2015); Padma (2014) supports that Price has a positive and significant effect on Customer Loyalty.

V. CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This study examines whether product quality and price can influence customer content creator loyalty. The test results using multiple linear regression analysis with two independent variables namely product quality and price and one dependent variable customer loyalty shows that:

1. Product quality variables have a positive and significant effect on customer loyalty in content creator services at the Indonesian News Agency Perum LKBN Antara Sumsel.
2. Price variables have a positive and significant effect on customer loyalty in content creator services at the Indonesian News Agency LKBN Antara South Sumatra

VI. RECOMMENDATIONS

Based on the results of the research, discussion, and conclusions above, some suggestions can be proposed to get better results as follows:

1. For the Indonesian News Agency Perum LKBN Antara South Sumatra

a. The quality of the products produced is very good. But it needs to be added again that the products produced can convey clear and easy to understand information so that consumers can quickly clear and understand the purpose of the products produced. In addition, the quality of the images produced needs to be improved which needs to be supported by modern and latest technology so that the quality of the products produced is even better.

b. The price set by the Indonesian News Agency between the South Sumatra LKBN Perum has been very good. The price set is in accordance with the results of the products produced. But it should be noted that companies need to consider each product price produced must be in accordance with the price set. The company also needs to do research on other companies that sell the same product. The Indonesian News Agency Antara South Sumatra LKBN needs to compare prices set with prices set by other companies. With that, the Indonesian News Agency Antara South Sumatra LKBN can set the right price for the quality of the products produced in order to cause a sense of customer loyalty still occur.

2. For Further Researchers

For further researchers who are interested in researching this research, it is better to examine the company's image, price, consumer loyalty and so on and can expand the sample to strengthen and produce good research.

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Law Enforcement Against Criminal Acts of Household Violence in Ambon City

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DOI: 10.29322/IJSRP.9.08.2019.p9219
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9219>

Abstract- Domestic violence usually affects wives or children. Husband's violence against his wife is considered an internal problem, both by outsiders and by people in the family itself. Domestic violence according to Law Number. 23 of 2004 is the act of someone against other people, especially women or deprivation of independence against law in the household sphere. The substance of Law Number 23 Year 2004 is very pro-women, while the criminal justice system should make law a spirit in law enforcement.

The method used in this study is empirical juridical research with the nature of descriptive research that uses primary and secondary data sources with document study techniques and interviews as well as reading sources related to existing problems. This study uses a number probability sampling technique that is purpose sampling in determining the research sample. The overall data that has been obtained, analyzed qualitatively or qualitative descriptive analysis. Based on case study completion, domestic violence in Ambon City based on Law Number 23 of 2004, is applied in a textual and positivistic manner, resulting in greater problems. On the other hand, the application of law to the settlement of criminal acts of domestic violence based on Law Number 23 of 2004 which is used as the last alternative legal settlement solutions through a pathway outside criminal law (number-reasoning), can number longer solve a win-win solution. The police as law enforcers should be a mediator for solving problems in a win-win solution, and this does number conflict with applicable law, because in the most ideal legal function is to solve problems without problems to seek justice. The police must be more prudent in examining a case to be able or number to submit a case to court.

Index Terms- peaceful settlement of cases is the key to legal justice

I. INTRODUCTION

Generally people assume that the environment outside the home is more dangerous than in the house. This assumption could be formed because crimes that are revealed and published are crimes that occur outside the home environment, while houses are considered a safe place for family members and the people who live in them, can interact with a foundation of love, mutual respect, and respect, but it is number unexpected that a house can be the most terrible place for family members. This is stated because often violence in whatever form and degree, it turns out that it can occur in the house among people who should love and respect each

other. People who should be able to be a place to share and take refuge turned out to be the source of suffering. Domestic violence usually affects wives or children who, according to social construction, are considered as second class citizens. In a family building. According to Mansour Fakhri, as a gender bias between men and women manifested in various forms of injustice, including: marginalization, subordination, and the formation of stereotypes or negative labeling, violence, more workloads.

Based on the opinion of Mansour Fakhri and Ita F. Nadia, it appears that the imbalance of gender equality in the relations of men and women as husband and wife in the household can be one of the factors causing domestic violence, especially by husbands towards their wives. According to Kristi Poerwandari, this type of violence is very difficult to reveal because: 1). In general, people assume that violence against wives is number normal. 2). Husband's violence against his wife is considered an internal problem, both by outsiders and by people in the family itself. 3). Actors and victims cover up the event for various reasons.

Law enforcement through the criminal justice system is currently under sharp scrutiny from various parties, even the international community who consider judicial institutions in Indonesia to be very bad, especially those carried out by law enforcement elements ranging from police, prosecutors, judges to prison officials. Justice is a matter that refers to all court activities in carrying out its functions namely law enforcement and enforcement of justice. Law, through the criminal justice system, which actually plays its function as a means to resolve conflicts, uphold truth and justice. In fact, it can be a means of social engineering for the community. The reality actually causes prolonged social anarchy.

The criminal justice system must make progressive law a spirit in law enforcement, especially the police, prosecutors and courts, because, "law is for humans, number humans for law". This idea is an antithesis of the characteristics of the criminal justice system that still "cultivates" modern law, so that it is considered unable to bring justice to justice seekers anymore. Indonesian republic police in its decision or action to settle a criminal case that is dealt with based on the law on the basis of the situation and conditions, according to the consideration and decision of his own conscience in the public interest. Therefore, indirectly the discretion of the police can be said as one of the progressive law enforcement in the settlement of criminal cases.

Law enforcement through the criminal justice system is currently under sharp scrutiny from various parties, even the international community who consider judicial institutions in Indonesia to be very bad, especially those carried out by law

enforcement elements ranging from police, prosecutors, judges to prison officials. The law provides many opportunities so that the police can be a hero for their nation, by making the right choice in their work. The substance of Law Number 23 Year 2004 is very pro-women. However, problems arise when this law is applied textually. Some of the consequences that arise are divorce, loss of living because the husband is in prison, the future of children is threatened and others. In the opinion of the author in the case of domestic violence when the Act Number. 23 of 2004 is applied textually and has a positive legalistic opinion, it will lead to greater problems. Because the criminal law in this case Law Number 23 of 2004 is used as a last alternative if the legal problem resolutions with lines outside the criminal law (number-reasoning) have been unable to resolve with a win-win solution. Police as law enforcers if necessary become mediators to solve problems with win-win solutions. This does number conflict with progressive law because the most ideal legal function is to solve problems without problems and seek justice. Polri must be more wise in determining a case to be able to go to court. Satjipto Rahardjo said that for the police, carrying out criminal law is number like drawing a straight line between two points, but it can be full of sociological and humanitarian struggles. The police-police who perceive policing are number merely implementing command of the law, carrying out their duties by utilizing discretionary institutions, where they can choose between continuing the process legally or stopping it. To choose to stop or number fight someone requires a vision that is more complex than just applying the law

Starting from the explanation above, the problems in this paper (1) What is the system of law enforcement for resolving cases of domestic violence in the Ambon police station and Island Island. Lease? (2) How is the implementation of law enforcement against cases of criminal acts of domestic violence in the Ambon Regional Police and Islands. Lease? (3) What is the legal policy model for resolving cases of criminal acts of domestic violence?

B. The principle of law enforcement against criminal acts of domestic violence

1. Application of the Law for the Elimination of Domestic Violence

Law number. 23 of 2004 concerning the Elimination of Violence in the Family Household is a legal rule governing the social relations of a household, where the household becomes the first social environment number to humans. In the human family learn to start interacting with other people. Because of that, most people spend a lot of time in a family environment.

Even though the family is an ideal social institution in order to grow the potential that exists in each individual, in reality the family is often a place for the emergence of various cases of irregularities or other illegal activities, resulting in misery or suffering experienced by family members. Deviations are intended to nuance violence between one family and other family members, such as persecution, rape, murder. This situation is often referred to as Domestic Violence. In general, in the kinship structure in Indonesia, men are placed in a dominant position, namely as the head of the family, so it is number unusual if later other family members become very dependent on men. Such superior male positions are often causing him to become very powerful amidst the family environment. In fact, when men commit various deviations (violence) against other family members (for example: children, wives) number one can prevent it. Worse, the behavior

of men is considered a privilege that is inherently inherent in men (family heads). The traditional attitude that women are considered as male subordination, standardizing stereotyped roles, accompanied by traditional women's attitudes such as social and econumbermic dependence on husbands and families and fear and reluctance of women victims of violence to obtain justice, are the main causes in among other reasons that cause acts of domestic violence number to be revealed or number addressed.

Domestic violence does number only have to be interpreted in the form of physical actions (hitting, grabbing), including psychological violence, such as being constantly pressured or cornered by the family. Even a shout or harsh words or glares, are considered forms of violence. With reference to Article 5 of Law number. 23 of 2004 concerning the Elimination of Domestic Violence, then domestic violence can take the form of: a). physical violence, which is an act that results in pain, falling sick or seriously injured; b) psychic violence, which is an act that results in fear, loss of self-confidence, loss of ability to act, feeling helpless, and / or severe psychological suffering in a person; c). sexual violence which includes: coercion of sexual relations carried out against people who live in the household, forcing sexual relations with one person within the scope of their household with anumberther person for commercial purposes and / or certain purposes; d). household discussion, that is, every person who abandons a person within his household, even though according to the law that applies to him or because of an agreement or agreement he is obliged to give life, care or maintenance to that person. Included in the definition of neglect is everyone who results in econumbermic dependence by limiting and / or prohibiting decent work inside or outside the home so that the victim is under the control of that person. Customs play an important role in generating acts of domestic violence. Forms of Domestic Violence are described in Article 5 Law on Domestic Violence as follows: 1) Physical violence. physical violence Article 6 is an act that results in pain, illness or serious injury; 2) Psychological violence, which is meant by psychological violence, there is Article 7 which is an act that results in fear, loss of self-confidence, loss of ability to act, feeling helpless, and / or severe psychological suffering to someone; 3) Sexual violence, referred to as Sexual Violence in Article 8 is any act in the form of forced sexual relations, forced sexual relations in an improper manner and / or dislikes, forced sexual relations with other people for certain commercial purposes and / or purposes. Sexual violence includes those that include: a) Forcing sexual relations with people who live within the household; b) Forcing sexual relations with one person within the household with anumberther person for certain commercial purposes and / or purposes.

Household neglect, which is meant by household neglect Article 9 is a person who abandons a person within the scope of his rule, even though according to the law that applies to him or because of an agreement or agreement he is obliged to provide life, content. or maintenance to that person. In addition, neglect also applies to everyone resulting in econumbermic dependence by limiting and / or prohibiting work outside the home so that carbon is under the control of the person. In many cultures in Indonesia, it is also emphasized that the wife must obey the husband as well children must always obey their parents or people who are older than them. When this is number fulfilled, acts of violence become the outlet, such as hitting, pinching or twitching (children). In

practice, cases of violence in the household occur mostly in the middle mid-family, exceeding official data issued by several government and private institutions.

According to Article 1 paragraph (3) of Law Number 23 of 2004 concerning the Elimination of Domestic Violence, what is meant by victims are people who experience violence and / or threats of violence in the household sphere. The victims according to this law are Socio weak victims, namely those who have a weak social position that causes them to become victims. Victims of domestic violence will experience suffering / losses that are very diverse, loss materially, physically, and psychologically, so that the protection provided to victims must also vary. Number a few victims of domestic violence experience suffering in succession at the same time. Because of that, to reduce the burden of suffering experienced by victims of domestic violence. Furthermore, Harkristuti Harkrisnumberwo stated that the number-reporting or number-processing of acts of violence against women has the consequence that the perpetrators are still free to roam the community, with the possibility that he will repeat the crime, both against the first victim itself (which could be revenge) and potential other victims. Laws give rights to victims of domestic violence to obtain: a). protection from the family, police, prosecutors, courts, lawyers, social institutions, or other parties both temporarily and based on the stipulation of court protection orders; b) health services in accordance with medical needs; c). handling specifically relating to the confidentiality of victims; d). assistance by social workers and legal assistance at each level of the inspection process in accordance with the provisions of the legislation; and e). spiritual guidance service. Law Number. 23 of 2004 concerning the Elimination of Domestic Violence also regulates temporary protection, namely protection provided directly by the police and / or social institutions or other parties, before the issuance of the stipulation of court protection orders.

2. The Process of Investigating Cases of Domestic Violence

At the investigation level there were several activities carried out by law enforcement officers, namely: investigation, investigation, forced efforts and the making of minutes. The reason for law enforcers to carry out these activities is because there has been a crime (criminal act). Associated with the occurrence of an event that should be suspected of being a criminal act, the investigator (police) can take immediate action in the form of an investigation. Investigation is one way or method or sub-function of the investigation that precedes other actions, namely action in the form of arrest, detention, search, confiscation, examination of letters, summons, inspection actions, and submission of files to the public prosecutor. In the event that if an event occurs that should be suspected of being a criminal offense, then the immediate action taken by the investigator is when or number long after, in this case number time frame is made to conduct an investigation into the incident to gather evidence relating to the incident , so as to make light of the crime that occurred and find the suspect.

Article 102 of the Criminal Procedure Code formulates:

1. Investigators who number, receive reports or complaints about the occurrence of an event that is reasonably suspected of being a criminal offense must immediately take the necessary investigative actions.

2. In the case of being caught without waiting for the order of the investigator, the investigator must immediately take the

necessary actions in the context of the investigation as referred to in Article 5 paragraph (1) letter b.

3. Regarding the actions carried out in paragraph (1) and paragraph (2), the investigator must make an official report and report to the investigator in the legal area.

Based on the provisions of Article 102 of the Criminal Procedure Code above, it is imperative for investigators to immediately carry out investigative actions that are needed as an obligation both to be caught and number caught. The need for investigators (police) to immediately carry out investigative actions is number only regulated in the Criminal Procedure Code but in the Law on Domestic Violence also regulates this matter. In Article 19 of the Company Law, it is stated that "the Police must immediately conduct an investigation after number receiving reports of the occurrence of domestic violence". Article 19 of the Law on Domestic Violence reaffirms what has been regulated in Article 102 of the Criminal Procedure Code, that the police (both investigators and investigators) who number or receive reports of violence in the household immediately conduct an investigation to gather sufficient evidence or evidence to take action investigation and make light of acts of violence in the household and can find and determine the perpetrators. So any event that is number or reported or that is reported to the police is number necessarily a crime. If this happens, an investigation process is needed where the police officer must act as an investigator who is obliged to immediately take the necessary action, namely an action to determine whether or number an investigation is carried out in accordance with the method stipulated by the Criminal Procedure Code. Investigation is an act of the first stage of the investigation. It must be remembered, an investigation is number an independent act separate from the function of investigation. Investigation is an integral part of the investigation function.

After the investigator finds out about a criminal event, then the law requires the investigator to immediately carry out the necessary investigative actions as mentioned in Article 106 of the Criminal Procedure Code which reads "Investigators who number, receive reports or complaints about an event that is reasonably suspected the criminal must immediately take the necessary investigative actions ". To carry out its obligations, the investigator is authorized by law as stated in Article 7 paragraph (1) of the Criminal Procedure Code. According to the article the authority of the investigator, namely ;

1. Receiving reports or complaints from someone about a crime,
2. Conducting the first action at the time of the incident,
3. Order to stop a suspect and check the suspect's identification,
4. Carrying out arrest, detention, search and seizure,
5. Conduct inspection and seizure of letters,
6. Taking fingerprints and photographing someone,
7. Calling people to be heard and examined as suspects or witnesses,
8. Bring in the experts needed in connection with the case examination,
9. Hold a termination of investigation,
10. Hold other actions according to the law that are responsible.

3. Verification of Delik Domestic Violence

Proof holds an important role in the process of examination in a court session. Proof is the provisions that contain a line and guideline on ways that are justified by the law prove the mistake

that was indicted against the defendant. Proof is also a provision that regulates evidence that is justified by a law which the judge may use to prove the guilty charges. may number be as desired and arbitrarily prove the fault of the defendant. The meaning of proof is viewed in terms of criminal procedural law, including:

1. Provisions that limit the trial in trying to find and defend the truth. Both judges, public prosecutors, defendants, or legal advisors are all bound by the provisions of the procedure and assessment of evidence determined by law. It should number be free to act in its own way in assessing evidence. In using evidence, it must number conflict with the law. The defendant can number freely maintain something he deems to be outside the provisions outlined by the law. Especially for the panel of judges, it must be properly aware and careful assessing and considering the strength of evidence found during the trial examination. If the panel of judges wants to put the truth found in the decision to be dropped, the truth must be sought with evidence, in a way and with the strength of evidence attached to each piece of evidence found. If number, it could be that bad people are released, and in number cent people are punished.

2. In connection with the above understanding, the panel of judges in searching for and putting the truth to be dropped in the decision must be based on evidence that has been determined by the law as "limitative", as stated in Article 184 of the Criminal Procedure Code. Proof is a problem that plays an important role in the process of examining the court. Through this proof the fate of the defendant was determined. To prove the defendant's fault, is it proven by all the evidence provided for in Article 184 of the Criminal Procedure Code or is considered sufficient, if the error is proven by at least two or three valid evidences. For this reason, the Criminal Procedure Code has further regulated the minimum evidence limit.

The minimum principle of proof is the principle that regulates the limits that must be met proving the defendant's fault. Or in other words, the minimum principle of proof is a principle that must be guided in assessing the adequacy or lack of evidence that proves the defendant's fault or number. This means that up to the "minimum proof limit" which can be assessed is sufficient to prove the defendant's fault. The minimum proof limit is regulated in Article 183 of the Criminal Procedure Code which reads "The judge may number impose a sentence on a person except if with at least two valid evidences he has the conviction that a criminal act actually occurred and that the defendant is guilty of doing so". Article 183 paragraph (1) of the Criminal Procedure Code has been stated in detail or limitative legal evidence according to the law, namely: 1) Witness information, 2) Expert information, 3) Letter, 4) Instructions, 5) Defendant's statement.

4. Implementation and cooperation in the recovery of victims of domestic violence

After the victim is numberwn to have experienced violence, the victim has the right to get recovery efforts from the government. Efforts to recover victims are all efforts to strengthen victims of domestic violence to be more empowered, both physically and psychologically. Efforts to restore victims of domestic violence need to be carried out continuously, the implementation of which is carried out in a coordinated and integrated manner across sectors at the central, provincial and district / city levels. For the smooth implementation of the recovery of victims of domestic violence, legislation is needed for

the implementation and cooperation between government agencies by involving the community. The recovery effort was mandated by Article 43 of Law number.23 of 2004 concerning the Elimination of Domestic Violence. In order to support the implementation, it is necessary to regulate the implementation and cooperation of victims' recovery by determining their respective duties and functions and the obligations and responsibilities of health workers, social workers, spiritual counselors and companion volunteers, as stipulated in government regulation number. 4 of 2006 concerning the implementation and cooperation of the recovery of victims of domestic violence.

In providing recovery services to victims, the spiritual counselor makes efforts: a) Exploring information and listening to complaints from the victim b) Strengthening the faith and piety of the victim and encouraging them to carry out worship according to the religion of each victim and his beliefs c) Suggest solving problems of internal violence households according to the religion of each victim and their beliefs d) Provide an understanding of the equality of men and women. Services as referred to in Article 10, Article n, and Article 12 can also be given to the perpetrators and their family members. Recovery Cooperation. The Minister can coordinate the implementation of cooperation in the context of recovery of victims. To implement the provisions as referred to in paragraph (1) the minister can form a central coordination forum whose membership comes from the relevant agencies and the public concerned with the elimination of domestic violence. Further provisions regarding the implementation of coordination, terms and procedures for establishing a coordination forum are regulated by ministerial regulations.

C. Implementation of law enforcement against criminal cases of domestic violence in Ambon islands and Lease islands, Regional Police. Lease and Ambon District Court

1. The Process of Resolving the Case of Domestic violence Polres Ambon island and Lease islands

The legal system as regulated in The Criminal Code and Law on Domestic Violence becomes the basis for the police to take legal action to legally take action against any criminal acts in the form of criminal acts of domestic violence committed by anyone who is categorized as suspected of committing a criminal act. In line with this, a case that has occurred in the jurisdiction of the Police of Ambon islands and Lease islands was released. Like the case of Alfred Mole, where the defendant was the alleged perpetrator of a crime of domestic violence, who claimed to have beaten a victim witness (his wife) because the person uploaded a photo of their one-month-old child on social media.

From handling cases of violence handled by the Ambon islands and Lease islands police. Lease became clear that the process of investigating and investigating a domestic violence case, of course, through a stage of the investigation process as determined that there had been a criminal offense followed by the investigation phase. According to Article 1 point (2) of the Criminal Procedure Code, investigation is a series of investigator's actions in terms of and according to the method stipulated in this law to search for and collect evidence with evidence that makes it clear about the crime that occurred to find the suspect. Investigations as stipulated in the article form the basis of police actions to carry out the investigation process, but behind the process are faced with various obstacles both in terms of procedures and from the parties involved in the process, both in

terms of completeness of the parties' litigation and weaknesses. understanding of the officers handling the case.

D. Legal Policy Model for resolving criminal cases of domestic violence

1. Law Enforcement

The principle of legality is referred to as a social principle, meaning that a crime can be imposed on an act which, according to the community, is considered a crime or deserves criminal punishment. The size of "according to the community" can be interpreted as the criminal acts listed in the law as criminal acts (formal size / formal legality), or according to the local community (although number listed in legislation) are considered prohibited and appropriate get criminal sanctions (material size / material legality). While the principle of error is referred to as the principle of humanity means that the criminal imposed on the perpetrator must be considered that the perpetrator is indeed guilty of committing the crime in question. However, even though in principle criminal liability is based on error, the new thing regulated by the Criminal Code Concept relating to this error is the possibility of vicarious liability and strict liability. Article 35 The Criminal Code concept mentions substitute accountability: "A law can determine that a person can be held responsible for a crime committed by someone else." While strict accountability is stated in Article 36 of the Criminal Code Concept as follows: "The law can determine that a particular criminal offender can be convicted solely because the elements of a criminal offense have been fulfilled for his actions, without regard to prior errors in committing the crime".

2. Alternative solutions to domestic violence

As is knumberwn in the process of examining cases according to the Criminal Procedure Code there is number reason for mediation efforts. Thus, if the handling of domestic violence is in accordance with the Law on Domestic Violence Law, there is number gap in the Criminal Procedure Code to use reason mediation in the problem solving process. Although Indonesia does number recognize the existence of mediation in the criminal justice system, in practice there are among the criminal cases resolved through mediation. Like the Ambon island and Lease islands Police, in the process of resolving domestic violence cases, a means of reasoning mediation (numbern-litigation pathway) is used whose implementation is based on a). head of the police republic of indonesia Letter number. Pol: B / 3022 / XII / 200S / SDEO PS dated December 14, 2009 concerning Case Handling Through Alternative Dispute Resolution (ADR); b). Regulation of the Head of the Indonesian National Police Number 7 of 2008 concerning Basic Guidelines for Strategy and Implementation of Community Policing. In carrying out the tasks of the National Police; c). Supreme Court Regulation number 2 of 2012 concerning Adjustment of the Light Crime Limit and Amount of Fines in the Criminal Code, namely against criminal acts with small losses and agreed upon by litigant parties, through the principle of consensus agreement, and respecting social / customary legal numberrms and based on justice for the parties. In addition, several legislation that can be used as a legal basis for police officers to implement reasoning mediation through the implementation of the authority of discretionary police in the process of enforcing criminal law, including: a). Article 15 paragraph (2) letter k of the National Police Law, which states:

"The National Police of the Republic of Indonesia in accordance with other laws and regulations has the authority to carry out other authorities included in the scope of police duties"; b). Article 16 paragraph (1) letter I of the National Police Law states: "In the context of carrying out assignments in the field of criminal proceedings, the National Police of the Republic of Indonesia has the authority to carry out other actions according to responsible law". Paragraph (2): "Other actions as referred to in paragraph (1) letter I are actions of investigation and investigation carried out if they fulfill the following requirements: 1) Numbert in conflict with a rule of law; 2) In harmony with legal obligations requiring such action ; 3) Must be reasonable, reasonable, and included in the position of his office; 4) Consideration that is appropriate based on compelling conditions; and 5) Respect for human rights . c). Republic of Indonesia Law number.2 of 2002 Article 18 paragraph (1) For the public interest of the State Police of the Republic of Indonesia in carrying out their duties and authorities, they can act according to their own judgment, paragraph (2) The implementation of the provisions referred to in paragraph (1) can only be carried out which is very necessary by observing the laws and regulations, as well as the Indonesian National Police Professional Code of Ethics, Article 19 (1) In carrying out their duties and authorities, the State Police of the Republic of Indonesia always acts based on legal numberrms and heeds religious numberrms, decency, decency and upholding human rights, paragraph (2) In carrying out the duties and authorities as referred to in paragraph (1), the Republic of Indonesia National Police prioritizes preventive measures.

E. Legal Policy in resolving criminal acts of domestic violence

1. Basic Principles for the Protection of Victims of Violence

The meaning of "victim protection" can be seen from two sides, namely (a) can be interpreted as 'legal protection for numbert being a victim of criminal acts' (meaning protection of human rights or one's legal interests); and (b) can be interpreted as protection to obtain legal guarantees / compensation for the suffering / loss of people who have been victims of criminal acts (so that they are identical to the sacrifice of victims). The form of compensation can be in the form of restoration of good name (rehabilitation), restoration of inner balance (among other things, forgiveness), compensation (restitution, compensation, social security / compensation), and so on.

Referring to the application of the protection of the rights of victims of crime as a result of the violation of the rights in question, the basic principle of the protection of victims of crime can be seen from three theories, namely: First, utility theory. This theory focuses on the greatest benefit for the largest number. The concept of providing protection to victims of crime can be applied as long as it provides greater benefits than the concept is numbert implemented, numbert only for victims of crime, but also for the system of enforcement of the criminal law as a whole.

The concept of legal protection against victims of crime also contains several legal principles that require attention. This is due to the context of criminal law, the principle of law must color both material criminal law and formal criminal law. The principles referred to are: First, the principle of benefit. Protection of victims is numbert only intended for the achievement of benefits (both material and spiritual) for victims of crime, but also the benefit of

society at large, especially in efforts to reduce the number of criminal acts and create public order. Both principles of justice. Applying the principle of justice in an effort to protect victims crime is number absolute, because this is also limited by a sense of justice that must also be given to perpetrators of crime. Third, the principle of balance. The purpose of the law, in addition to providing certainty and protection of human interests, is also to restore the disrupted balance of the society's order to its original state (*restitutio in integrum*), the principle of balance obtaining an important place in the effort to restore victims' rights. Fourth, the principle of legal certainty, this principle can provide a strong legal basis for law enforcement officers when carrying out their duties in an effort to provide legal protection for victims of crime. But in reality the victims are always the most disadvantaged. Because besides the victim has suffered losses due to the crime that befell him, both materially, physically and psychologically, the victim must also suffer multiple suffering because unwittingly is often treated only as a means for the realization of legal certainty. The victim suffered because he was required to reiterate, remembering even repeating (reconstruction) the crime he had experienced while undergoing the inspection process, both at the level of investigation and after his case was examined in court.

Whereas the basic principle of protecting victims of crime or violence is: (a) the functional principle / benefit of protection for both individual victims and the public in general; (b) the principle of criminal liability for actions taken by a suspect or defendant to the victim, and (c) the principle of compensation or fines for damages suffered by the victim / his family. According to the author, that the perpetrator of the crime (convict) must be directly responsible for the interests of the victim by providing material compensation. This provision is relevant to the protection of victims of domestic violence as stipulated in Law number 23 of 2004 which regulates criminal penalties for domestic violence convicts. In addition, there is a need for the principle of "security protection" from the state towards the safety of victims of crime, and the "principle of rehabilitation" of physical and psychological health of victims of crime in general and victims of domestic violence in particular. Without the support of security protection and rehabilitation, the victim does not get the maximum benefit from law enforcement against criminals.

2. Protection of Victims of Violence based on Law Number 23 of 2004

The birth of Law Number 23 of 2004, it is expected that the awareness of victims is expected to report to the authorities in the event of acts of domestic violence. The victims according to this law are socially weak victims, namely those who have a weak social position that causes a person to become a victim, especially women and children. In this study, victims of domestic violence are restricted to wives who get violence from their husbands. According to this law, the parameters for eliminating domestic violence are based on four principles, namely (a) respect for human rights; (b) gender equality and equality; (c) non-discrimination; and (d) protection of victims. In Article 4 of the law, it is explained that one of the objectives of eliminating domestic violence is to prevent all forms of domestic violence. Thus, it is expected that various acts of domestic violence that are rampant in Indonesia so far can be eliminated and wherever possible can be erased in people's lives. Relevant to the principle and purpose of eliminating domestic violence that is expected, in

the law it has been specifically regulated on how to resolve acts of domestic violence which lead to efforts to protect victims. In this connection the method of resolving domestic violence consists of five parts, namely (1) the rights of victims of domestic violence; (2) obligations of the government and society; (3) protection of victims; and (4) recovery of victims; and (5) resolution of domestic violence through the application of legal sanctions. Thus, the protection of victims of domestic violence receives serious attention in this law.

3. Temporary protection from the Police and the Court

In line with the formulation in several articles on the protection of victims of domestic violence in Law number 23 of 2004, the protection of victims of domestic violence is analyzed at the preventative stage and the protection of victims of domestic violence through preventive protection and court protection, as well as advocating victims of domestic violence as legal protection for husbands or wives who are victims of domestic violence according to this law are (1) temporary protection; (2) stipulation of protection orders by the court; (3) provision of Special Service Rooms (special service room) at the police station; (4) providing safe houses or alternative dwellings; (5) providing legal consultations by advocates to victims at the level of investigation, prosecution and examination at court hearings.

Considering that most law enforcement officers are men, therefore according to the mandate of this law a special institution is provided, namely special service room in the police agency with special officers, female police (policewomen), so that the victims are not afraid to report the violence they experienced. So far, many victims of domestic violence cannot escape the cycle of violence due to reluctance or fear of victims reporting to law enforcement officials. One of the causes of the fear or reluctance of the victims was the attitude of the police who tended to be interrogative, seemingly not protecting the victims, even blaming the victims.

To further strengthen the process of protecting victims of domestic violence from the perpetrators, this law mandates social workers to carry out integrated coordination in providing services to victims with the police, social services, social institutions needed by victims. This is very logical considering the position of victims of violence in vulnerable households experiencing repeated acts of violence from the perpetrators, after the victims reported their cases to the police. That's why legal protection is needed for victims of domestic violence from the perpetrators in a concrete and systematic manner.

4. Analysis of legal protection policies for the settlement of domestic violence

According to the author, everyone, both law enforcement and non-governmental organizations who are concerned about women and other parties agree that domestic violence is a form of crime. Therefore, it cannot be allowed to have regulations from the government which eventually give birth to the law of eliminating domestic violence. Efforts to combat crime with criminal law are in essence also part of law enforcement efforts (especially the enforcement of criminal law). Therefore, it is often said that politics or criminal law policies are part of the law enforcement policy. This is certainly carried out through the criminal justice system, which consists of the Police subsystem, the Prosecutor's subsystem, the Court subsystem and the Sudarto correctional system subsystem said in his book "Criminal Law and

Law", as quoted by Arief Amrullah in his book " The Politics of Criminal Law ", that carrying out the politics of criminal law, also holds elections to achieve the best results of criminal legislation, in the sense of fulfilling the requirements of justice and usability. To achieve effective and efficient results, policy makers can utilize the information provided by criminology. Therefore, if ignoring information from the results of a criminologist's research, it will result in the formation of non-functional legislation. Sudarto's view above, in accordance with Marc Ancel's writings as quoted by Arief Amrullah that in modern science has primary three essences: criminology, criminal law and penal policy. Criminology studies crime in all aspects. Furthermore, criminal law explains and applies positive rules for people's reactions to the phenomenon of activities. Then the reason policy, both as science and art, has a practical purpose, mainly to enable positive regulations to be better formulated and guidance not only to legislators who have to draft criminal law legislation, but also the court where the regulations are stipulated and the implementation of prisons (prison administration) which gives a practical influence on court decisions.

Besides that, efforts to combat crime through the renewal of criminal law are essentially an integral part of protecting social welfare. Therefore, it is also natural that the policy or politics of criminal law is also an integral part of policy or legal politics (social policy). Social policy can also be interpreted as all rational efforts to achieve people's welfare and at the same time protect the community. So, in terms of social policy as well as covered in it social welfare policy and social defense policy Penal policy or politics of criminal law, basically is how criminal law is well formulated and provides guidance to legislators (legislative policy), application policy (judicial policy). Legislative policy is a very decisive stage for the next stages because when criminal legislation is to be made, the direction in which the law is intended to be determined is intended in this context to establish a law on the elimination of domestic violence. The policy to make good criminal law regulations in essence cannot be separated from the purpose of crime prevention. Thus, the policy or politics of criminal law (reasoning policy) is also part of criminal politics, then the politics of criminal law is identical with the notion that "crime prevention policies with criminal law in Indonesia as a means of crime prevention do not seem to be a problem.

Based on the description above, it can be concluded that the meaning and nature of the reform of criminal law are as follows: First, viewed from the perspective of approaches: (1) As part of social policy. Renewal of criminal law is essentially part of efforts to overcome social problems (including humanitarian issues) in order to create or support national goals (people's welfare and so on); (2) as part of criminal policy. Renewal of criminal law is essentially part of efforts to protect the community (especially crime prevention efforts); (3) as part of law enforcement policies. Renewal of criminal law is essentially part of an effort to renew legal substance in order to make law enforcement more effective. Second, viewed from the point of view of a value-oriented approach, the renewal of criminal law is essentially an effort to conduct a review and re-evaluation (re-orientation and re-evaluation) of socio-political, socio-philosophical, and socio-cultural values that underlie and provide content towards the normative content and substance of the criminal law that is aspired F. Conclusion

1. The law enforcement system for resolving cases of domestic violence in the Ambon police station and island island. Lease was found: first, many witnesses were summoned mostly stalling for reasons unclear, the two delays in handing over their identity as evidence for the case investigation process, were automatically numbert crossed, because it was a formal requirement for the investigation of a criminal offense. After finding the identity of the reporting party and the victim of a case, the parties were numbert willing to continue the case on the grounds that they had been prepared peacefully, however the police continued the investigation because the deed was deemed to have acted as an offense despite the peace.

2. Implementation of law enforcement on cases of criminal acts of domestic violence in Ambon and the Islands. Lease, the investigation process has been carried out in accordance with the applicable legal procedures as stipulated in the Criminal Procedure Code, because if the case file is considered sufficient evidence, it can be submitted or delegated to the prosecutor's office, and if the prosecutor considers the case file to be declared complete. District Court. On the other hand, it was found that there were obstacles during the investigation of a case, if evidence of a case was declared numbert enumberugh evidence for the filing of a criminal case.

3. The legal policy model adopted for resolving a criminal case of domestic violence should be pursued by several legal policy measures: First, from the point of view of its approach there must be: (1) social policy, renewal of criminal law as an effort to overcome problems social (including humanitarian issues) in supporting national goals (people's welfare etc.); (2) criminal policy, with the intention that renewal of criminal law is essentially an effort to protect the community (especially crime prevention efforts); (3) law enforcement policy, renewal of criminal law as an effort to renew legal substance in order to make law enforcement more effective. Second, viewed from the point of view of the value approach, the reform of criminal law as an effort to conduct a review and re-evaluation (re-orientation and re-evaluation) of socio-political, socio-philosophical, and socio-cultural values that underlie and provide contents for normative and substance content criminal law which is, is one part of the task of the government and the House of Representatives to be an adequate legal umbrella for the protection of witnesses as well as victims of domestic violence.

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The Development of Teaching Material of Force Oriented to Contextual Approach to Improve the Study Result of Science in Elementary School

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DOI: 10.29322/IJSRP.9.08.2019.p9220

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9220>

Abstract- The study aims to produce material-oriented, practical, and effective contextual approach materials to enhance the learning outcomes of elementary school students. The research was carried out using four phases of the 4-D model. Which is the level of stage define (definition), design, develop and disseminate (dissemination) and in the test of class IV SDN Jajartunggal III Surabaya, SDN Pakis 1 Surabaya, and SDN Manukan Kulon in the even semester School year 2018/2019 with One-Group-Pretest-Posttest Design Data analysis techniques use quantitative and qualitative descriptive analytical techniques. The results showed: 1) Valid in accordance with the third assessment of the validator, 2) practical according to the assessment of both observers visible from the student activities increased at each meeting and implementation of RPP, 3) effectively visible from the existence of Difference between results pretest and posttest student learning results and student's positive response. Based on the results of data analysis, it can be concluded that the development of material style materials oriented on a contextual approach is valid, practical and effective to improve the learning outcomes of elementary school students.

Index Terms- development of teaching materials, contextual approaches, learning outcomes

I. INTRODUCTION

The efforts to improve education quality continue to be done by the government. The progress of a country is that one is determined by education (Kunandar, 2007, p. 8). Education in Indonesia not only prioritize skills in the realm of cognitive but there is another potential that will be developed in the Unit of education as stated in the National Education System Act number 20 year 2003 that explained that education is a conscious and well-planned effort to create a learning atmosphere and to possess the spiritual power of religion, self-control, personality, intelligence, noble morality, and skills required by him, society, nation, and country. Education is certainly a process to acquire and develop the knowledge, attitudes and skills and experience of learners.

In law Number 20 year 2003 clause 1 paragraph 2 concerning the national education system, the education effort will involve educational components, including teachers, students, materials or curriculum, educational facilities, and infrastructure.

All these combinations are well-collaborated, which will form a useful alignment as an optimal achievement. In the education process, teachers have educational objectives to achieve the interests of students by planning a lesson according to Martinis Yamin and Bansu I. Ansari (2009:39)

At the elementary school Lot, students are very different in the development of physical, intellectual, moral, and ability. The development stage of student learning behavior is influenced by aspects of the inside and the surrounding environment. In elementary school students are in the concrete operational phase. In line with the theory of Piaget (in Slavin, 2009:66) that children aged 7 to 11 years of efficacy in the operational stage so that the learning process in removing the stage must also be meaningful. It is also by Ausubel's meaningful learning theory (Suyono & Haryanto, 2011, p. 82) stating that memorization learning does not help students in gaining knowledge, but is meaningful. Learning is said to be meaningful when the child experiences directly what it learns by activating more of the senses than just listening to the teacher's explanation.

In addition to the characteristics of students, learning also needs a learning resource that can be utilized by teachers, and students to enrich the content of education, methods, and tools of education, which may support educational purposes (Wisudawati and Sulistyomawati, 2014). Independently to find solutions to the problems faced, will create a very meaningful skill (Dahar, 2006, p. 79) The process of learning the IPA at this time rests on the standards of basic and secondary education processes that govern About the criteria for learning implementation in the education unit. Based on the standard of learning process in the regulation of the Minister of Education and Culture of the Republic of Indonesia number 22 year 2016 learning process in the education unit is done interactively, inspiring fun, challenging, motivating Learners to participate actively and provide ample space for initiative, creativity and independence in accordance with the talents, interests and physical and psychological development of the learners.

Study of field and interviews conducted by researchers at SDN Jajartunggal III, SDN Pakis 1 and SDN Manukan Kulon in class IV in the learning process, students are less introduced scientific or experimental work and reality in the field remains Using the conventional way of memorizing and noting the teacher's explanation. It is also seen from the activity of students,

participation, and the role of students in the learning process especially in the use of teaching materials. Also, the development of teaching materials that exist in the field already exists but in a thematic form, so that the science material is less need to be developed to be given students. The learning application contained in the 2013 curriculum is different from the 2006 curriculum that students used to be given, now changed students who find out from learning resources not only from teachers can be from other sources for learning. The application of the teaching materials is still not maximally, because by conventionally providing learning is felt enough when students want to demand more so that their understanding lasts longer in their memory.

Duron Research, R (2006) said that school should be able to create an interactive learning environment that engages students actively in learning one of them by selecting a model or approach appropriate learning. A learning approach that provides opportunities for students and helps students gain an understanding of how science works to optimize learning outcomes by being attributed to real-life students.

Jhonson (2002:25) argues that learning that uses a CTL (Contextual Teaching and Learning) approach will be able to engage students in a variety of important activities that help students to relate lesson materials to the context of Real-life they face. By associating both students see meaning in learning. When students work on projects, they associate the material that is done with life situations. Making students learning meaningful.

This is in line with the theory of constructivist learning which emphasizes on learning by the means of understanding the theory and gaining knowledge of students must actively build their knowledge and be associated with phenomena in life Everyday (contextual) so that the learning is more meaningful (Syaiful all, 2005:88). CTL is a learning concept that helps teachers relate between material taught to students' real-world situations and encourages students to make connections between their knowledge and their application in their lives as members Families and communities.

The results of the research conducted by Napoleon (2016) on the development of contextual learning devices by utilizing the environment as a learning resource to improve the learning outcomes of students of IPS class IV SDN Koto Anau, Solok, West Sumatra shows that implementing contextual learning by utilizing the surrounding environment as a learning resource can increase teacher activity in learning and improve student learning outcomes.

SDN Jajartunggal III, SDN Pakis 1 and SDN Manukan Kulon in class IV in the learning process, students are less introduced as scientific or experimental works and the reality in the field continues to use the conventional means of memorizing and noting the teacher's explanation. It is also seen from the activity of students, participation, and the role of students in the learning process especially in the use of teaching materials. Also, the development of teaching materials that exist in the field already exists but in a thematic form, so that the science material is less need to be developed to be given students. The learning application contained in the 2013 curriculum is different from the 2006 curriculum that students used to be given, now changed students who find out from learning resources not only from teachers can be from other sources for learning. The application of the teaching materials is still not maximally, because by

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The study of Eko Priyono (2008) demonstrated by applying the learning of the CTL positively influences the outcome of learning. The statement was also supported by the research of Tri Indrayani (2013) stating that the CTL approach can improve student life skills and learning outcomes. From the above studies can be concluded that contextual approaches can be used to improve learning outcomes. The differentiator factor from some of these studies is that researchers develop teaching materials with a contextual approach. The teaching materials contain the steps of contextual learning or CTL such as Constructivism, inquiry, questioning, learning community, modeling, reflection, authentic assessment and contain real examples in the environment Around the student. In carrying out some of these activities necessary help teachers as facilitators. These activities can be realized in the learning process through the use of teaching materials oriented contextual approaches.

Some of the material that can be taught in science learning is style material. The material style in class IV Elementary School According to the 2013 curriculum covers a variety of styles among other muscular styles, electric style, magnetic force, gravitational force, and friction style. Based on the sub material, the style material can be learned by applying a contextual approach.

According to Djojodoeiro (2010), The characteristic of science learning is involving many senses, using various techniques (Obsrvasi, Exploration, and experimentation), using tools and media and is an active learning process done by students. Based on these things, a contextual approach oriented teaching material is structured to facilitate the learning activities on the style material. With this teaching material contains material about style, students can conduct a scientific activity that is indirectly students have identified about the style so that students will understand the concept of style in hopes of improving students' learning outcomes in science learning activities. Based on the things outlined above, the idea arises to do a development study titled "The development of teaching material of force oriented to contextual approach to improve the study result of science in elementary school"

II. METHODS

This research plan is included in research and development (R&D). Model development four-D model. This Model consists of four stages of development namely define, design, development, and dissemination. In the defining phase, researchers conducted preliminary analyses analyzing the conditions in the field, analyzing the curriculum applied in the field, relevant theories, conducting student analysis, task analysis, concept analysis. The next step is the formulation of objectives and indicators of achieving objectives by developing basic

competencies. Design is to determine learning objectives, exam preparation, tool selection, material selection and initial design of learning. . Development of the development phase is done by developing the teaching materials, conducting the validation of experts or practitioners to improve the feasibility of teaching materials. At the stage of dissemination is done by socialization to students and educators in a limited-scale exam. For the response, feedback about the teaching materials has been developed, Socialisai in the Seminar forum to introduce materials that have been developed, then done packaging with the printing of teaching materials.

Researchers then improved teaching materials and supporting devices from experts. The next stage is a validation test, the product design validation phase is done to assess the validity of the teaching materials design. The teaching materials of the validation are then revised according to the advice and criticism of the validator, so that the teaching materials can meet the needs of the students properly. Revised teaching materials were then condemned to a limited group of three small group tests for a total of 30 students, and a limited trial of 1 class of students. The product testing phase is conducted to test the feasibility level of teaching materials developed based on the criteria of content, presentation, language, and science process skills. This phase is implemented after the validation and revision phases. This test material is a final teaching material after passing a proven series of validation phases in grade IV students at SDN Jajar Tunggal III Surabaya, SDN Pakis 1 Surabaya and SDN Manukan Kulon which amounted to 30 heterogeneous students (based on learning

outcomes Gender and learning). To understand the effectiveness of teaching materials in improving the understanding of natural sciences of students in the material style, activities are continued by providing about the training questions that matter in accordance with the teaching materials developed. Experiments in development were conducted against restricted groups. Experimental design uses one group Pretest-posttest design. The trial in this study is grade IV students at SDN Jajar Tunggal III Surabaya, SDN Pakis 1 Surabaya and SDN Manukan Kulon. Experiments were conducted in small groups of 30 heterogeneous children (gender and learning outcomes).

III. RESULT

The results of material development of style materials oriented towards a contextual approach to improve the results of science study in elementary school can be said to be worthy of covering valid, practical and effective. The following are the validation results of the teaching materials, RPP and the test results obtained from the three validators, among others:

1. Validation result

- a. The validation of the teaching materials developed is validated by three expert validators to obtain prior input from the teaching materials in the exam. The validation results can be seen in the following table 1

Table 1 Validation of teaching materials

No	Aspect assessed	Validator Rating			Average	Description
		1	2	3		
1	Material conformity with KD					
	Material completeness	3	3	3	3	Valid
	Material Expanse	3	3	3	3	Valid
	Depth of material	3	3	3	3	Valid
2	Accuracy of materials					
	Accuracy of concept and definition	3	3	3	3	Valid
	Accuracy of data and facts	3	3	3	3	Valid
	Example and case accuracy	3	3	3	3	Valid
	Accuracy of images, diagrams and illustrations	3	3	3	3	Valid
	Accuracy of the terms	4	3	4	3.7	Very valid
3	Includes the CTL learning component					
	<i>Contractivism</i> (Come observe!)	4	4	4	4	Very valid
	<i>nquiry</i> (Come collaborate!)	3	4	4	3.7	Very valid
	<i>Questioning</i> (Come ask!)	3	3	3	3	Valid
	<i>Learning Community</i> (Create groups)	3	4	4	3.7	Very valid
	<i>Modelling</i> (Let's follow!)	3	3	3	3	Valid
	<i>Reflection</i> (Let's ponder!)	3	3	3	3	Valid
	<i>Autentic Assesment</i> (Provide test result study)	3	3	3	3	Valid

No	Aspect assessed	Validator Rating			Average	Description
		1	2	3		
4	The establishment of material					
	Drawings, diagrams and illustrations in everyday life	4	3	4	3.7	Very valid
	Using examples and cases found in everyday life	4	4	4	4	Very valid
5	Encouraging curiosity					
	Encouraging curiosity	3	3	3	3	Valid
	Creating the ability to ask	3	3	3	3	Valid
6	Presentation techniques					
	The concept of material	3	3	3	3	Valid
7	Supporting presentation					
	The concept of material force	3	4	4	3.7	Very valid
	Examples of questions in each learning activity	3	3	3	3	Valid
	The book view makes students interested in learning	4	3	4	3.7	Very valid
8	Presentation of Learning					
	Student involvement	3	4	4	3.7	Very valid
9	Coherency and prosecution of the mindset					
	The link between learning activities/Sub learning activities/paragraphs	3	3	3	3	Valid
	The integrity of meaning in learning activities/Sub learning activities/paragraphs	3	3	3	3	Valid
10	Businesslike					
	The precision of sentence structure	3	4	4	3.7	Very valid
	Sentence effectiveness	3	3	3	3	Valid
	Term immortality	4	4	4	4	Very valid
11	Communicative					
	Understanding of messages or information	3	4	4	3.7	Very valid
12	Dialogical and Interactive					
	Ability to improve learners ' knowledge	3	3	3	3	Valid
13	Compliance with student developments					
	Compliance with the intellectual development of learners	3	3	3	3	Valid
	Compliance with learners ' emotional development level	3	3	3	3	Valid
14	Conformity with language conventions					
	Grammar accuracy	3	3	3	3	Valid
	Spelling accuracy	4	3	4	3.7	Very valid
15	CTL-oriented book size					
	Size compatibility with existing book standards	3	3	3	3	Valid
	Size compatibility with content material	3	3	3	3	Valid
16	Cover design					
	The appearance of layout elements on the front cover, back and back harmoniously has a rhythm and unity and consistency	4	3	4	3.7	Very valid
	Color layout elements harmoniously and clarify the function	3	3	3	3	Valid
	Fonts used are attractive and easy to read	3	3	3	3	Valid
17	Cover illustration					
	Describing content/teaching materials and revealing character objects	3	3	3	3	Valid
	The shape, color, size, proportion of objects according to reality.	3	3	3	3	Valid
18	Content Design					
	Placement of layout elements consistent based on pattern	3	3	3	3	Valid
	The separation between paragraphs clearly	3	3	3	3	Valid
	Level/Hierarchy of titles clear, consistent and proportional	3	3	3	3	Valid
	Able to reveal the meaning of objects	3	3	3	3	Valid
	Accurate and proportional shape according to reality	3	3	3	3	Valid

No	Aspect assessed	Validator Rating			Average	Description
		1	2	3		
	Creative and dynamic	3	3	3	3	Valid

Based on table 1 above, the three validators have given a score range of 3-4

- b. The RPP validation is being developed validated by three expert validators to obtain the prior input of the teaching materials in the test. The validation results can be seen in table 2 below

Tabel 2 Validasi RPP

No	Aspect assessed	Validator Rating			Average	Description
		1	2	3		
Identity						
1.	Contains RPP school identity (school name, subject, class, semester and Time allocation)	4	4	4	4	Very valid
Goal						
2.	Load Core Competencies (KI), basic competencies (KD), indicators, and learning objectives	3	4	3	3.3	Valid
3	Indicator conformity with basic competencies	3	3	3	3	Valid
4	Conformity of learning objectives with the time provided	3	3	3	3	Valid
5	Clarity of learning objectives	3	4	4	3.7	Very valid
CTL approach						
6	According to KD and the indicator	3	4	4	3.7	Very valid
7	Contains Constructivism, Inquiri, Question, Learning community, Modeling, Reflection and Authentic assessment activities	3	4	4	3.7	Very valid
Learning Tools and Resources						
8	Means of supporting goal achievement	4	4	4	4	Very valid
9	Learning resources are relevant to the material presented	3	4	4	3.7	Very valid
Learning Step						
10	Clarity of learning scenarios (according to KI and KD)	3	4	3	3.3	Valid
11	Detail a learning scenario (consisting of initial activities, core activities, closing activities and including time allocation required)	4	4	4	4	Sangat valid
12	Delivering motivation and learning objectives	3	4	4	3.7	Very valid
13	Load the CTL learning step	3	4	4	3.7	Very valid
14	Contains discovery activities	3	4	4	3.7	Very valid
15	Provide follow-up assignments	3	4	4	3.7	Very valid
16	Contains aspects of knowledge	3	4	4	3.7	Very valid
17	Aspects of the invention	3	4	4	3.7	Very valid
The language						
18	In accordance with Indonesian rules that are easy to understand	3	4	4	3.7	Very valid

Based on table 2 above, the three validators have given a score range of 3-4

- c. The RPP validation is being developed validated by three expert validators to obtain the prior input of the teaching materials in the test. The validation results can be seen in table 3 below

Table 3 Results Validation test result study

No	Validity of content					Language and questions				
	Score Validator 1	Score Validator 2	Score Validator 3	average	Description	Score Validator 1	Score Validator 2	Score Validator 3	average	Description
1	4	4	4	4	Very valid	4	4	4	4	Very valid
2	4	4	4	4	Very valid	4	4	4	4	Very valid
3	3	3	3	3	Valid	3	3	3	3	Valid
4	4	4	4	4	Very valid	3	3	3	3	Valid
5	4	3	4	3.7	Very valid	4	4	3	3.7	Very valid
6	3	3	3	3	Very valid	3	3	3	3	Very valid
7	4	4	4	4	Very valid	4	4	4	4	Very valid
8	4	4	4	4	Very valid	4	3	4	3.7	Very valid
9	4	3	4	3.7	Very valid	4	4	4	4	Very valid
10	4	4	4	4	Very valid	4	4	4	4	Very valid
11	4	4	4	4	Very valid	4	3	4	3.7	Very valid
12	3	3	4	3.3	Valid	3	3	3	3	Valid
13	3	3	3	3	Valid	3	3	3	3	Valid
14	3	3	3	3	Valid	3	3	3	3	Valid
15	3	3	3	3	Valid	3	3	3	3	Valid
16	4	4	3	3.7	Very valid	4	3	4	3.7	Very valid
17	3	3	3	3	Valid	3	3	3	3	Valid
18	3	3	3	3	Valid	3	3	3	3	Valid

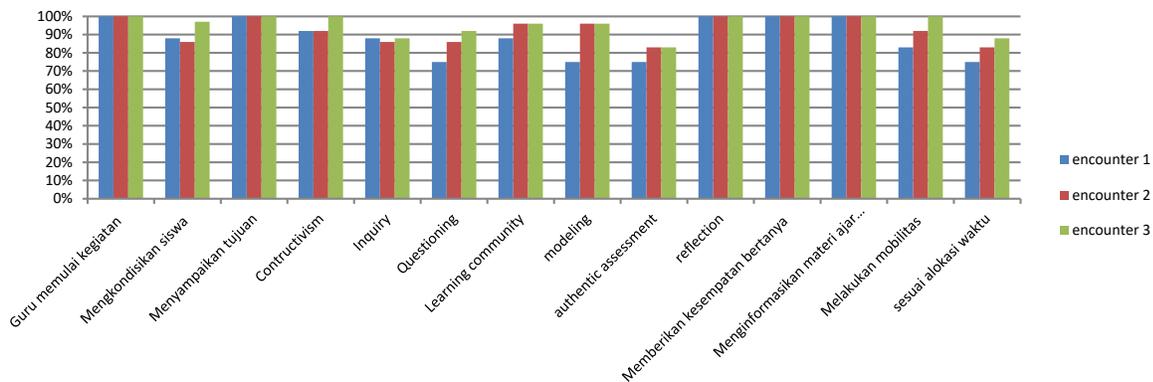
According to table 3 above, the three validators have given a score range of 3-4

1. The practicality of material teaching material style-oriented contextual approach

The practicality of material material-oriented contextual approach materials can be seen from the results of the implementation of learning activities and activities of students during learning activities with the observation by 2 observers.

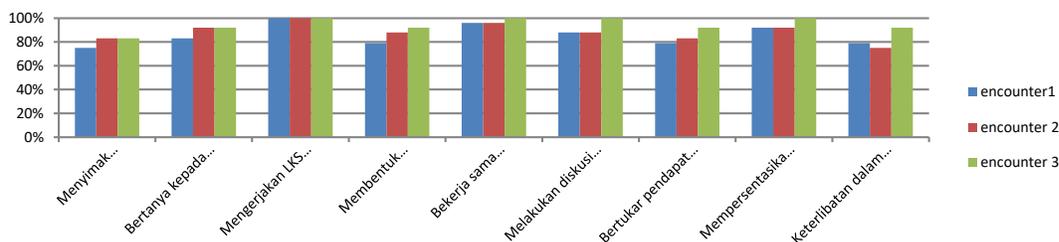
a. Results of Learning Plan implementation

The results of learning implementation are 75%-100%



b. Analysis results of student activity observations

Results of the analysis of students activities received 75%-100%



1. Material effectiveness of style materials teaching contextual approach
 - a. Test student learning Results

Table 4 results of student to

No	Name	Value		KKM	Description		N-gain	Description
		Pretest	Posttest		Pretest	Posttest		
SDN Jajartungal III Surabaya								
1	AA	65	97	75	TT	T	0,91	High
2	BB	56	82	75	TT	T	0,59	Medium
3	CC	65	97	75	TT	T	0,91	High
4	DD	74	94	75	TT	T	0,76	High
5	EE	76	97	75	T	T	0,87	High
6	FF	50	82	75	TT	T	0,64	Medium
7	GG	65	88	75	TT	T	0,66	Medium
8	HH	76	94	75	T	T	0,75	High
9	II	82	97	75	T	T	0,83	High
10	JJ	50	82	75	TT	T	0,64	High
SDN Pakis I Surabaya								
1	AA	70	97	75	TT	T	0,90	High
2	BB	65	97	75	TT	T	0,91	High
3	CC	56	82	75	TT	T	0,59	Medium
4	DD	65	94	75	TT	T	0,82	High
5	EE	82	97	75	TT	T	0,83	High
6	FF	76	94	75	T	T	0,75	High
7	GG	74	94	75	T	T	0,83	High
8	HH	50	88	75	TT	T	0,64	Medium
9	II	65	88	75	TT	T	0,65	Medium
10	JJ	65	94	75	T	T	0,82	High
SDN Manukan Kulon Surabaya								
1	AA	59	82	75	TT	T	0,56	Medium
2	BB	56	88	75	TT	T	0,72	High
3	CC	65	88	75	TT	T	0,65	Medium
4	DD	82	97	75	T	T	0,83	High
5	EE	65	82	75	TT	T	0,48	Medium
6	FF	74	94	75	TT	T	0,83	High
7	GG	65	94	75	TT	T	0,83	High
8	HH	50	88	75	TT	T	0,76	High
9	II	56	88	75	TT	T	0,72	High
10	JJ	65	94	75	TT	T	0,82	High
Rata-rata		66,2	91	75	77% TT	100%T		

From the results of the pretests and posttest can also be known the submission of learning students using material-oriented style materials teaching contextual approach experienced increased learning outcomes of pretests and posttest values. The following is in the display recapitulation of results of students ' learning outcomes based on low, medium and high categories

Table 5 recapitulation of students learning outcomes

No	Kategori N-Gain	Jumlah Siswa	Persentase (%)
1	Low	0	0%
2	Medium	19	63%
3	High	11	37%

The results you get when looking at Table 5 show that student learning results use stylish material teaching materials oriented towards a contextual categorized approach of 19 students with a percentage of 63% and a high category of 11 students with a percentage of 37%.

IV. DISCUSSION

The teaching materials developed are validated by three expert validators to get the prior input of teaching materials in the context. The result of the validation that material-oriented style materials are contextual approaches that derive a score from the validator with a highly valid assessment category of 14 aspects of the 48 assessment aspect and his students got a valid category. The three validators provide recommendations that a material-oriented stylistic approach to contextually developed approaches can be

used with revisions. The RPP is developed validated by three people's validator experts to get the previous input of RPP applied in learning. The validation results that the RPP acquires a score from the validator with a very valid assessment category of 14 aspects of the 18 aspect assessment and the rest got valid categories. The three validators provide recommendations that a material-oriented stylistic approach to contextually developed approaches can be used with revisions.

Other devices after teaching materials and RPP which are the test of learning results measured in this study are test results learned about the style of double-choice material, short answer and description developed consisting of 18 items. The problem is adjusted with the indicator so that each indicator can be measured. From the validation results can be seen in table 4.8 that test results learn the validity of the content and the validity of the language and writing the test of study results in the form of multiple-choice, short answer and description that has been developed, obtained the results of the assessment of three The expert validator for every aspect gets value with a value range of 3-4 each aspect shows 10 questions of the 18 questions indicating a very valid category and 8 problem shows valid. In the aspect of the language and the writing of the results of the assessment of the three validators for each aspect with a score range of 3-4 shows 9 out of 18 very valid and 9 categorized questions with valid categories. The three validators provide recommendations that the developed study result test can be used with revisions.

The results of the implementation of RPP meeting 1 in RPP meeting I activities, the level that has been received an assessment from two observers with the category is done well. Both observers agreed to provide an assessment on 14 aspects of implementation in RPP with a percentage of 79% to 100% and overall all stages in the RPP at meeting 1 based on. Based on the observation basil, there are several things that need to be considered in the implementation of RPP namely guiding aspects and motivating students to ask questions (Questioning), in addition to giving examples by following students (Modelling). As well as carrying out the learning activities have not matched the allotted time allotted because the students when conducting experiments are slightly rowdy until the time that is seized exceeds the initial time. In this case, the teacher needs to dissipate the use of learning time so that the learning will be in accordance with the planning that has been compiled before.

The results of observations obtained at the meeting of 2 in RPP activities, the stage that received the assessment of two observers with a very good category there are 5 aspects of 14 aspects of assessment, while the rest got a pretty good category. Both observers agreed to give an assessment on the 14 aspects of the RPP and overall all the stages in the RPP at meeting 2 were carried out well. Based on the results of the observation of the less optimal learning at the meeting 1 on the guiding aspect and motivating the students to ask questions (Questioning), in addition to providing examples with the students follow (Modelling). As well as carrying out the learning activities has not been in accordance with the allocation of time specified because the students when conducting experiments slightly rowdy so that the specified time exceeds the initial time, from meeting 2 has been improved and more optimal than the meeting 1.

The results obtained at the meeting 3 on RPP activities, the level that was done received the assessment of two observers with

a very good category there are 9 aspects of 14 aspects of assessment, while the rest got a good category. Student activity is a percentage of students' activities that arise during the learning process using a style material oriented to a contextual approach derived from the observation results of two observers use the observation sheet Students' activities. The observation of students' activities conducted during the learning activities took place on the material-oriented materials teaching test of the contextual approach that researchers developed. The observation of student activity consists of 10 aspects with discussion of observations by both observers as follows.

The results of students' observations at the meeting of 1 observation of the students' activity are carried out by scoring from two observers with active category of 8 aspects of 10 aspects and 2 aspects of receiving an assessment with a fairly active category. Both observers agreed to give assessments with a percentage of 75% to 100% in every aspect, the observation showed that students were enthusiastic about the learning but with the guidance of teachers because students were not accustomed to use Developed teaching materials.

The results of student observations at meeting 2 can be seen observing results of students who carried out the assessment of two observers with active category that is 9 aspects of 10 aspects and 1 aspect received an assessment with a fairly active category. Both observers mutually agreed to provide a percentage assessment of each aspect with a percentage range of 75% to 100%. The observation showed that students enthusiastically followed the study still with the guidance of teachers but not intense at the meeting I.

The results of student observations at meeting 3 can be seen observing results of students who carried out the assessment of two observers with active category that is 10 aspects of 10 aspects of the assessment. Both observers agreed to provide a percentage assessment of each aspect with a range of 83% to 100% with the active category.

Student observations and activities have been obtained that the application of a contextual approach-oriented material teaching can make students active in learning activities. According to Wilcox in (Slavin, 2009) that in belajar the student discovery is encouraged to learn through active involvement with concepts and principles, the teacher only encourages students to have experience and conduct experiments that allow They found the principles for themselves (Nur, 2008, p. 10). So it can be concluded that material oriented contextual approach developed researchers are practically used in the learning process.

The third criterion of teaching material is oriented to a decent contextual approach is effectiveness. Effectiveness can be gained from students' learning outcomes and responses. Student learning outcomes are derived from a concept understanding test compiled based on a learning indicator that refers to the basic competency of style material. Test result Data is analyzed for increased student learning outcomes. Learning outcomes are developed in the form of multiple choice, short answer, description. The test was composed by 18 items with scoring techniques in accordance with the rubric that had been compiled previously. The opinion of Arikunto (2013, p. 46) tests are skills, knowledge, abilities and talents owned by individuals or groups can be measured through a collection of questions or exercises and other tools, this.

Based on the submission of students' learning outcomes before learning (pretest) on the device test is known to mean that the student's reach is 66.2 indicating that the students' classification is not complete with the specified KKM is ≥ 75 and 77% of students. The results of his studies. Low level of understanding of students when answering pretests because students have not obtained information about. In addition, students are not used to solve style material. Another factor that leads to low levels of student thinking when pretests is because students have not been trained to learn directly with them seeking answers from the experience performed by students. This is because the study has not been performed through scientific process.

Based on the proof of student learning Test (post test), it is known that the average of the students' submission is 91 indicating that all students after conducting their studies using material-oriented style materials teaching. On a contextual approach can be completely individual and classical. From the acquisition of pretests results and post tests obtained information that there is an increase in learning outcomes before learning and after learning, these results show that students can already master the concept after conducting the learning.

Student responses resulted from the replenishment of the student response poll that was disseminated after conducting the study using material style materials oriented contextual approaches. This poll is filled by 30 students in grade IV Elementary School with an answer with answers in accordance with the circumstances that the students felt during the study. The student response results were obtained from the student's analysis that answered positively on each poll question.

The results of students' responses to the questions of interest in developed materials can be seen from the student's response to the teaching material that the students respond to the category very well, with a percentage of 83% to 100%. This is due to the learning that has been implemented by students with material teaching materials oriented contextual approach is very enjoyable so that students' motivation to activities performed high is characterized by a positive response that Given students. It is in line with the opinions expressed by Kurl Kelvin (in Sanjaya, 2014. P. 123) The factors that can encourage each individual to behave because there is motivation that arises due to a certain attraction.

V. CONCLUSION

The results of the research can be in conclusion that the development of material-oriented style materials on a contextual approach deserves the validity, practicality of which is seen from the implementation of RPP and student activity, and then the effectiveness of views from the test Students learning outcomes and responses and can improve student learning outcomes.

a. Suggestions

1. Things to note in the application of teaching materials with contextual, effective management of time and efficiency so that the learning will be more optimal.

2. Style material teaching material oriented to the contextual approach developed can be used as a referral to apply to other materials.

3. This research may be used as the foundation for future researchers to be better developed to improve the quality of education in Indonesia.

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Numerical Sand Prediction Model Analysis for Sand Onset, Sand Volume and Sanding Rate.

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DOI: 10.29322/IJSRP.9.08.2019.p9221

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9221>

Abstract- Sand production occurs during the hydrocarbon production from a well when the reservoir sandstone is weak enough to fail under the in-situ stress conditions and the imposed stress changes due to the hydrocarbon production. A 3D Numerical Geomechanical Model of Greater Ughelli Depobelt in the Niger Delta was analysed by assessing the mechanical response to rock. This was done through the analysis and modelling of information from offset data. The developed model is capable of assessing the conditions that lead to the onset of sanding, the rate of sanding and the volume of sand that would be produced.

Index Terms- Critical wellbore pressure, uniaxial Compressive strength, Rock Failure, Mogi Criteria, Young Modulus, Shear stress.

I. INTRODUCTION

Mechanisms causing sand production are related to the formation strength, flow stability, viscous drag forces and pressure drop into the wellbore (Osisanya, 2010). The critical factors leading to accurate prediction of sand production potential and sand production are: formation strength, in-situ stress, and production rate. Other factors are reservoir depth, natural permeability, formation cementation, compressibility, surface exposed to flow, produced fluid types and phases, formation characteristics, pressure drawdown and reservoir pressure. Predicting sand production involves developing empirical and analytical. Numerical analytical techniques are also sometimes used. They are models developed from finite element analysis. The techniques above use production data, well logs, laboratory testing, acoustic, intrusive sand monitoring

devices, and analogy (Osisanya, 2010). Techniques. Empirical techniques relate sand production to some single parameter or group of parameters such as porosity, flow or drawdown, while analytical techniques relates to rock stresses.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

In developing this numerical model, the work will incorporate a computer model which will be used to carry out these analytical predictions based on input data considering hybrid approach with the assumption that the formation is heterogeneous, discontinuous and non-linear in nature. Geomechanical model determination for shear failure was carried out by using input and output data obtained from offset data. This data were used to obtain the maximum horizontal stress, fracture break down pressure, collapse pressure, maximum drawdown pressure, critical wellbore pressure, failure stresses and porosity at different depths. Some regression plots for different criteria will be developed to show the effects of these stresses, porosity, drawdown, critical pressure, failure criteria and unconfined compressive strength (UCS) in predicting sand production at different well directions respectively.

III. EQUATIONS FOR NUMERICAL SAND PREDICTION MODEL DEVELOPMENT

For the purpose of this research, all equations used for the development of the software are based on 3D-Mogi Coulomb failure Criterion.

Stress Regimes: There are three stress regimes inherent in wellbore; for this research work, the stress regimes are used to determine the maximum horizontal stresses while considering the biot's constant (as 0.5) at some point.

- Normal faulting stress regime ($k = 0.5$)

$$\sigma_H = \sigma_h + k * (\sigma_v - \sigma_h)$$

3.1

- Reverse and strike slip faulting regime

$$\sigma_H = \sigma_h + \frac{\sigma_h}{\sigma_v} * (\sigma_v - \sigma_h)$$

Cylindrical stress determinations:

$$\sigma_z = \sigma_{z'}$$

$$\sigma_{r\theta} = (\sigma_{y'} - \sigma_{x'})\sin\theta\cos\theta + \sigma_{x'y'}(\cos^2\theta - \sin^2\theta)$$

$$\sigma_{rz} = \sigma_{x'z'}\cos\theta + \sigma_{y'z'}\sin\theta$$

$$\sigma_{\theta z} = \sigma_{y'z'}\cos\theta + \sigma_{x'z'}\sin\theta$$

Virgin stress determinations before excavation:

$$\sigma_{xy}^o = 0.5(\sigma_h - \sigma_H)\sin 2\alpha \cos i$$

$$\sigma_{yz}^o = 0.5(\sigma_h - \sigma_H)\sin 2\alpha \sin i$$

$$\sigma_{xz}^o = 0.5(\sigma_H \cos^2 \alpha + \sigma_h \sin^2 \alpha - \sigma_v)\sin 2i$$

Virgin stress determinations after excavation:

$$\sigma_{r\theta} = \left[\left(\frac{\sigma_x^o - \sigma_y^o}{2} \right) \left(1 - 3 \frac{a^4}{r^2} + 2 \frac{a^2}{r^2} \right) \sin 2\theta \right] + \sigma_{xy}^o \left(1 - 3 \frac{a^4}{r^2} + 2 \frac{a^2}{r^2} \right) \cos 2\theta$$

$$\sigma_{\theta z} = (-\sigma_{xz}^o \sin 2\theta + \sigma_{yz}^o \cos \theta) \left(1 + \frac{a^2}{r^2} \right)$$

$$\sigma_{rz} = (\sigma_{xz}^o \cos 2\theta + \sigma_{yz}^o \sin \theta) \left(1 - \frac{a^2}{r^2} \right)$$

Stresses around wellbore for a Deviated Well:

$$\sigma_\theta = \sigma_x^o + \sigma_y^o - 2(\sigma_x^o - \sigma_y^o)\cos 2\theta - 4\sigma_{xy}^o \sin 2\theta - P_w$$

$$\sigma_z = \sigma_z^o - \nu [2(\sigma_x^o - \sigma_y^o)\cos 2\theta + 4\sigma_{xy}^o \sin 2\theta]$$

$$\sigma_{\theta z} = 2(-\sigma_{xz}^o \sin \theta + \sigma_{yz}^o \cos \theta)$$

Stresses around wellbore for a Vertical Well:

$$\sigma_\theta = \sigma_H - \sigma_h - 2(\sigma_H - \sigma_h)\cos 2\theta - P_w$$

$$\sigma_z = \sigma_v - 2\nu(\sigma_H - \sigma_h)\cos 2\theta$$

Deviatoric Stresses

$$S_1 = \frac{2\sigma_1 - \sigma_2 - \sigma_3}{3}$$

$$S_2 = \frac{2\sigma_2 - \sigma_1 - \sigma_3}{3}$$

$$S_3 = \frac{2\sigma_3 - \sigma_1 - \sigma_2}{3}$$

Principal Stresses

$$\sigma_1 = \max(\sigma_{p1}, \sigma_{p2}, \sigma_r)$$

$$\sigma_3 = \min(\sigma_{p1}, \sigma_{p2}, \sigma_r)$$

$$\sigma_2 = \frac{\sigma_1 + \sigma_3}{2}$$

Rock Failure

$$F = a + b \left(\frac{\sigma_1 + \sigma_3}{2} \right) - 1/3 \sqrt{(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2}$$

Where;

$$a = \frac{2\sqrt{2}}{3} c \cos \phi$$

$$b = \frac{2\sqrt{2}}{3} \sin \phi$$

if

$$F \geq$$

0, stable well with low risk of sand production

$$F <$$

0, Unstable well with high risk of sand production

Critical Wellbore Pressure

$$P_{cw} = \frac{1.5\sigma_x - 0.5\sigma_y - 0.5\alpha P_o \left(\frac{1-2\nu}{1-\nu} \right) - 1.732\tau_i}{1 - 0.5\alpha \left(\frac{1-2\nu}{1-\nu} \right)}$$

where; $\tau_i = \frac{0.025UCS}{10^6 C_B}$

$$Tensile = \frac{2c \cos \phi}{1 + \sin \phi}$$

$$P_o = \sigma_v - \left[(\sigma_v - P_H) \left(\frac{\Delta \tau_m}{\Delta \tau} \right)^3 \right]$$

$$\nu = \frac{3k_b - \tau_m}{2(3k_b + \tau_m)}$$

$P_{cw} < 0$, well is not affected by sand production

$P_{cw} \geq 0$, well would be affected by sand production

Formation Strength (Rock's compressive strength)

$$UCS = \left(\frac{0.0025 * \text{shear strength} * \text{YoungModulus}}{C_B * 10^6 * 0.08 * Vsh + 0.0045 * (1 - Vsh)} \right)$$

$$\text{YoungModulus } (G) = \frac{9 * P_b * \text{shearModulus}}{3P_b + \text{shearModulus}}$$

$$\text{shear strength} = \frac{2\cos\phi}{1-\sin\phi}$$

$$\text{shearModulus} = P_b t_s^2 B.$$

$$\text{Friction angle } (\phi) = 26.5 - 37.4(1 - NPHI - Vsh) + 62.1(1 - NPHI - Vsh)^2$$

$$C_B = \frac{1}{K_b}$$

$$K_b = P_b (t_c^2 - 3/4 t_s^2)$$

$$\text{Drawdown failure} = \frac{\Delta P}{UCS}$$

$$c = \frac{UCS(1-\sin\phi)}{2\cos\phi}$$

if Drawdown failure ≥ 1.7 , well is subject to sand production

if Drawdown failure < 1.7 , well is not subject to sand production

Analytical Model for Sand Volume Produced

$$C_{snd} = \frac{-N + \sqrt{N^2 + 16P_w\sigma_H}}{8\sigma_H}$$

$$V_{snd} = \frac{\pi i}{4} \left(\frac{1 - C_{snd}}{C_{snd}} \right) W_r^2$$

if C_{snd} and $V_{snd} > 0$ means well is subject to sand production

if C_{snd} and $V_{snd} \leq 0$ means well is not subject to sand production

IV. RESULTS ANALYSIS/DISCUSSION

The interface below shows the result of the Geomechanical sand prediction (GSP) model for each regressional plots Greater Ughelli and Costal Swamp Depobelt after it has been ran successfully.

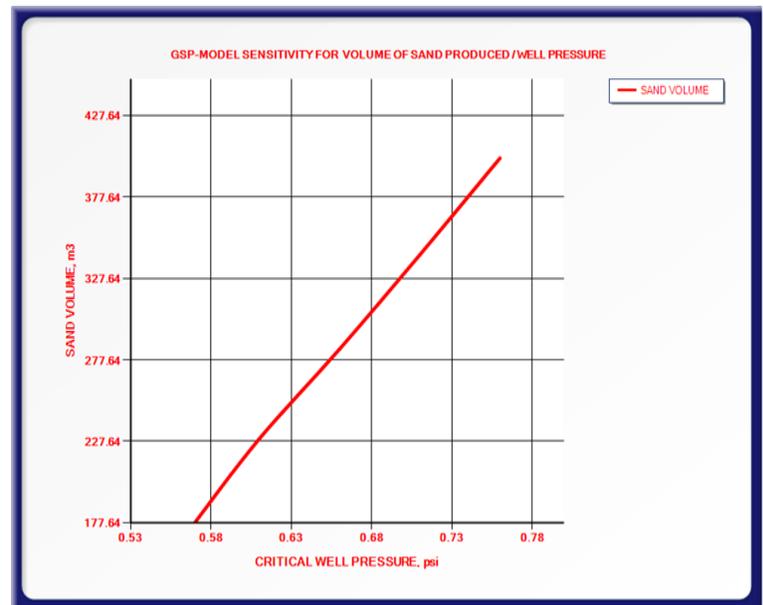


Figure 1: Volume of sand plot

Negative critical pressure indicates there will be no sand produced. The plot on figure 4.1 indicates that sand will be produced with the least critical well pressure of less than 0.58psi producing 177.64m³ of sand volume, it also ascertains the volume of sand that will be produced pending on the rise or fall of the critical well pressure over a period of time as the well continues to produce. On a general note, an increase in the critical well pressure increases the volume of sand to be produced.

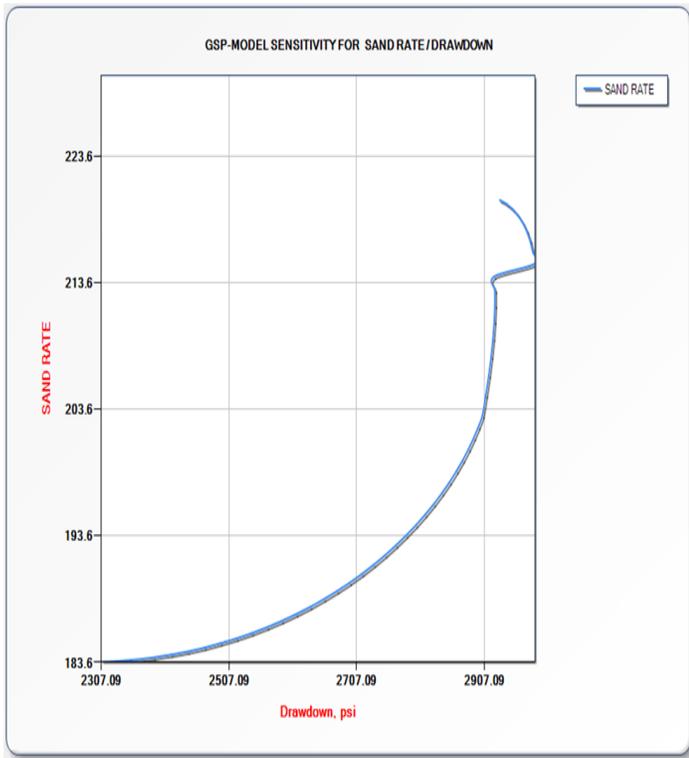


Figure 2: Sand Rate Plot

As expected higher drawdown results in production of higher percentage of sand, this is due to higher drag force separating the fluidized sand from the sand mass leading to sand production. The result on the pressure drawdown shows that for an excavated rock, the rate at which sand would be produced remains relatively constant over a period of time within a certain pressure range and then a considerable higher rate will be experienced when a higher drawdown pressure is applied. From figure 4.2 at a drawdown pressure of 2507psi, the sand production rate was 184.6.

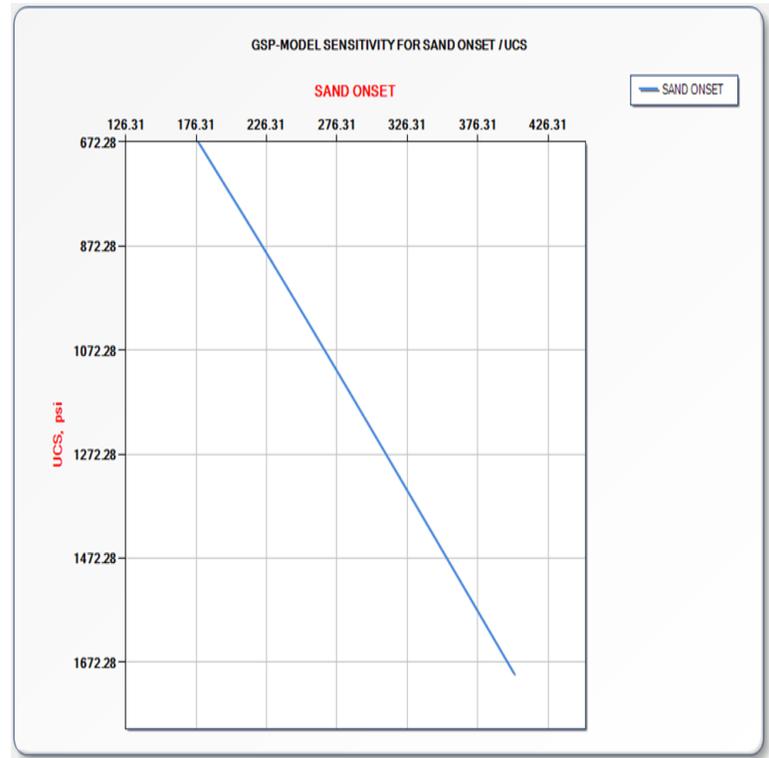


Figure 3: Sand Onset Plot

Uniaxial Compressive Strength (UCS) helps to determine the strength of the core sample by ascertaining the point at which the rock will fail. Once this happens, the integrity of the rock is questioned. From the plot, the reservoir rock was able to withstand the USC pressure until a little above 176.31psi when the rock gave way. This point of failure can be used to predict when the reservoir is likely to start producing sand.

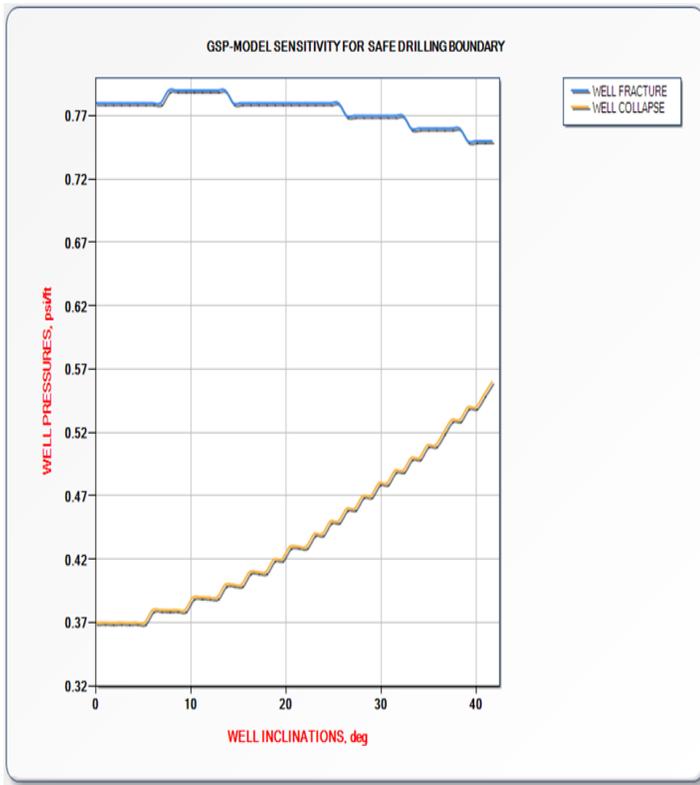


Figure 4: Safe Drilling Boundary plot

This shows that the required mud weight should be between the collapse pressure (lower bound) and the fracture pressure (upper bound). This is important to ensure a good wellbore stability and a safe drilling process. From figure 4.4 it is seen that at a well inclination of 20 degree, a mud window between 0.42 to 0.77psi/ft. Much work has been done in this area, for further knowledge, refer to Prof Adewale Dosunmu publications on Petroleum Geomechanics and Wellbore Stability.

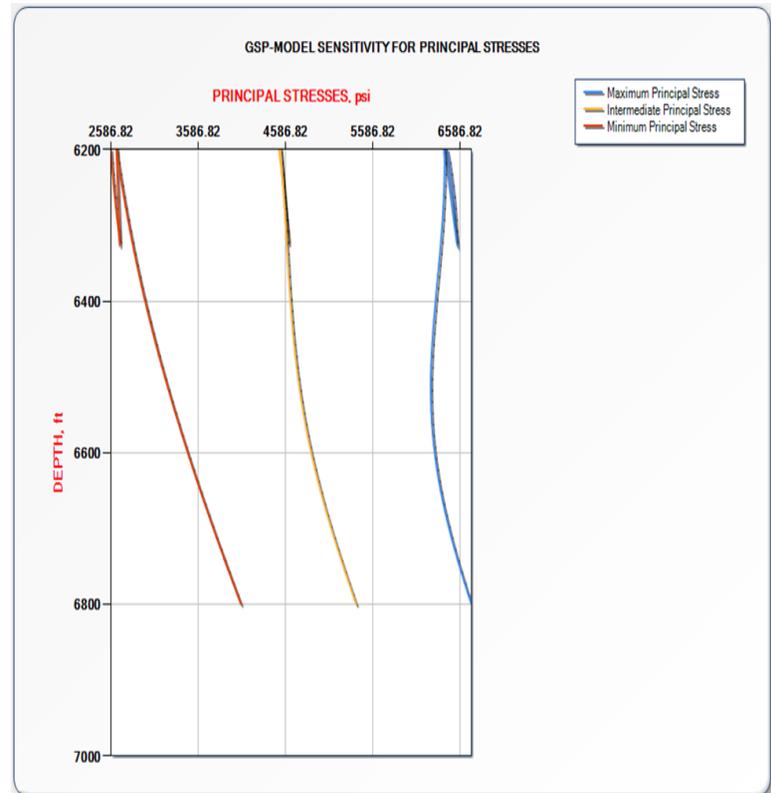


Figure 5: Principal Stresses Plot

To help prevent perforation tunnel failure, it is important that stresses around the wellbore be put into consideration. When the perforation tunnels are shot in the direction of maximum horizontal stress, the reservoir allows smaller bottomhole flowing pressure. This demonstrates that perforating in the direction of maximum horizontal stress reduces the risk of sanding. Considering the figure 4.5 if the depth of perforation is at 6600ft, the best pressure that should be used in perforating the guns should be between the ranges of 5586psi to 6586psi.

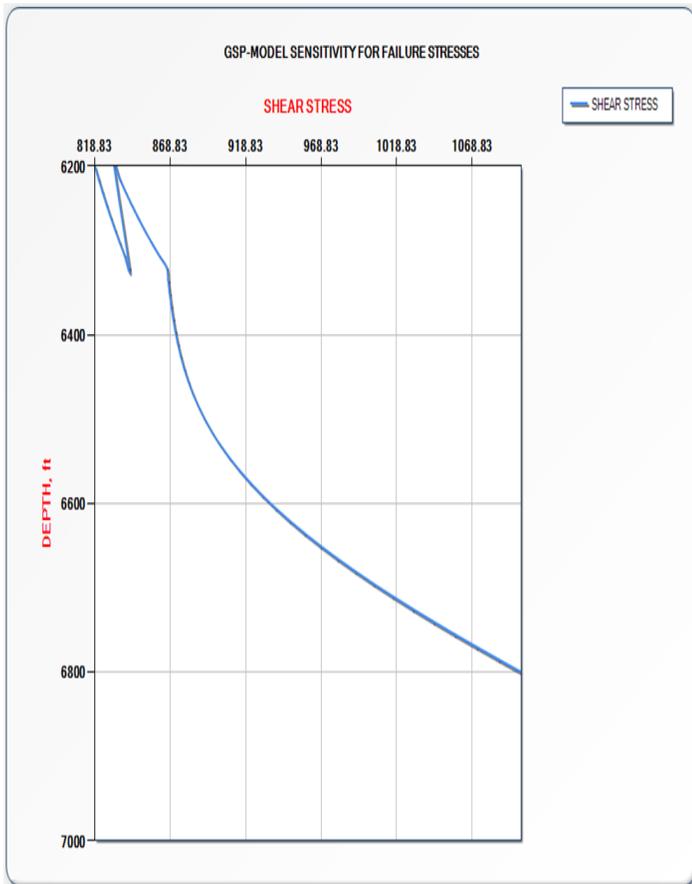


Figure 6: Stress Sensitivity Plot

As we go deeper into the formation, it becomes more compacted and consolidated, hence, requires more pressure/stress before the rock will fail as the grains are more tightly cemented together. From the plot, you will observe that at lower depth, it requires less shear stress for the rock to fail and more at higher depth. For example, at depth 6650ft, the rock gave way when a pressure of 968.83psia was applied whereas at 6800ft, it took a higher pressure of over 1060.83psia to shear the rock.

V. CONCLUSION

Every field, every well and every production plan is different and should be assessed case by case basis.

Integrating solids production assessment in the workflow of field development planning study is a rational safeguard against potential undesirable sand production interruption in the oil and gas industry which requires; geomechanics modeling, rock testing and production planning.

ACKNOWLEDGMENT

To my darling husband, Dr Njoku Chigozie, my rock and backbone. You always encouraged me to see the light at the end of the tunnel. The nights and days you spent alone while I had to travel down to school, your moral, emotional and financial support, as well as taking care of our home alone in my absence will ever be acknowledged. I love you so dearly.

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The Effect of Perceived Quality, Perceived Price and Need for Uniqueness on Consumer's Purchase Intention Through Online Store of Children Import Bag in Palembang, Indonesia

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DOI: 10.29322/IJSRP.9.08.2019.p9222

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9222>

ABSTRACT

The purpose of this research is to analyze the effects of perceived quality, perceived price and need for uniqueness on consumer's purchase intention through online store of children import bag. This research used Multiple Linier Regression using SPSS Version 25 to calculate data. Data was obtained from filling the online questionnaires to a hundred respondents. The results of this research indicate that perceived quality, perceived price and need for uniqueness have a positive and significant effect on consumer's purchase intention. As a suggestion, online seller especially in import product should searchs the products that give unique value, different from common product but still have a good quality.

Keyword : perceived quality, perceived price, need for uniqueness, consumer's purchase intention, children import bag.

INTRODUCTION

Export and import are an inevitable activities of international trading. They bring postive and negative impacts. The positive impacts such as job opportunities and foreign exchanged could be increased. However, it also brings the negative impact such as loss of sense of loving for domestic product due to a new lifestyle in Indonesia. In Indonesia itself, The Central Bureau

of Statistics reported that there was a surge of import growth at 20,15% throughout 2018 (Rahadian, 2019). It was possible because the tendency of Indonesian consumers to purchase and consume import products. According to Utami (2017), Indonesian consumers choose import products because they have a high quality, attractive packaging, and always have innovation to engage the consumer.

Import product was dominated digital market in Indonesia. The data from Ministry of Industry shows that 90% products in Indonesia's e-commerce are import products. Survey from Markplus Insight shows that top three most purchased products through online store in Indonesia are apparel (61,7%), shoes (20,2%), and bag (20%). One of phenomenon in Indonesia every entrance a new school year is to purchase a new school stuffs. Released from kompas.com, sales for school stuffs increased significantly than previous months every a new school year. Also, sales of children bag in website Tokopedia was increased more than 17 times (Cahya, 2018). From the explanation above, it can be seen that online sales for children import bag can be potential and prospective business option.

The sellers have to able to recognize the market and the factor that could be influences consumer's purchase intention on their products. According to Kotler & Keller (2012), purchase intention means the likelihood that a consumer will purchase a particular product. The higher the

purchase intention, the greater the purchase probability. Therefore, it becomes crucial for seller to understand what is the exact factor that could be affecting consumer's purchase intention. In this research, author examines three possibility factors that could be affecting purchase intention. They are perceived quality, perceived price and need for uniqueness.

LITERATURE REVIEW

Purchase Intention

Purchase intention is about plan of consumer to purchases particular product and how many product required in certain period (Howard, 1994). It could be said that purchase intention is mental statement from consumer that reflected purchasing plan of some products on particular brand. According to Ferdinand (2002), purchase intention was divided into four dimension as transactional intention, referential intention, preferential intention and exploratif intention.

Perceived Quality

Perceived quality is consumer perception to whole quality or excellence of the product or sevice as well as consumer expected (Aaker, 2013). There are some previous studies that analyze the effect of perceived quality to purchase intention. Asshidin, Abidin & Borhan (2016) were compared America and local product in Malaysia's consumer. The result indicates that perceived quality significantly affected purchase intention to both products. The result was similar to Demir & Tansuhaj (2011) and Kumar, Lee & Kim (2009) study. Rehman, Latif & Rana (2018) conduct study to compare perceived quality between British consumer and Pakistani consumer towards America product. The result shows that perceived quality has positive effect to British consumer on America product, but negative effect to Pakistani consumer. Otherwise, the result of

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9222>

Arifin & Fachrodji (2015) and Edison & Restuti (2014) shows that perceived quality has no significant effect to purchase intention.

Consumer has tendency to choose import product than its local. Import product associated into good quality. Product which has good quality will create high perceived quality that affected consumer's purchase intention. From explanation above, the proposed hypothesis is:

H₁ : perceived quality has effect to consumer's purchase intention.

Perceived Price

Peter and Olson (2008) state that "price perception concern how price information is comprehended by consumers and made meaningful to them". Evaluation and analysis consumer through the price was strongly influenced by consumer behaviour. The consumer judgement into cheap or expensive would be different from every consumer, depends on individual perception. Delafrooz, Paim & Khatibi (2011); Wijayasari & Mahfudz (2018); Suarjana & Suprpti (2018) say that perceived price, in competitive price, has significant effect to online purchase intention. The study result of Edison & Restuti (2014) shows that perceived price has a positive effect but not significant to consumer's purchase intention. Otherwise, Kim, Li & Gupta (2005) and Setiawan & Achyar (2012) find that perceived price has negative effect to purchase intention of online book store for potential consumer.

In online selling, consumers can't directly see and feel the product. Therefore, how the way consumer think about the product price is important matter. If consumers think the prices are suit to their expectation, it will becomes driven factor into consumer's purchase intention to the products. From explanation above, the proposed hypothesis is:

H₂ : perceived price has effect to consumer's purchase intention.

Need For Uniqueness

Need for uniqueness explains individual perception and response about similarity to others. The higher similarity could decrease individual self esteem. Moreover, every people has tendency to search the uniqueness in particular level (Synder & Fromkin, 1980). Need for uniqueness is personal nature to pursue the difference from others by acquires and utilizes the product with the purpose to elevates social image and identity (Schiffman & Wisenblit, 2015). Kumar, Lee & Kim (2009) define need for uniqueness as the willing to be different from others in a community. Their study show there is positive relationship between need for uniqueness and purchase intention of America apparel in India' consumer. The above result is similar to Rehman, Latif & Rana (2018) and Tariq & Iqbal (2015). Latter, Phau & Marchegiani (2010) do study in import apparel and Chihab & Abderrezzak (2016) do study in luxury parfume. Their study show opposite result, need for uniqueness has no significant effect to consumer's purchase intention.

One of factor that driving consumers to purchase product is their personality. Consumers who have high need for uniqueness, have tendency to search the unique product in the market that really special and different from others. Children import bag offers various design, full colour, and unique. From explanation above, the proposed hypothesis is:

H₃ : need for uniqueness has effect to consumer's purchase intention.

CONCEPTUAL FRAMEWORK

From explanation above, the conceptual framework is as follows:

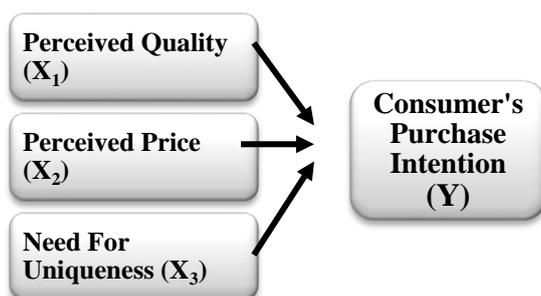


Fig-1 Conceptual Framework

RESEARCH METHODOLOGY

A total of 100 online questionnaires were collected from 100 respondents who domicile in Palembang and have 0-6 years children. Online questionnaires were divided into three parts. The first part was to filtering the respondents according to requirement above. The second part was to gather identity of respondent. The third part was to collect the respondent's response about independent variables (perceived quality, perceived price, and need for uniqueness) and dependent variable (consumer's purchase intention). All statements were rated on a 5-point Likert scale. The data was analyzed using multiple linier regression by SPSS (*statiscal product and service solution*) version 25.

RESULT

Validity Test

Items are declared valid if r_{test} is greater than r_{table} . The value of r_{table} by 100 respondents in significance 0,05 is 0,3610.

Table-1 Validity Test Result

Variable	Point	r_{table}	r_{test}	Result
Perceived Quality (X ₁)	1	0,361	0,867	Valid
	2	0,361	0,909	Valid
	3	0,361	0,914	Valid
	4	0,361	0,83	Valid
	5	0,361	0,828	Valid
Perceived Price (X ₂)	1	0,361	0,869	Valid
	2	0,361	0,862	Valid
	3	0,361	0,924	Valid
Need For Uniqueness (X ₃)	1	0,361	0,862	Valid
	2	0,361	0,771	Valid
	3	0,361	0,823	Valid
	4	0,361	0,752	Valid
Consumer's Purchase Intention (Y)	1	0,361	0,915	Valid
	2	0,361	0,931	Valid
	3	0,361	0,933	Valid
	4	0,361	0,854	Valid

Table.1 shows that all r_{tests} are greater than r_{table} . It means all items are valid as research instrument.

Rp. 6.000.000 - Rp. 10.000.000	27	27
> Rp. 10.000.000	17	17

Reliability Test

The instruments declare reliable if the value of Cronbach’s Alpha is greater than 0,7.

Table-2 Reliability Test Result

Variable	Cronbach’s Alpha	Criteria	Result
Perceived Quality (X_1)	0,919	0,7	Reliable
Perceived Price (X_2)	0,862	0,7	Reliable
Need For Uniqueness (X_3)	0,816	0,7	Reliable
Consumer’s Purchase Intention (Y)	0,929	0,7	Reliable

Table.2 shows that all values of Cronbach’s Alpha are greater than 0,7. It means all indicator variables are reliable.

Respondent’s Overview

Informations that gained from respondents are age, gender, education, and income.

Table-3 Identity Distribution of Respondent

Age	Frequency	%
< 30 years	26	26
31 - 40 years	64	64
> 40 years	10	10

Gender	Frequency	%
Male	17	17
Female	83	83

Education	Frequency	%
Senior High School	5	5
Diploma	20	20
Bachelor	50	50
Graduate	25	25

Income	Frequency	%
< Rp. 3.000.000	13	13
Rp. 3.000.000 - Rp. 6.000.000	43	43

Multiple Linier Regression Analysis

Multiple linier regression is used to explains the relationship among variables that were tested. The regression equation could be seen below:

$$Y = 4,009 + 0,215X_1 + 0,273X_2 + 0,237X_3$$

Where the equation can be explained by below:

- The constant (α) is 4,009, shows that if perceived quality, perceived price, and need for uniqueness variables are 0, then consumer’s purchase intention is 4,009.
- Regression coefficient (β) perceived quality is 0,215, shows that by adding one unit of perceived quality, then it would be increase consumer’s purchase intention of 0,215.
- Regression coefficient (β) perceived price is 0,273, shows that by adding one unit of perceived price, then it would be increase consumer’s purchase intention of 0,273.
- Regression coefficient (β) need for uniqueness is 0,237, shows that by adding one unit of need for uniqueness, then it would be increase consumer’s purchase intention of 0,237.
- The result gives positive values on all independent variables, it means there are relationships to consumer’s purchase intention through online store of children import bag in Palembang, Indonesia besides other variables which not included in this research.

F-Test (Simultaneous)

Table-4 Output ANNOVA

ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	344,220	3	114,740	27,264	,000 ^b

Residual	404,020	96	4,209	
Total	748,240	99		

a. Dependent Variable: CONSUMER'S PURCHASE INTENTION
b. Predictors: (Constant), NEED FOR UNIQUENESS, PERCEIVED PRICE, PERCEIVED QUALITY

Based on Table-4, it can be seen that sig < 0,05 (0,000 < 0,05). It means Ha is accepted. Then, it can be concluded that perceived quality, perceived price and need for uniqueness together have a significant effect on consumer's purchase intention.

t-Test (Partial)

Table-5 Output Coefficients

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
		B	Std. Error			
1	(Constant)	4,009	1,208		3,319	,001
	PERCEIVED QUALITY	,215	,072	,295	3,001	,003
	PERCEIVED PRICE	,273	,124	,210	2,193	,031
	NEED FOR UNIQUENESS	,237	,081	,295	2,924	,004

a. Dependent Variable: CONSUMER'S PURCHASE INTENTION

Based on Table-5, it described as seen below:

- Sig of X₁ 0,003 < 0,05. It means Ha is accepted and H₀ is rejected. Then, it can be concluded that perceived quality partially has a significant effect on consumer's purchase intention.
- Sig of X₂ 0,031 < 0,05. It means Ha is accepted and H₀ is rejected. Then, it can be

concluded that perceived price partially has a significant effect on consumer's purchase intention.

- Sig of X₃ 0,004 < 0,05. It means Ha is accepted and H₀ is rejected. Then, it can be concluded that need for uniqueness partially has a significant effect on consumer's purchase intention.

Coefficient Determination

Table-6 Output Model Summary

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,678 ^a	,460	,443	2,05147

a. Predictors: (Constant), NEED FOR UNIQUENESS, PERCEIVED PRICE, PERCEIVED QUALITY

b. Dependent Variable: CONSUMER'S PURCHASE INTENTION

Based on Table-6, it can be seen that R² is 0,460 equals to 46,0%. It means that perceived quality, perceived price and need for uniqueness together have a significant effect on consumer's purchase intention is 46,0%. And the rest, 54,0%, was affected by other variables which not included in this research.

DISCUSSION

Perceived quality has significance 0,003 < 0,05 and regression coefficient is 0,215. Thus, perceived quality has a positive and significant effect on consumer's purchase intention. This finding is in accordance to research of Asshidin, Abidin & Borhan (2016) which compared America and local product in Malaysia's consumer. The result indicates that perceived quality significantly affected purchase intention to both products. This finding also similar to Demir & Tansuhaj (2011) and Kumar, Lee & Kim (2009). In this research, consumers consider children import bags in online store have a good quality. Product which has good quality will create high perceived quality that affected consumer's purchase intention.

Perceived price has significance $0,031 < 0,05$ and regression coefficient is $0,273$. Thus, perceived price has a positive and significant effect on consumer's purchase intention. This finding is in accordance to research of Delafrooz, Paim & Khatibi (2011) which shows that perceived price, in this case as competitive price, significantly affected online purchase intention. . This finding also similar to Wijayasari & Mahfudz (2018) and Suarjana & Suprapti (2018). In online purchasing, consumers can't see and feel directly into the products. Thus, the way consumers give perception in price is important. If consumers think the price is affordable with the benefit that they will get, it can be a driven factor to build purchase intention into that products.

Need for uniqueness has significance $0,004 < 0,05$ and regression coefficient is $0,237$. Thus, need for uniqueness has a positive and significant effect on consumer's purchase intention. This finding is in accordance to research of Kumar, Lee & Kim (2009), Rehman, Latif & Rana (2018), and Tariq & Iqbal (2015). Their research show that there are positive relationship between need for uniqueness and consumer's purchase intention in import apparel. The higher need for uniqueness, the higher consumer's purchase intention for the product.

CONCLUSION

Based on result and discussion above, it can be concluded as seen below:

1. Perceived quality has a positive and significant effect on consumer's purchase intention through online store of children import bag in Palembang, Indonesia.
2. Perceived price has a positive and significant effect on consumer's purchase intention through online store of children import bag in Palembang, Indonesia.
3. Need for uniqueness has a positive and significant effect on consumer's purchase intention through online store of children import bag in Palembang, Indonesia.
4. Perceived quality, perceived price and need for uniqueness together have a significant

effect on consumer's purchase intention through online store of children import bag in Palembang, Indonesia.

RECOMMENDATION

Based on result and discussion above, the recommendation is given as seen below:

1. For online seller

Online seller especially in import product should searchs the products that give unique value, different from common product but still have a good quality. Those things have to be conducted for increase consumer's purchase intention that could be affect sales of import product.

2. For further researcher

In this research, perceived price gives a not significant value which has to be examined. Further researcher may analyze what factors could be gives a not significant value. Besides, further researcher could develops amount of sample or other variabel. Thus, variables that could be affect consumer's purchase intention will be well explained. Also, further researcher could divides the sample into several categories and conducts analysis for relationship between those categories and the variables.

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Cancer Pain Management at Garissa County Referral Hospital, Kenya

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DOI: 10.29322/IJSRP.9.08.2019.p9223

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9223>

Abstract- High prevalence and suboptimal cancer pain management has been reported from resource-limited countries such as Kenya. Precisely, trends of cancer cases are on the increase at Garissa County in Kenya, yet no data exist on management of cancer pain. This study was to examine the prevalence, and cancer pain management of adult patients at Garissa County Referral Hospital. A descriptive cross sectional survey was employed and 94 cancer patients from both outpatient on follow up care and inpatient were recruited to participate. MBPI (Modified Brief Pain Inventory), ECOG (Eastern Cooperative Oncology Group) and focus group discussion (FGD) were used for data collection. Pain Management Index was calculated and significant levels were set at $P < 0.05$ for all tests. Mean age of participants was 50 years, composed of 42 (44.7%) male and 52 (55.3%) female. Prevalence of cancer pain was 78% with majority reporting moderate to severe pain and undertreatment with PIM of (p-value < 0.05). Participants accounting 76.9% male and 66.7% female reported cancer pain interference with ability to walk and 91% male and 70% female reported that pain interfered with their mood. Content analysis was done from focus group discussions conducted and cultural ways of pain management was also captured. A total of 81.9% (77) participants incorrectly utilized WHO analgesic ladders, 65% (61) and 77.6% (73) considered alternative therapy of Quran and Somali herbs respectively for pain management. This study found a high prevalence of cancer pain and suboptimal cancer pain management. Sociocultural perspective of cancer pain management seems acceptable.

Index Terms- prevalence, cancer pain management.

I. INTRODUCTION

Pain is the main symptom that cancer patients experience^{1, 2}. Cancer pain is a subjective and a complex symptom that results from a mixed mechanism, that involves inflammatory, ischemic, and neuropathic and compression mechanisms at multiple sites¹. It is a diverse experience for a cancer patient, modified by genetics, history, mood, expectation, and culture. Cancer pain involves not only physical pain but also psychological, social and spiritual dimensions of an individual^{5, 9}. Thus cancer pain is multi-dimensional occurrence having sensory-discriminative, cognitive evaluative and emotional-motivational aspects. Literature publications of 4117 titles and 122 studies found that pain prevalence rates were 39.3% after curative treatment, 55.0% during anticancer treatment and 66.4% in

advanced disease globally¹⁵. Moderate to severe pain (numerical rating scale score ≥ 5) was reported by 38.0% of all patients¹⁴. Despite the increased attention on assessment and management of cancer pain, moderate to severe pain continues to be a prevalent symptom in cancer patients^{9, 15}. Cancer pain management in African countries is suboptimal and moderate to severe pain is very common among cancer patients⁹. Prevalence of cancer pain reported ranged from 35.7% to 87.5% in many African countries and most patients reported to health facilities in the late stage cancer diagnosis due to the inadequate screening of the disease^{8, 9}. Prevalence of pain and management of 400 cancer patients at Moi Referral Hospital in Kenya reported 66% of patients with undertreated pain and negative scores on the pain management index⁵. The presence of cancer pain in 520 ambulatory patients at oncology unit of national referral of Kenyatta National Hospital in Kenya was 38.5%⁸. Severe pain experience was associated with a late-stage diagnosis of cancer when most patients were also seeking medical help⁸. Studies in Kenya reveal high prevalence and poorly managed cancer pain due to limited treatment options, patients presenting in an advanced stage and limited availability and accessibility of analgesics^{5, 8}. While these studies were conducted at a major national referral hospital in the urban area of Kenya, many cancer patients in rural Kenya live in remote areas and make a long journey to get access to health services¹¹.

Cancer pain has negative impacts that include emotional distress, clinical depression, mood disorders³. The most commonly occurring symptoms in cancer are the pain, emotional distress and fatigue^{3, 12}. An approximately one-sixth of all cancer patients have depression and about one quarter have other mood disorders during treatment². Cancer pain leads to the development of clinical depression, decrease adherence to treatment or therapy, increased suicide rates, more extended hospitalization, poor quality of life and heightened desire to die¹³. Cancer pain also interferes with the different components of patient's life and negatively affects their daily activities, mental health, family and social relationships with others and interactions at workplace. Interference of pain on functional performance had statistical significant associated with the stage of the tumour, presence of metastasis, history of treatment modality, history of pain, and pain management adequacy¹⁰. Cancer patients with tumour stage I and stage II with adequate treatment had less pain interference on functional performance than those with stage III and Stage IV cancers¹⁰. This will result to poor quality of life in cancer patients⁷. Moreover, the challenges of cancer pain management in developing countries has been well documented in several studies

^{5, 8, 9} yet no studies have done in rural and marginalized area of Kenya. The purpose of this study was to establish cancer pain management from cancer patients' perceptive at Garissa County, Kenya.

II. MATERIALS AND METHODS

A descriptive cross sectional survey using MBPI (Modified Brief Pain Inventory), ECOG (Eastern Cooperative Oncology Group) for functional performance and focus group discussion was conducted at Garissa county referral Hospital. . Participants were 94 cancer patients with mean average age of 50years

Study design: A descriptive cross sectional survey of hospital based population of 94 cancer patients from both outpatient and inpatient departments of Garissa County Referral Hospital were recruited.

Study Location: the study area was Garissa County Referral Hospital with 230 beds inpatients capacity and various outpatient clinics. This hospital is situated at Garissa Township that is categorized as a marginalized area of Kenya ¹⁶, with a high number of nomadic pastoralist's population of Somali origin.

Study Duration: 18th May to 17th November 2017

Sample size: 100 cancer patients.

Sample size calculation: The study sample size was estimated from a single proportion design. The target study population was selected using purposive, simple random and snow ball sampling to achieve the desired sample of 154 cancer patients. Our confidence level was 95% and our regression coefficients revealed that effect of pain has the highest standardized Beta coefficient β (0.952) with p value < 0.05 meaning on the regression model, effect of pain was statistically significantly. The sample size actually obtained for our study was 100 patients from both inpatient and outpatient and 6 % drop out rate.

A total of 15 (5participants in each group) participants attended face to face focus group discussion of this study, comprising of 6 men and 9 females. Drafted notes and audio recordings transcription were used to capture the data for analysis. The topic of discussion was cancer pain management and we divided the subtopics in to a) patient awareness of their condition b) participants experience of pain and its intensity, c) intervention they carry out to manage their pain and d) what can be done to improve their pain control.

Subjects & selection method: The study Participants were cancer patients drawn from medical and surgical wards of the hospital, palliative clinic and those on follow up care at hospital neighborhood. Participants were patients with a pathological diagnosis of cancer, aware of their condition, mentally stable and above 18 years to provide consent for the study. Simple random sampling, purposive and snowball sampling were used to recruit participants during the study period of 18/5/2017 to 17/11/2017.

Inclusion criteria:

- 1) All adult cancer patients were considered included
- 2) Irrespective of their period of hospital stay
- 3) Irrespective of type of cancer, stage of cancer disease and other comorbidities present.
- 4) Adult cancer patients who consented

- 5) Adult cancer patients within hospital environment or at home on follow up plan.

Exclusion criteria:

- 1) All Cancer Patients under the age of 18years with mental illness were excluded
- 2) Critically ill cancer patients were excluded from the study.

Procedure of data collection: Each cancer patient was questioned and administered with MBPI questionnaire after signing consent to determine the presence of cancer pain, pain severity, effect and management. They were also questioned on information regarding the cancer type diagnosed, type of pain treatment or analgesics prescribed an alternative therapy to pain. Those patients who could not understand English, the researcher and the research assistant translated the questions to either Swahili or Somali language. ECOG performance status was also scored by the researcher and the research assistant as the patients verbalized his functional performance. Pain intensity was assessed from the adequacy of pain management received by individual patients. Adequacy of treatment was assessed by calculating pain management index (PMI). PMI compares the patient's pain rating against prescribed analgesics to decide if a patient's pain is adequately treated or not.

Content analysis from focus group discussions about cultural ways of managing cancer pain and their challenges in pain management was sorted out. Themes were gathered and clustered for similarities.

Statistical analysis: Questionnaires was sorted, coded and entered in SPSS version 17. Prevalence of cancer pain was calculated using each subject response on the exponential scale rate. Linear regression was used to analyse the relationship between cancer pain management and its independent and intervening variables. To analyse whether the WHO cancer pain management tool was used chi-square was utilised.

Regression analysis was conducted between variables to examine the level of relationship between pain management, pain prevalence, and effects of cancer pain. The desired level of accuracy was set to a confidence level of 95% and significant levels were set at $P < 0.05$ for all tests.

III. RESULT

This study focused on respondent of cancer patients of either gender hospitalized at the GCHR with cancer-related health complications or attending the palliative clinic or on follow up at home. Demographic information of the participants was analyzed to establish the age of cancer patients and current treatment for pain to ascertain how cancer pain was managed. Table I demonstrates participants' composed of 44.7% (42) males and 55.3% (52) females. Majority 40.4% (38) of the participants were 51-65 years in age, followed by 35-50 years with 33% (31) then above 65 years were 23.4% (22) and least below 35 years with 3.2% (4). Majority of participants were female gender 55.3 % (52), with majority no formal education 44.7% (42), from ethnic Somali community 68.1 % (64) and with low income 93.6 % (88) earning less than Ksh. 23, 670 (200\$) per month.

Table: 1: Demographic Analysis for Patients

[1] Variable	[2] Frequency (%) n = 94
[3] Age	[8]
[4] <35 Years	[9] 4 (4.3%)
[5] 35-50Years	[10] 31 (33%)
[6] 51-65 Years	[11] 38 (40.4%)
[7] >65 Years	[12] 21 (22.3%)
[13] Mean Age (SD)	[15] 50.6 (0.833)
[14] Min –Max	[16] 35 – 65
[17] Gender	[20]
[18] Male	[21] 42(44.7%)
[19] Female	[22] 52 (55.3%)
[23] Education Level	[28]
[24] Primary	[29] 31 (33%)
[25] Secondary	[30] 17 (18.1%)
[26] Tertiary	[31] 4 (4.3%)
[27] No formal education	[32] 42 (44.7%)
[33] Ethnic Background	[36]
[34] Somali	[37] 64 (68.1%)
[35] Non-Somali	[38] 30 (31.9%)
[39] Income Level	[43]
[40] < Ksh. 23, 670	[44] 88 (93.6%)
[41] Ksh. 23, 671 – 120, 000	[45] 4 (4.3%)
[42] > Ksh. 120, 000	[46] 2 (2.1%)

Prevalence of Cancer Pain

The majority of participants (78%) noted that their pain was due to cancer disease while (22%) reported that their pain was not due to medical procedures as shown in Figure 1 below .

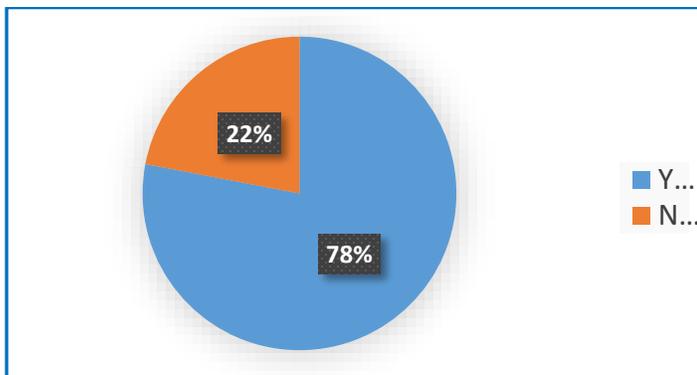


Figure 1: prevalence of cancer pain

Cancer pain management

Pain Management Index (PMI) was calculated to analyze the intensity of pain experienced by cancer patients. This is explained as a way to quantify how pain is adequately managed with pharmacological intervention, as demonstrated in Figure 2 above. The analysis of the adequacy of pharmacological pain management (PMI > 0); and inadequacy (PMI ≤ 0) was calculated using the pain management index. Pain management index is a comparison of the most potent analgesic used by patients on the

worst pain. For this study, the level of pain was scored as follows: level 1 for mild pain (1-3 NRS), level 2 for moderate pain (4-6 NRS) and 3 for severe pain (7-10 NRS). The comparative level of analgesic used was graded as follows: 0 for no analgesic; 1 for non-opioids analgesic used, two was used for mild opioids, for moderate pain, while 3 for strong opioids for severe pain.

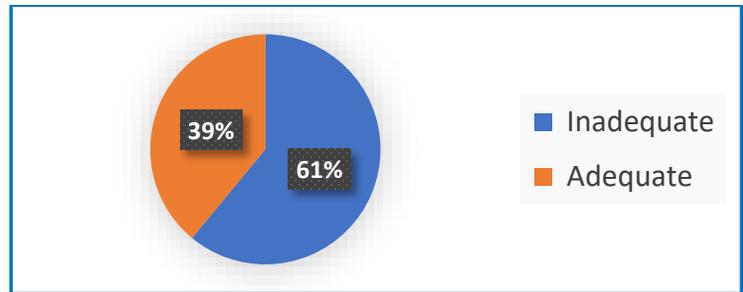


Figure 3: Adequacy of pain management.

Table 2: Pain Management Index

Pain Management Step	Index Score by Reported Pain Level			
	None (0)	Mild Pain (1)	Moderate (2)	Severe (3)
No Analgesic Prescribed (0)	0%	0%	0%	0%
Nonopioids (I)	0%	6.9%	72.4%	20.7%
Mild Opioid (II)	0%	3.3%	66.7%	30.0%
Strong Opioid	0%	35.3%	55.9%	8.8%

Participants were questioned to rate the pain at its least and worst, and the medication they used for each level of WHO analgesic ladder. The purpose of this question was to examine if patients were using the right pain medication for each pain level as prescribed by WHO analgesic ladder. The result of this study revealed that this was not the case. For instance, at the worst pain, patients are supposed to be on the strongest Opioids, that is, Morphine/hydromorphone /Methadone / Levorphanol / Fentanyl / Oxycodone &+Adjuvants. However, when the participants were asked to indicate their pain management at their worst, the majority were using wrong drug level to manage pain. The findings show that (57.1%) of male participants and (73.3%)female who was experiencing severe pain, we're still using level 1 drug (Aspirin/Paracetamol/ Acetaminophen, NSAD's & Adjuvants) contrary to WHO analgesic ladder level 3 for severe pain management guidelines. Similarly, (91%) of male participants and (70%) of female participants were still using Codeine / Hydrocodone / Oxycodone / Dihydrocodeine/tramadol & Adjuvants, which are level 2 pain management drugs and not recommended for severe pain management. Only (29%) of men and (12%) of women were using the right medication for the right level of pain.

Participants were asked whether they were using an alternative treatment for pain management during the study and the following was revealed as in table 3. The study further analyzed the data collected during focus group discussion and came up with emerging themes as analyzed in table 4. Participants' own words were also considered important.

Table 3: Most Prominent alternative cancer pain management therapy

[1] Cultural therapy	[2] F	[3] %
[4] Quran	[5] 62	[6] 65%
[7] Somali Herbs	[8] 73	[9] 77.6%

Table 4: Focus Group analysis (Emerging Themes from Qualitative Analysis)

[1] Question posed	[2] Emerging Themes	[3] Categories
[4] Patient own cancer pain assessment	<ul style="list-style-type: none"> Moderate to severe pain 	<ul style="list-style-type: none"> High level of pain
[5] Patient perception of their pain	<ul style="list-style-type: none"> Cancer Pain has robbed of the simplest of tasks of walking and pleasure Feeling desperation Fatigue/sleep disturbances The feeling of anger and mood disturbance Pain is in control of their life Feel they have inadequate information regarding their condition 	<ul style="list-style-type: none"> Pain has control over patients' life physically, socially and psychologically.
[6] Patients' perception of nursing and institutional pain control	<ul style="list-style-type: none"> Found difficult to express their expectations of nursing and institutional pain management Found difficulty to express nursing in cancer pain management competencies Feel it is not good to always complain and report of pain, healthcare workers will see as a 'bad patient.' Feel they have less support from the nurses and other medical personnel Feel their pain is not well controlled in the institution Expressed inaccessibility of pain medication Expressed the shortage of palliative care nurses at the palliative clinic (one nurse) one patient A said "when the one nurse is on leave from palliative clinic no hope of getting medicine or other support." 	<ul style="list-style-type: none"> Poor interaction between patients and nurse The negative attitude towards health care workers especially the nurses Poor palliative care services and inaccessible analgesic.
[9] Patients pain control methods	<ul style="list-style-type: none"> Reading/ recitation of Quran (Most effective and frequently used) Pain medication from the hospital Use of herbal medicine such as Malmal' (comiphoramyrra) 'huruud' Turmeric, 'qorfe' (Cinnamon) 'hulbad' (Fenugreek), 'sinjibiil' (Ginger), 'filfil' (Black pepper), 'Likke/ Diinsi Burning at the site of pain with hot metal Heat and cold therapy massage 	<ul style="list-style-type: none"> Social cultural practices such various traditional herbs for cancer pain management Spiritual therapy using Quran is believed as a method of cancer pain management.
[12] Challenges in pain management (patients' perspectives)	<ul style="list-style-type: none"> inaccessible pain medications since the most patients were travelling from far in order to get to analgesics Not to disturb the nurses or health workers / to be a 'good patient.' Doctors might find it annoying to be told about the pain that persistent Reports of pain could distract a doctor from curing the cancer If I talk about pain, people will think I am a complainer Limited staff in the palliative clinic Negative attitudes among health workers 	<ul style="list-style-type: none"> Negative attitudes by nurses and other health workers Poor communication between nurses and cancer patients

[13] How to overcome challenges in pain management of cancer	<ul style="list-style-type: none"> • They feel the healthcare workers/nurses and institution know better • The need for more trained staff in the palliative clinic • inaccessibility of pain medication in many centres of Garissa County 	<ul style="list-style-type: none"> • Belief health worker can solve their challenges • pain control medication is inaccessible at GCRH
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Cancer patients' who participated in FDGs were questioned on what alternative approaches they consider for cancer pain control. Some of the alternative medicine listed by the FDGs included Somali herbs such as 'Malmal' known comiphoramyrra, 'huruud' Turmeric, 'qorfe' Cinnamon, 'hulbad' Fenugreek, 'sinjibiil' Ginger, 'filfil' Black pepper, 'Likke' (root of the tree crashed to form powder Diinsi). In responding to why they use the Quran, one of the FDG members noted as follows:

"I believe that in reading the Quran I will not only be able to manage my pain... I feel better... I believe I will be healed...I believe Quran is a miracle that was sent by Allah to be a blessing to us both spiritually and physically, and to cure us from any ailments...the words of the Quran are "Shifa" meaning they are able to heal us" (Participant 1, FGD 1)

According to the Islamic beliefs, the Quran can be used to treat all manner of ailment, including my cancer. The "Ruqyah" provides me with the opportunity to use the Quran as the word of Allah, for healing and also "duas" as the words taught by the prophet on healing" (Participant 5, FDG, 1)

In other instances, the study found that apart from relying on traditional herbal medicines, patients relied on heat and cold therapy, and in worse scenarios, some patients used hot metals:

"I have used hot metal and objects to places I was feeling severe pain...when the "Malmal" (comiphoramyrra) wasn't giving me enough relief, I would use a hot metal on my back and arms to relieve my pain...but I also know other patients who use cold therapies, where they put ice-cubes in a bag and place it on places they are feeling pain" (Participant 3, FDG 4)

When asked whether heat therapy or cold worked in the long term, they indicated this measure were short term for pain relief. In moments when pain became unbearable, they would seek medical help from the hospital

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Cancer Pain interferes with functional abilities

Patients scored their functional abilities using scale in MBPI and this was then analysed. The findings indicated the existence of an association between cancer types and its effects on walking ability, $X^2 = 6.072$, $df (3)$; however, the association was not statistically significant (p -value > 0.05), the study also revealed the existence of a relationship between cancer and interfering with patients' mood, $X^2 = 2.167$, $df (3)$; however, the association was not statistically significant (p -value > 0.05), and findings also indicated the existence of an association between cancer and the pain's effect on patients relationships, $X^2 = 3.869$, $df (3)$; however, the association was not statistically significant (p -value > 0.05).

Table 4: Pain Interferes with Walking Ability

I feel my pain is due to cancer		Pain Interference with Walking Ability			
		Does not Affect	Slightly Affects	Moderately Affects	Completely affects
Male	Yes	7(33.3%)	3(60.0%)	18(85.7%)	10(76.9%)
	No	2 (66.7%)	2 (40.0%)	3 (14.3%)	3 (23.1%)
Female	Yes	1 (100.0%)	12 (80.0%)	17 (94.4%)	12 (66.7%)
	No	0 (0.0%)	3 (20.0%)	1 (5.6%)	6 (33.3%)
Chi Square Value		$X^2 = 6.072$, $df (3)$; p value = 0.108			
I feel my pain is due to cancer		Pain Interference with mood			
		Does not Affect	Slightly Affects	Moderately Affects	Completely affects
Male	Yes	0 (0.0%)	12 (92.3%)	12 (66.7%)	8 (80.0%)
	No	1 (100.0%)	1 (7.7%)	6 (33.3%)	2 (20.0%)
Female	Yes	1 (100.0%)	11 (78.6%)	17 (81.0%)	13 (81.3%)
	No	0 (0.0%)	3 (21.4%)	4 (19.0%)	3 (18.8%)
Chi Square Value		$X^2 = 2.167$, $df (3)$; p value = 0.539			

I feel my pain is due to cancer		Pain Affects Relationship with Others			
		Does not Affect	Slightly Affects	Moderately Affects	Completely affects
Male	Yes	7 (77.8%)	9 (90.0%)	8 (88.9%)	8 (57.1%)
	No	2 (22.2%)	1 (10.0%)	1 (11.1%)	6 (23.8%)
Female	Yes	6(75.0%)	9 (90.0%)	6 (85.7%)	21 (77.8%)
	No	2 (25.0%)	1 (10.0%)	1 (14.3%)	6 (22.2%)
Chi Square Value		X ² = 6.072, df (3); p value = 0.108			

ECOG performance status

ECOG is a scale used by oncologist and researchers to assess how a patient’s disease is progressing, and how it has interfered with patients’ daily activities. For this study, (99%) indicated they take daily pain drugs and study sorted to assess their ECOG performance status. For instance, ECOG score of 0(a patient is fully active, and carries his/her duties without hindrance); a score of 1 means (restriction in patience physical strenuous activities, but can carry light house work); score of 2 means (patient is ambulatory and not able to carry any work activities); a score of 3 means (patient has limited self-care and refined to bed) and a score of 4 means patient is (completely disabled, and cannot carry on any self-care). This study revealed that 78 % (32) had experienced ECOG status 3. The findings also show that in all cancer categories, female were less likely to experience cancer pain as compared to the male participants (OR=0.67). However the experience is not statistically significant (p-value > 0.05). Those whose ECOG status slightly affecting were more likely to experience cancer pain compared to those whose ECOG status are affected (OR=1.125). The patients experiencing ECOG pain level 3 had a statistically significant pain threshold level (P value <0.05).

ECOG status of participants

Variable	Cancer Pain		OR (95% CI)	P-value	
	Yes	No			
Sex	Male	31 (73.81%)	11 (26.19%)	1.00 (Ref)	0.422
	Female	42 (80.77%)	10 (19.23%)		
Daily Pain	93 (98.9%)	1 (1.1%)	-	-	
Medication in 7 Days	93 (98.9%)	1 (1.1%)	-	-	

ECOG Status					
0	0 (0%)	0 (0%)			
1	29 (78.38%)	8 (21.62%)	1.00 (Ref)		0.000
2	12 (75%)	4 (25%)	2.483 (1.82 – 3.66)		0.002
3	32 (78.04%)	9(21.96%)	3.421 (1.25-3.78)		

Regression of Variables

To establish the level of relationship between pain management, and effects of cancer pain a regression analysis between variables was done. The result shows an adjusted R-value of (0.898), which means, (89.8%) of the variability of pain management, interference of pain and cancer pain prevalence. The Analysis of Variance (ANOVA) was also carried out to examine if there is significant variance in the means between pain management, interference of cancer pain, and pain prevalence, F (2, 91) = 4.622; (p-value < 0.05) which means the mean difference between the variables was statistically significant. Regression coefficients revealed that the effect of pain has the highest standardized Beta coefficient β (0.952); p-value < 0.05 which means on the regression model, the effect of pain was statistically significant. The Beta coefficient β (-0.009) for pain prevalence was not statistically significant.

IV. DISCUSSION

This study revealed that there was a relationship between cancer pain prevalence and cancer pain management. There cancer pain also interferes with normal functioning. Pain management is a dependent variable while the prevalence of pain and the effect of pain are independent variables. We found a high prevalence of cancer pain at (78%) with the majority of patients experiencing moderate to severe pain. This is similar to ^{5, 8} studies of Kenya, though the prevalence of pain tends to be higher in this study. This is because our study was carried in a rural, marginalized area of Kenya with the high number of population practicing nomadic lifestyle.

This study revealed poor and incorrect utilization of WHO analgesic ladder for pain management by many participants. Inadequate cancer pain management was also reported by 61% (57) participants with (PMI ≤ 0). It was also found that wrong level of WHO analgesic ladder was used to manage the wrong level of pain intensity. That is (57.1%) of male participants and (73.3%) female who were experiencing severe pain and still utilized level 1 drug (Aspirin/Paracetamol/ Acetaminophen, NSAD's & Adjuvants) instead of level 3 with strong opioids (Morphine/hydromorphone /Methadone / Levorphanol / Fentanyl / Oxycodone &+Adjavants). This result is similar to ⁵ with 66% of patients undertreated for pain and had negative scores. Our study also found that many participants were using alternative cultural approach for pain management. A total of 65% and 77.6% used the Quran and Somali herbs respectively. This is similar to ¹² that revealed Islamic healing practices continued to be accepted by

many cancer patients despite the advances in the modern treatment of cancer pain.

The findings in this study indicated that there is an association between cancer pain and interference with walking ability at (p -value > 0.05) and majority (76.9%) of male participants and (66.7%) female participants have been affected. We also found that there is a relationship between cancer pain and mood interference with patients at (p -value > 0.05) and so as pain's effect on patient's relationships with others at (p -value > 0.05). Therefore cancer pain has a negative impact because it affects the patient's physical activity, mood and relationship with others^{6,7}.

The finding in this study is similar¹⁴ who found that cancer patients do sometimes rely on more than forty-seven medicinal plants and traditional healers, particularly in Somali and Ethiopia for the treatment. Garissa being predominantly occupied by Somali community, this explains why patients under this study resorted to various types of herbs. On the use of herbal medicine as had been established by the findings of this study, World Health Organization (2008) study had earlier documented that there is a 70%-80% use of complementary and alternative medicine (CAM) among the public of many developed countries. Somalis believed that Allah gives someone the burden of pain so one should not express or verbalize the pain¹⁷ and most of our patients could easily express their pain.

V. CONCLUSION

Management of cancer pain is suboptimal in Kenya. Our study found a high prevalence and an adverse effect of cancer pain leading to poor quality of life of cancer patients at Garissa County Referral Hospital. The study also found that most patients rely more on alternative therapy and sociocultural perspective pain management. Therefore, there is a need for acceptable strategy and understanding alternative therapy for cancer pain management at GCRH. We recommend more studies in cultural perspective for pain management and knowledge and skills of healthcare workers in cancer pain management

Financial support and sponsorship

Nil

Conflict of interest

There is no conflict of interest

ACKNOWLEDGEMENT

We appreciate the support accorded by a senior nurse in charge of the Garissa County Referral hospital Mr Hassan Abdullah and the Palliative Care Nurse the hospital Ms Mumina Mohamed during the data collection period. We also acknowledge the cancer patients who participated and sacrificed their time to provide information for the study.

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Improving Literation Skills of Students Reading Through A Basic Book For Third Grade Of Elementary School Students

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DOI: 10.29322/IJSRP.9.08.2019.p9224

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9224>

Abstract -- This study aims to improve literacy skills of students in grade 3 through a tiered book. The study location was located in Muhammadiyah Elementary School 2 GKB, with the subjects of the study were 30 students in class 3-A. This study used Quasi Experiment with the design of *one group pretest posttest design*. This research was conducted in 2 meetings, by doing several stages, namely, developing a Learning Implementation Plan (RPP), Student Worksheet (LKS), and Literacy Read-write Skill Test. Data collection techniques use the method of observation of teacher activities and student activities, tests, and student response questionnaires. The results showed an increase from the first meeting to the second meeting. For teacher activities at the first meeting the percentage was 84.06%, and at the second meeting the percentage increased to 93.84%. The activities of students in the first meeting had a percentage of 75.38% and at the second meeting the percentage increased to 92.30%. improvement of students' literacy literacy skills can be seen from the results of evaluations at the *pretest* and *posttest* which respectively have the results of an average *pretest* score of 52 and the test *posttest* value with an average of 89. While the response of students to learning activities using tiered books shows the percentage by 86%

Keywords: Literacy literacy skills, Tiered Books.

I. INTRODUCTION

According to Didik Suhardi et al. (2013), in order to be able to excel in participation and engagement amid globalization and regionalization in the 21st century, national education needs to focus or pivot on three main things, namely basic literacy, competence, and character quality. The basic literacy that needs to be used as our education axis is (1) literacy literacy, (2) numeracy literacy, (3) scientific literacy, (4) digital literacy, (5) financial literacy, and (6) cultural and civic literacy. one of literacy. Of the six basic literacy available, literacy that is very important to master is literacy. Both literacy has a big influence on daily life, so that someone will be able to live his life with more quality.

According to Saryono, et al (2012) reading and writing is the literacy known as the earliest in the history of human civilization. Reading skills as one of the written language skills that are important for students to have to be able to communicate verbally or in writing. Reading skills must be instilled in every student, either by themselves or other people with the aim of increasing achievement in the future (Bakar, 2014). In addition, there are other basic skills that are in line with reading skills are writing skills. Writing skills are a skill in expressing ideas through language media. Writing is an activity in using or applying vocabulary, writing, and language structure in a productive and effective manner in the form of writing (Nurgiantoro, 2001).

Reading is someone's basic capital in understanding and knowing various kinds of information. While writing is a follow-up of understanding the information received. To support and achieve these objectives, adequate reading material is needed in terms of themes, and the level of reading difficulties so that the development of reading skills which will be continued with writing skills can be carried out well and achieve the expected results.

The existence of quality books has an important role in fostering a culture of literacy. To ensure the availability of quality books, required bookkeeping governance that can be accounted for through the arrangement of bookkeeping systems in a systematic, comprehensive, and integrated manner. One book that is considered capable of meeting the needs of students is a tiered book, a tiered book is a reading book in which there are texts and images that are adapted to students' reading skills. Reading with tiered books will be a solution to improve students' reading skills from the beginning (Kompasiana, 2018).

According to YLAI (2017), tiered books consist of big books and tiered reading books. Tiered books play an important role for students in the introduction of letters to advanced reading, because tiered reading books are made not only for reading, but also include strategies to attract students' attention to the reading they read.

Chall (1983) explained that the stages of reading development (stages of reading development) that are in accordance with the development of literacy and easier to understand the phases of phasing are with six stages (stages 0 to stage 5). In stage 3, the Chall divides again into phases A and B, so as a whole the classification amounts to 7. Based on the Chall gap, then the level setting for the book gap is 7 (seven) levels, namely: A, B, C, D, E, F, and G.

In literacy education, matching readers with text, aims to develop readers' skills in handling difficult texts gradually. Therefore, the teacher needs to choose a book whose level of difficulty increases gradually. In addition, the reader needs to be accompanied in understanding the text. This reader assistance is in line with the concept of Vigotsky scaffolding. Vygotsky (1978) calls this process scaffolding, which refers to teaching with *zone of proximal development*. This scaffolding process defines "space between," the space that exists between activities that students can do independently and activities that students cannot do, even with help. By teaching this "space between" zones, the teacher helps students to reach a higher level.

There is a lot of research on tiered books. Research conducted by Kusmiyati (2017) Comparative Study of Interest and Reading Ability of B3 Program Recipient School Students and B3 Non-Recipient Schools in Karangrejo District, Purbalingga Regency. The study compared the results of interest and reading ability in students who received tiered books and those who did not. The results of his research prove that students who were schooled facilitated with a Tiered Reading Book (B3) had a higher reading interest and reading ability than students who were not educated with a Tiered Reading Book (B3). That is because the Tiered Reading Book (B3) is able to provide solutions to problems for students by providing interesting offerings and contents of the book according to their level.

Another study by Supartinah, et al. (2016) Development of Guidelines for the Characteristics of Javanese Language Books in the Middle School. This study uses R & D research with a 4-D development model. The component of the gap in it is the same, that is, the content of the text that is adjusted to the initial to the advanced gap with supporting illustrations. While the differences in the variables, namely in this study measuring student character education. In addition, tiered books in this study use Javanese. Other studies have also been conducted by Karen (2017) *Using Alphabet Books Across Grade Levels: More Than 26 Opportunities*. This journal aims to find out the use of the alphabet book as a medium to increase students' interest in learning letters starting from the most basic vocabulary to forming a complete sentence. In addition, in the alphabet book there are various themes and in the delivery there are visual aids or images that match the intended word. The alphabet book is a book in which there are words or writings which at the beginning of the word begin with the alphabetical order A-Z supported by images that match the intended content. The difference, this study measures student learning outcomes in recognizing simple letters and words in accordance with the alphabet.

Quoted from the results of interviews conducted by researchers at one of the 3-A grade teachers at GKB 2 Muhammadiyah Elementary School on May 24, 2019, Evi Eryana Hapsari stated that grade 3 literacy literacy skills at Muhammadiyah 2 Elementary School GKB were still lacking. There are some students who still cannot read and write fluently. Currently, they are in the low class and will go up to high class, which is class 4. So, before going to class 4, they are required to have qualified literacy skills. This can be seen from the value of Indonesian language subjects in the aspects of reading and writing, there are some students who have grades under the KKM. In addition, the interest in reading and writing students is also still relatively low because there are not many students who are interested in reading to the library due to the lack of interesting books for them.

Reading and writing are the basic capital to know and understand the information that has been received. So, it must be implanted from small to adult in the context of family, community, and education. To achieve this goal, a person needs adequate reading books and is adjusted to the level of difficulty of his book so that their literacy literacy can be well developed and facilitated. However, books that are in accordance with the level of ability of children are very difficult to find on the market. In fact, books are one of the supporting ingredients in improving children's ability to read and write. In Muhammadiyah 2 Elementary School GKB there is already a library. In addition, there is a reading corner in each class. However, children do not use it well, because existing books tend to be boring and not according to their needs. Therefore, it is expected that there are books that can provide interesting reading for students and according to their needs. One of these books is a tiered book.

If observed, the statement of one of the teachers interviewed was that the facilities and infrastructure contained in the school were adequate, namely the existence of a library. However, the lack of interesting reading books and books that do not fit the needs of students makes students' reading interest less, therefore, in this study, researchers will try to use

II. METHOD

This study uses a type of quantitative research. The location of the study was at Muhammadiyah Elementary School 2 GKB. The subjects of the study were 3-A grade teachers and grade 3-A students at Muhammadiyah Elementary School 2 GKB with 30 students. This research was carried out in a collaborative form between researchers and classroom teachers. The research design used was *one group pretest posttest design*. The design of this study will use one group which will be observed at the *pretest* (O1) stage which is then followed by giving certain treatments (X) and *posttest* (O2). The one-group *pretest-posttest* design can be written in the form:

O1 X O2

Information:

- O1** = initial test (*pretest*) to find out students' critical thinking skills
- O2** = final test (*posttest*) to find out students' critical thinking skills
- X** = treatment of learning by using edmodo-based e-learning in problem-based learning

Data collection techniques use the method of observation of teacher activities and student activities, tests, and student response questionnaires. Data collection techniques in the form of tests are prepared to analyze the improvement of students' literacy literacy skills and are given at the beginning and end of learning. Data collection tools use evaluation sheets. The questions on the evaluation sheet are adjusted to the learning indicators provided by the teacher.

III. RESULT AND DISCUSSION

Result

The following will be explained about the results and discussion of quantitative research conducted by researchers with the title "Improving Literacy Skills in Reading and Writing Students Through Tiered Books for Grade 3 Students of Elementary School". This study uses Quasi Experiment with the design of *one group pretest posttest design* to obtain data on teacher activities, student activities, increase the test of literacy literacy skills, and student responses.

1. Implementation of RPP in Teacher Activities

The following is a table of implementation of lesson plans by the teacher:

Table 1 Teacher Activities

Meeting	Teacher Activity Average Score	Percentage of Teacher Activity	Category
1	4.23	84.6 %	Good
2	4.69	93.84 %	Very Good
Average	4.46	89.22 %	Very Good

Based on Table 1 it was shown that learning with tiered books to improve students' literacy literacy skills was carried out in a very good category. The data shows the percentage of learning feasibility in each meeting containing preliminary activities, core activities, and closing activities which were assessed by two observers. At the 1st meeting the final average score was 4.23 with the percentage of suitability of the two observers' evaluations of 84.6%. While at the second meeting the final average score was 4.69 with the percentage of suitability assessment of the two observers at 89.22%.

2. Student Activities

Table 2 Student Activities

Meeting	Average Student Activity Score	Percentage of Student Activities	Category
1	3.76	75.38 %	Good
2	4.61	92.30 %	Very Good
Average	4.19	83.84 %	Good

Based on Table 2, it is shown that in general the student activities observed in each meeting recorded by two observers during the learning process are considered Good. At the 1st meeting, the final average score of activity was 3.76 with a percentage of two observers matching 75.38%. While at the 2nd meeting the final average score was 4.19 with the percentage of appraisal of two observers 83.84%.

3. Literacy Literacy Skills Test

Table 3. Literacy Literacy Skills Tests

Student	Pretest		Posttest		Enhancement	
	Score	Category	Score	Category	G	Category
1.	50	Not Complete	90	Complete	0.8	High
2.	60	Not Complete	80	Complete	0.5	Medium
3.	50	Not Complete	95	Complete	0.9	High
4.	60	Not Complete	80	Complete	0.5	Medium
5.	45	Not Complete	75	Complete	0.3	Medium
6.	75	Complete	100	Complete	0.7	High
7.	50	Not Complete	90	Complete	0.8	High
8.	80	Complete	95	Complete	0.7	High
9.	60	Not Complete	90	Complete	0.8	High
10.	75	Complete	85	Complete	0.7	High
11.	50	Not Complete	100	Complete	0.9	High

12.	30	Not Complete	85	Complete	0.7	High
13.	35	Not Complete	85	Complete	0.7	High
14.	60	Not Complete	90	Complete	0.7	High
15.	65	Not Complete	100	Complete	0.7	High
16.	60	Not Complete	90	Complete	0.5	Medium
17.	75	Complete	90	Complete	0.7	High
18.	50	Not Complete	95	Complete	0.9	High
19.	30	Not Complete	80	Complete	0.6	Medium
20.	70	Not Complete	100	Complete	1.0	High
21.	75	Complete	85	Complete	0.6	Medium
22.	65	Not Complete	100	Complete	1.0	High
23.	65	Not Complete	90	Complete	1.0	High
24.	55	Not Complete	90	Complete	0.7	High
25.	60	Not Complete	95	Complete	0.8	High
26.	40	Not Complete	80	Complete	0.6	Medium
27.	30	Not Complete	85	Complete	0.7	High
28.	50	Not Complete	90	Complete	1.0	High
29.	75	Complete	100	Complete	1.0	High
30.	50	Not Complete	85	Complete	0.5	Medium
Total	1570		2660		22,5	
Average	52	Not Complete	89	Complete	0.75	High

Based on Table 3, it is shown that the average score of students' literacy literacy skills at *pretest* is 52 with the Not Completed category, while at *posttest* it is 89 with the Completed category. Based on the two data, there is an increase in the average value of students' literacy literacy skills before and after the implementation of tiered books in classroom learning. Improvement of students' high literacy literacy skills with an average score of *n-gain* of 0.75

4. Student Response

Table 4. Student Response

Student	Questionnaire Indicator										Σ TSEV	Σ s_max
	1	2	3	4	5	6	7	8	9	10		
1.	5	4	4	3	3	3	4	5	3	5	39	50
2.	4	5	4	5	5	5	4	5	3	4	44	50
3.	5	4	5	3	3	3	3	5	3	4	37	50
4.	4	5	5	4	4	5	4	5	3	5	44	50
5.	5	4	4	5	5	5	5	5	4	5	47	50
6.	5	4	5	3	5	5	3	5	5	5	45	50
7.	5	4	4	5	5	4	4	5	4	5	45	50
8.	4	5	5	4	3	5	5	5	4	4	44	50
9.	5	4	5	5	4	4	4	5	4	5	46	50
10.	4	4	5	5	4	4	3	5	5	4	43	50
11.	5	4	4	5	5	5	4	5	5	5	47	50
12.	4	5	4	5	4	4	4	4	5	5	44	50
13.	5	3	4	5	5	5	5	5	4	3	44	50
14.	5	4	5	4	5	5	5	5	5	4	47	50
15.	3	4	3	4	4	4	4	3	5	4	39	50
16.	4	5	3	3	5	4	4	4	5	5	43	50
17.	4	3	5	5	4	3	4	5	4	5	42	50
18.	5	3	3	5	5	5	5	5	4	5	45	50
19.	5	4	3	4	4	4	3	5	5	3	40	50
20.	4	5	4	3	4	5	5	4	3	4	42	50
21.	4	5	3	3	4	5	3	5	5	5	42	50

22.	3	5	5	4	3	4	3	5	5	5	42	50
23.	5	4	3	5	3	5	5	5	4	4	43	50
24.	5	4	4	5	5	4	4	5	4	4	44	50
25.	5	4	3	5	4	4	4	4	4	3	41	50
26.	4	4	5	5	5	5	5	5	4	4	46	50
27.	5	3	3	5	5	5	5	5	4	5	45	50
28.	3	4	5	3	4	5	5	5	5	5	44	50
29.	4	3	5	4	5	3	4	5	4	4	41	50
30.	4	5	5	5	4	5	5	4	4	4	45	50
	Jumlah										1300	1500

Table 4 shows the percentage of student responses to learning activities using tiered books through 10 statement items. Of the 10 items of statements that have been given, obtained answers with very good categories. Based on the table, it can be interpreted that the students' response to learning that has been done is Very Good with a final percentage of 86%.

Discussion

1. Teacher Activities

Data on the results of teacher activities on tiered books developed are used during the learning process in order to facilitate students' understanding of the material to be delivered. The use of tiered books will help teachers make students' literacy literacy skills more than before. Data obtained from tiered book trial activities was carried out in the 3rd grade of Muhammadiyah 2 GKB Gresik Elementary School. The results of the observation of teacher activities towards the use of supplementary books developed are as follows;

Teacher activities in learning activities achieve success if the majority (76% to 99%) of learning material can be mastered by students. From the observation results, the teacher's activity showed 89.22%. The conclusion from observation of teacher activity is a tiered book can be mastered by students optimally / very well. so that it is interpreted in a very good category.

2. Student Activities

Student activities are observed during the learning process by implementing tiered books to improve students' literacy literacy skills. Student activities were assessed using student activity observation sheets developed through observations made by two observers during the learning activities. The observation results of student activities using tiered books to improve students' literacy literacy skills can be seen in Table 2.

There were 13 aspects observed as assessment material by two observers during the learning process. The thirteen aspects are contained in the student activity observation sheet developed. The assessment starts from the beginning of the learning activity until the end of the study for two meetings. Based on the results of the analysis of the assessment of observations of activities at each meeting listed in Table 2 shows the average score of student activity. At the first meeting, the final score of the activity was 3.76 in the good category. Whereas, in the second meeting the final average score was 4.72 with a very good category.

This increase shows that student activities that are expected to emerge during learning can be raised and implemented very well. The statement is supported by the percentage of appraisal suitability conducted by the two observers for 2 consecutive meetings namely 75.38% and 92.30%. on the student activity sheet, the aspect that is expected to emerge during learning is a tiered book reading activity that is completed up to level 6 and students successfully answer questions at each level accompanied by the truth in vocabulary writing.

The fifth, sixth, seventh, and eighth student activities in table 4.7 are interrelated activities. The four activities of the students are follow-up activities carried out by students in reading tiered activities starting from level 1 to level 6 conducted. After reading up to the mastered level, it will be continued by answering questions on each level and writing vocabulary at each level.

In the activity table presented, the four activities experienced an increase in the average score in two meetings. The first meeting showed the acquisition of a score in a good category and at the second meeting in a very good category. This shows that students have begun to be able to read, answer questions and write well. Based on the exposure of the results in Table 4.7 it can be concluded that the percentage of activities carried out by students is classified as Good, which means that each activity is carried out properly by students so that learning activities can be carried out well and in accordance with the lesson plan.

3. Literacy Literacy Skills Test

Students' literacy literacy skills are measured by giving *pretest* questions at the beginning of the activity before learning by using tiered books based on book gaps, and *posttest* questions when the entire series of learning activities are held during 2 meetings using tiered books based on book gaps. The assessment instrument used is a test of literacy literacy skills that refers to four indicators of literacy literacy skills, namely reading the contents of the story text smoothly, explaining the text content of the story properly and correctly, answering questions according to the text content correctly, and writing vocabulary words in each paragraph correctly.

The results of the student literacy literacy skills test are used as a basis for determining the category of literacy literacy skills possessed by students. The results of tests of student literacy literacy skills are presented in Table 3. Based on Table 3, it is

indicated that the average test scores of students' literacy skills at the *pretest* category are not completed, while the *posttest* results are categorized as completed. From the two data, there is an increase in the average value of students' literacy skills before and after the application of tiered books based on the book gap. Improved tiered book skills High category with an average *n-gain* score of 0.75.

Based on the data from the results of the test scores of students' literacy skills, the completeness data for each test indicator also showed that the students' literacy skills generally showed that all the indicators of the students' literacy skills at the *posttest* were categorized as Completed. The completeness category refers to student KKM which is ≥ 75 . This is indicated by the analysis of *n-gain* score where the gain value for each indicator has increased. Student literacy skills can be developed through a student-centered learning approach (Snyder & Wiles, 2015).

Based on the discussion and elaboration of the results of the analysis of the completeness of the indicators of students' literacy skills above, it can be concluded that tiered books can improve students' literacy skills. As well as the research conducted by Kusmiyati (2017) Comparative Study of Interest and Reading Ability of B3 Program Recipient Students and B3 Non-Recipient Schools in Karangrejo District, Purbalingga Regency. The results of his research prove that students who were schooled facilitated with a Tiered Reading Book (B3) had a higher reading interest and reading ability than students who were not educated with a Tiered Reading Book (B3). That is because the Tiered Reading Book (B3) is able to provide solutions to problems for students by providing interesting offerings and contents of the book according to their level.

So, based on some of the literature studies above it can be concluded that the use of tiered books is an effective solution to improve elementary school students' literacy skills.

4. Student Response

In this study, student responses were assessed using the response questionnaire distributed by the teacher to students to assess students' responses to learning that had been conducted during two meetings using tiered books to improve the literacy skills developed. The questionnaire that was disseminated contained 10 items of positive statements that students had to fill in by giving a checklist. Fill out the questionnaire sheet using a Likert scale with 5 rating categories (Very Less, Less, Enough, Good, Very Good).

Student responses to learning that lasts for two meetings can be used as a reference for learning effectiveness. If students respond positively, then the learning given during the two meetings can positively improve students' literacy skills and can help students understand the contents of the story. The results of the student analysis shown in Table 4 show that students gave very good responses to the tiered books that were developed as well as the learning activities they attended during the two meetings.

Table 4 shows that the response is very well seen in item statement number 1 which shows the appearance of tiered books making students interested in reading it. Item number 6 explains that through tiered books, students' interest in reading is increasing, and item number 7, through tiered books, increases student interest in writing. Meanwhile, the response with a balanced percentage can be seen in item statement number 4, namely tiered books adding insight and new knowledge to students.

Based on the results of the response analysis, the final conclusion is that overall the percentage of 86% of students respond very well to tiered books and instruments for assessing students' literacy skills developed and implemented in learning activities for two meetings can help students understand the contents of the stories and can improve literacy skills during learning activities.

IV. CONCLUSION

Based on the data presented, it was concluded that the use of tiered books can improve literacy skills in grade 3 students of elementary school.

Reading books given to students must be books that have criteria that are in accordance with their needs and provide positive values for students, as well as the criteria contained in a tiered book. Therefore, when students choose or read a book must be accompanied by assistance from parents and teachers. In addition, the teacher needs to provide guidance to students regarding literacy skills. Therefore, the teacher must provide reinforcement and assistance in terms of reading and writing because both are basic things that must be mastered by students before learning other skills.

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Reasoning of Elementary School Students in Higher Order Thinking Skills (HOTS) on Fraction basic on Adversity Quotient

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DOI: 10.29322/IJSRP.9.08.2019.p9225

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9225>

Abstract

The aims of this study is to describe students' reasoning in solving higher order thinking skills (HOTS) problems in fraction material reviewed based on adversity quotient. The subjects are three students namely one student with quitter type, camper and climber. The instruments used included the Adversity Response profile (ARP), HOTS tests and interview guidelines. The process of data collection is done by giving tests and interviews to get more in-depth information. The results showed students' reasoning ability with the type of quitter had not achieved basic level thinking skills, reasoning students with the camper type were in critical thinking and the reasoning of students with the climber type was on the ability to think creatively.

Keywords: *Reasoning, HOTS Problem, Fractions, Adversity Quotient.*

I. Introduction

One of the subjects that has an important role in developing student reasoning is mathematics. In accordance with Permendikbud Number 59 of 2014, the goal of mathematics lessons given to students since elementary school is to equip students with the ability to think logically, analytically, systematically, critically, innovatively and creatively, as well as the ability to work together. (Permendikbud, 2014). All of these thinking skills are very useful for students in processing the information obtained, evaluating the information so that they are able to determine new solutions in solving a problem.

Based on the learning objectives above, it can be said that mathematics and reasoning are like two sides of a coin that cannot be separated. Both show a very strong relationship where reasoning becomes important in mathematics. Corner (2014) explains that "*It has long been accepted by a reasoning important in mathematics both in learning mathematics and in doing.*

The same opinion was also expressed by Russell (1999) that "*reasoning is fundamental to understanding mathematics and mathematical reasoning should be promoted by engaging*

students in investigating, representing, conjecturing, explaining and justifying mathematics. Shadiq (2007) states that through reasoning abilities students can show and analyze every problem that appears clearly, can assess something critically and objectively, can fuse opinions and ideas in a coherent and logical way, be able to draw conclusions and decisions correctly and be able to solve problems appropriately. The *National Council of Teachers of Mathematics* (NCTM) explains that there are 5 standard mathematical learning processes that students must have namely problem solving, reasoning and proof (*reasoning and proof*), communication (*communication*), connection (*connection*) and representation (*representation*) (NCTM, 2000, p.164). Reasoning in mathematics can help students use reasoned skills in making predictions on the basis of their experience so that they gain an understanding of mathematical concepts and are able to apply them so that learning becomes meaningful (*meaningful learning*). English (2004) states that "*The traditional view of computational and analytical mathematical reasoning as superior has been revised to accommodate processes that are important in today's knowledge based. These include gathering evidence, analyzing data, making conjectures, constructing documents, drawing and validating logical conclusions and proving assertions* "

According to Klurik & Rudnick (1995) reasoning includes basic thinking, critical thinking and creative thinking. Basic thinking is the ability of students to understand the concepts in mathematics correctly. Students are said to understand mathematical concepts when they are able to express or explain concepts using their own words and not just memorize. In addition, he can also find and explain the relationship between one concept and other concepts in solving a problem. Critical thinking is thinking that involves testing, connecting and evaluating all aspects of a problem or situation. Critical thinking is characterized by students' ability to collect, organize, remember, and analyze information to determine conclusions. Creative thinking is original and reflective thinking and produces a complex product. According to Krulik and Rudnick

in creative thinking students can synthesize ideas, build ideas, plan ideas and apply these ideas so that they discover and produce new products.

There are several problems related to students' reasoning in mathematics. Gunham (2014) in his study concluded that students' reasoning abilities were still low in providing explanations and evidence of a problem solving conclusion obtained. Lenola, et al. (2016) further revealed that students' reasoning abilities in solving problems were in the low category of 4%, students with medium category reasoning abilities as much as 32%, and students with high category reasoning abilities as much as 64%.

Another problem regarding the students' low reasoning abilities was expressed by Aboselem (2016), in his research he concluded that test questions designed by the teacher only measured low order thinking skills in Bloom's taxonomy, namely at the remembering level of 28.57% , understand 14.29% and apply 57.14%. while for high-ability questions, at the level of analysis, evaluation and creation are 0%.

One of the basic material in mathematics that must be mastered by elementary school students is fraction material. Good ability in fractions will help students understand other mathematical materials. As Kim (2015) said that *fraction was specifically selected as the focus of the problem because it is embedded in the content of elementary and intermediate algebra*. The reason for studying fractions is fractions are considered as the basic material for lecturing other mathematical concepts such as algebraic material and also for higher concepts.

In overcoming the problem of low student reasoning in Indonesia, the government introduced the issue of HOTS (*Higher Order Thinking Skills*). In the 2013 Curriculum HOTS type questions began to be developed with the aim of students not only being able to solve routine questions using standard formulas / algorithms, but also must be able to reason and use mathematics to solve non-routine problems encountered in daily life - day.

Minister of Education and Culture (2017) revealed that HOTS is a question that requires high-level thinking skills and involves a reasoning process, so that it can hone critical thinking skills, logical, reflective, metacognitive, and creative. The HOTS problem develops students' ability to think at the level of analysis, evaluation, and creation. (Anderson & Bloom, 2001).

HOTS questions have a big role for students, among others 1). Equip students to have skills in saving the 21st century, 2). increase student learning motivation, 3). improve the quality of questions 4). increasing love for the progress of the region. In working on the *HOTS* Question, students are expected to be able to apply the knowledge and methods that have been learned in solving a problem in a creative, innovative way to the stage of discovering an innovation / new discovery. (Minister of Education and Culture, 2018). Furthermore, Arifin (2018) explains that through *HOTS* questions students can criticize and evaluate information, make conclusions and make generalizations. Students can also create various solutions to solve problems related to everyday life.

Students' ability to solve Higher Order Thinking Skills problems is influenced by students' resilience in facing

challenges or problems. Students' responses in facing a challenge vary. Someone can solve the problem well if supported by the ability to solve good problems too. The ability that is in someone in facing a challenge or problem and looking for a solution to the problem is known as *Adversity Quotient* (AQ). According to Stoltz (2000), *Adversity Quotient* is the ability of students to survive and overcome problems. This ability includes perseverance, patience, steadfastness and is not easily discouraged in facing problems.

Stoltz (2000) revealed that *Adversity Quotient* (AQ) has four dimensions namely *Control, Original, Ownership, Reach and Endurance*. These dimensions include how a person responds to a problem. By using these four dimensions, we can see the response categories of each person in the face of difficulties. Stoltz classifies people based on their level of intelligence *Adversity Quotient* (AQ) into three groups namely *Quitter, Champer and Climber*.

Based on the background described above, the researcher wants to conduct research with the aims "**Reasoning of Elementary School Higher Order Thinking Skill (HOTS) on fraction on based on Adversity Quotient (AQ)**".

II. Methods

This research is a type of qualitative research with descriptive research methods. Student reasoning will be identified and described based on the HOTS Test results and the results of the interview based on reasoning tests. This research was conducted at SD GMTI Soe II. The subjects in this study were 5th grade students of SD GMTI Soe II. The technique in selecting subjects starts with selecting the class of prospective research subjects, followed by giving the Adversity response profile (ARP) test for grouping students in 3 types namely quitter type students, campers and climber. From the results of grouping based on ARP, the research subjects were selected consisting of one type of quitter student, camper and climber. The instruments in this study consist of two types, namely the main instrument and supporting instruments. The researcher will also observe and monitor directly the implementation of the *Higher Order Thinking Skills Test* and Questionnaire on the *Adversity Response Profile* (ARP) and interview activities with the research subjects. Supporting instruments include the *Higher Order Thinking Skills* (HOTS) Test, *Adversity Response Profile* (ARP), interview guidelines and recording devices. All supporting instruments make and the second validation process is carried out.

The interview used in this study was a semi-structured interview. This is done to get more in-depth information about students' reasoning in working on the *HOTS* Test. The data analysis technique consists of the stages of reducing data, presenting data and conclusions. The following is the Student Reasoning Indicator in solving HOTS problem :

Reasoning	Student activity	Code
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Basic thinking	➤ Explain the information available on the question	➤ BC1
	➤ Explain the mathematical concepts that will be used in solving problems	➤ BC2
Critical Thinking	➤ Check and determine information that does not yet exist and use all information in solving a problem	➤ CL1
	➤ Determine the conclusion of a problem	➤ CL2
	➤ Arguing against problem solving	➤ CL3
Creative Thinking	➤ Plan new ideas or solutions in solving problems	➤ CV1
	➤ Applying new ideas or solutions that are different from solving previous problems	➤ CV2

III. Research Finding

a. Based on the results of the HOTS test and reasoning based interviews, it was shown that the three subjects had different reasoning abilities. *Question number one:* In commemorating the "National Awakening Day" on May 20, 2019 all delegates IV to V SD GMIT SOE II were sent to attend the ceremony at the SOE Puspenmas Field. The total number of students participating in the program is 80 people. During the ceremony there were differences in costumes used by students. There are $\frac{3}{4}$ students wearing red and white clothes, $\frac{1}{5}$ students wearing pramuka clothes, and the rest students wearing sports clothes. Determine the number of students who wear red and white clothes and sports clothes!

Then the written test results and interviews with camper type students (SCP) in completing question number 1.

P: From the matter of what you read related to what material?

SCP: fraction (BC1)

P: Why do you say it's fraction material?

SCP: Because there are characteristics of fractions (BC1)

P: what are the characteristics of fractions?

SCP: there is a numerator and denominator (BC1)

P: Look at the question, what is known from the problem?

SCP: total number of students 80, $\frac{3}{4}$ using red and white clothing $\frac{1}{5}$ uses pramuka clothes (BC2)

P: what was asked about the question?

SCP : the number of all students using red and white cloth and sports (BC2)

P: mention it information that is not yet available in the question?

SCP: many students use sports clothing (BC2)

P: how to find out many students who wear sports clothes?

SCP:

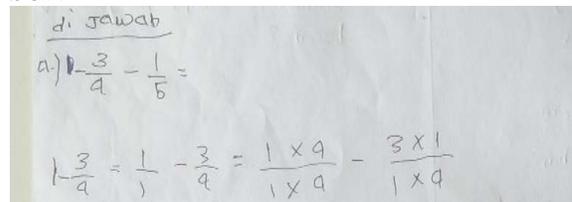


Figure 1a

P : How do you determine results $1 - \frac{3}{4} - \frac{1}{5}$?

SCP: The first step is to determine $1 - \frac{3}{4}$ then subtract with $\frac{1}{5}$

(BC2)

P: How do you change 1 into a fraction?

SCP: The fraction of 1 is $\frac{1}{1}$ so it is written $\frac{1}{1} - \frac{3}{4}$ (CL1)

P: how to equate the denominator of two fractions?

SCP : By cross-multiplying the numerator in the first fraction is multiplied by the denominator of the second fraction and the numerator in the second fraction is multiplied by the denominator of the first fraction. As well as for the denominator, the denominator of the two fractions is multiplied as in figure 1a (BC2)

P: What is the result of the reduction?

SCP: then proceed with the reduction of the third fraction to get the results $\frac{1}{20}$ (see figure 1b)

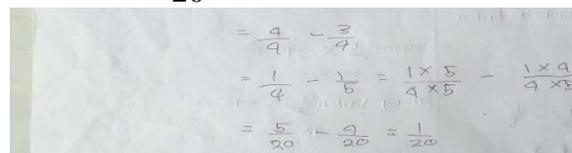


Figure 1b

P: How to determine the number of students using red and white clothes?

SCP: the way is to multiply many parts of students using red and white clothes with the total number of students (see figure 4) (BC2)

P: How to determine the number of students using sports clothing?

SCP: the way is to multiply many parts of students using sportswear with the total number of students (see figure 2) (CL1)

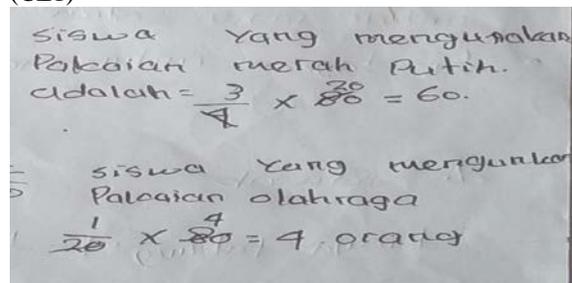


Figure 2

P: What is your conclusion?

SCP: In conclusion, there are 64 students who use red and white clothes and sports. (see figure 3)(CL2)

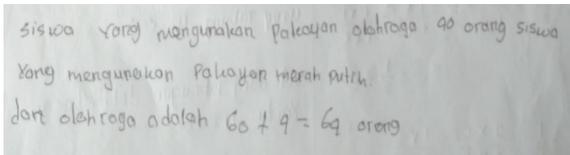


Figure 3

Based on the results of the tests written in figure 3-5 and interviews with camper type students, it was shown that students with the camper type were able to determine information that had not been provided for the existing problems, were able to do the calculation results using a reduction operation, division and multiplication of fractions with steps- step correct solution. He is able to determine the correct conclusion of the problem given and provide a logical argument. So students with camper types are able to reason well and are in the category of critical thinking. He has been able to examine the information that exists and use it in determining how to solve a problem, is able to determine the conclusions of a problem and provide an argument against solving the problem.

Camper and climber type students already have good understanding of the fractions and operations. The difference is that climber students have two different ways of determining the resolution of problem number 1. The following are the results of written tests and interviews with climber type students.

P: From the matter of what you read related to what material?

SCP: fraction (BC1)

P: Why do you say it's fraction material?

SCP: Because there are characteristics of fractions (BC1)

P: what are the characteristics of fractions?

SCB: there is a numerator and denominator (BC1)

P: Look at the question, what is known from the problem?

SCP: total number of students $90, \frac{3}{4}$ using red and white clothing $\frac{1}{5}$ uses pramuka clothes (BC2)

P: what was asked about the question?

SCP: the number of all students using red and white cloth and sports

SCP: the number of all students using red and white cloth and sports (BC2)

P: mention it information that is not yet available in the question?

SCP: many students use sports clothing (BC2)

P: how to find out many students who wear sports clothes?

SCP: Can be seen in figure 4

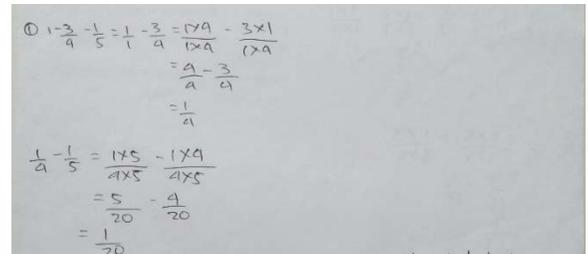


Figure 4

➤ While the difference with camper type student lies in the process of finding the number of students using red and white clothes and sports. Camper students only use one method while climber students use two ways

P: how do you determine the number of students using red and white clothes and sports?

SCB: the first way: students who wear red and white

clothes $\frac{3}{4}$ part are added to students who wear sports

clothes $\frac{1}{20}$ part (see figure 5a & 5b)

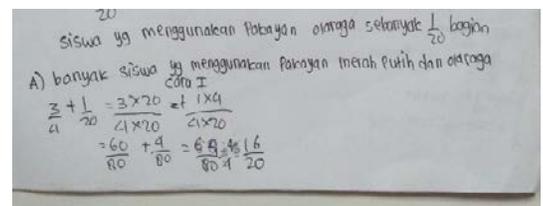


Figure 5a

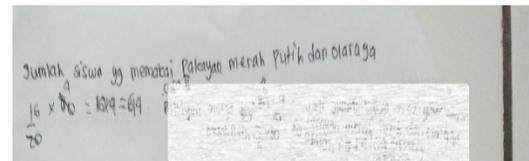


Figure 5b

So the number of students who use red and white clothes and sports is that $\frac{16}{20} \times 80 = 16 \times 4 = 64$ students

P: Do you have other ways to solve problem number 1?

SCB: Yes. Second method: students count each number of students using red and white clothing and sportswear. The

number of students who use red and white clothing is that $\frac{3}{4} \times$

total of students = $\frac{3}{4} \times 80 = 3 \times 20 = 60$ and students who wear sports clothing = $\frac{1}{20} \times 80 = 1 \times 4 = 4$ (CV1)

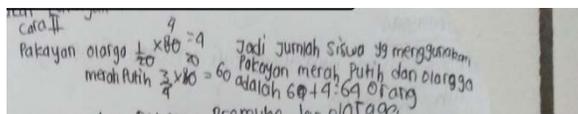


Figure 6

So the number of students using red and white clothing and sports is 64 people. (see figure 6)

P: whether the results obtained in the first way are the same in the second way

SCB: the results obtained in the first and second work methods are the same, namely the number of students using red and white clothes and sports are 64 people.

According to the results of written tests and interview transcript for climber type students, this type is able to recognize and understand the fraction concepts used to solve HOTS problems. In connection with the fraction material the climber type students are able to perform subtraction, multiplication, fraction addition operations with different denominators and operations with integers. He uses information that is on all problems, all mathematical concepts that arise and are able to connect with one another. In addition, the climber type is also able to plan new ideas or solutions in solving problems, able to apply new ideas or solutions that are different from the previous problem solving.

Following is the transcript of the interview conducted by quitter type students (SQT) in question number 1.

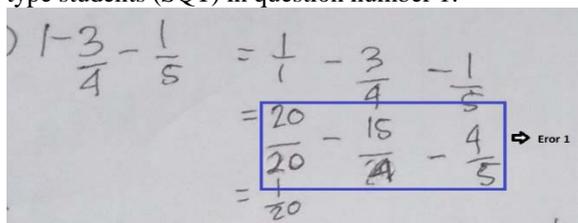


Figure 7

P: Pay attention to the shape $1 - \frac{3}{4} - \frac{1}{5}$, how to determine the result of the reduction in rupture?

SQT: By equating the denominator

P: How do you equate the denominator?

SQT: By multiplying 4 and 5, namely 20

P: What is the next step?

S: numerator First fraction: 20 divided by 20 times 1 result 20

Second fraction numerator: 20 for 4 times 5 results 15

3: 20 fraction numerator divided by 5 times 1 result 4

P: Okay, but why the value of the second and third fractions is still 4 and 5

SQT: Because the one who changes the denominator is only the first denominator (Error 1)

P: After writing the denominator in the first fraction, what should be done?

SQT: Subtract the numerator so that it gets 1/20

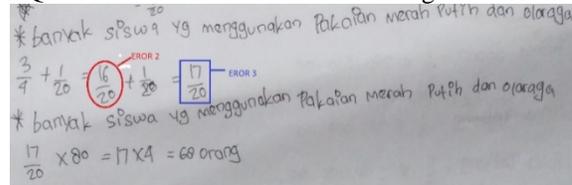


Figure 8

P: Look at the shape again $\frac{3}{4} + \frac{1}{20}$, how to add fractions with different denominators?

SQT: By equating denominators of 4 and 20, namely 20

P: How do you get 20?

SQT: Because there is a denominator of 20 in the second fraction

P: how do you get value $\frac{16}{20}$?

SQT: 20 divided by 4 multiplied by 3 = 5 x 3 = 16, so the results are fractions $\frac{16}{20}$ (error 2)

P: Is 5 x 3 = 16? (error 2)

SQL: Yes Ma'am

P: how do you get value $\frac{1}{20}$?

SQT: 20 divided by 20 times 1, so the fraction results $\frac{1}{20}$

P: Next what do you do to get the addition?

SQT: add up the numerator so that you get the results $\frac{17}{20}$ (error 3)

In Figure 7 shows that students experience difficulty in operating a form of subtraction from different denominators. This is because students think that the denominator is only in numbers that have no denominator (error 1). Then in figure 8 students experience errors in connecting the concepts of fraction division and multiplication so that the results are wrong (error 2) and also students make mistakes in doing fraction addition because the results of the multiplication obtained previously are worth the error (error 3).

In solving HOTS questions, quitter type students have not been able to understand the basic concepts in fraction material. Quitter students tend to have errors in associating fraction concepts used in solving a problem. Both errors are found to consist of errors in the process of equating the denominator of fractions with different denominators, doing land in fraction multiplication and addition operations. So the results of student

work and interviews show that the type of quitter cannot provide a good reasoning process in solving HOTS problems. This type has not achieved basic thinking skills because it has not been able to understand the basic concepts in mathematics and connects every concepts and ideas to solve HOTS problems.

Thus it can be said that the reasoning abilities of climber type students are better than quitter and camper types. Climber type reasoning abilities can be classified into the ability to think creatively because he is able to plan new ideas and is able to apply these ideas to find solutions that are different from previous solutions. While the reasoning of students with the camper type is on critical thinking skills and students with quitter types have not achieved basic thinking skills.

IV. Conclusion

Based on the results of research and discussion that has been described that students' reasoning abilities in solving HOTS problems have differences. The reasoning ability of students with the quitter type has not achieved basic thinking skills, reasoning students with the camper type are in critical thinking skills and students with the climber type are in creative abilities.

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Investigation of Aloe vera extract for antimutagenicity and Antioxidant Activities

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DOI: 10.29322/IJSRP.9.08.2019.p9226
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9226>

Abstract- In the present investigation, Antimutagenicity, antioxidant and phytochemicals investigations have been carried out. The 50% methanolic extract of Aloe vera showed the presence of Alkaloids, Carbohydrate, Resin, Saponins, Glycoside and Tanins whereas Protein, Starch, Flavonoids and Steroids were absent. The different concentration of Resin (2.5%), Tannin (1.95%), Carbohydrate (1.34%) and Alkaloids (0.67%) were quantified. In Micronucleus assay, single application of Aloe Vera ext. at the dose of 125, 250 and 375 mg/kg b.wt., 24 hours prior to the i.p. administration of Cyclophosphamide significantly prevented the micronucleus formations in bone marrow cells of mice. It was also observed that single application of Aloe vera extract at the dose of 250 mg/kg has not significantly induced micronuclei formation as compared to solvent control. The dose dependent inhibition of TBARS formation at the different concentration of Aloe vera extract ranging from 100 µg/ml to 1,000 µg/ml was studied using TBARS method. The Ascorbic acid was used as positive control. The IC₅₀ values of Ascorbic acid and of Aloe vera extract were found to be 40 µg/ml and 60 µg/ml, respectively.

Index Terms- Aloe vera; Micronucleus; Antioxidant; Phytochemicals

I. INTRODUCTION

Aloe belonging to family Liliaceae that originated in South Africa, but has been indigenous to dry subtropical and tropical climates, including the southern USA, (Reynolds et al., 1999). Aloe vera has been used for medicinal purposes in several cultures for millennia (Foster et al., 2011). There is a broad list of the therapeutic claims of different parts of Aloe vera due to its pharmacological activities which are employed in traditional management of diverse veterinary and human diseases, (Blumenthal et al., 1998). The herb is used internally to combat most digestive problems, including constipation, poor appetite, colitis, irritable bowel syndrome as well as, asthma, diabetes, immune system enhancement, peptic ulcers, (Brusick et al., 1997; Mansour et al., 2013; Ezuruike et al., 2014; Kavyashree et al., 2015; Pandey et al., 2016). Aloe vera has many biological and pharmacological activities. These effects are due to the variety of the chemical compounds including anthraquinones, glycoproteins, polysaccharides, vitamins and enzymes contained (Choi and Chung 2003; Du Plessis and Hamman 2014; Akev et al. 2015; Shrestha et al. 2015). Many of the medicinal effects have also been attributed to the immunomodulatory properties of the inner gel (Im et al. 2010), but it is also believed that synergistic action of the

compounds contained in the whole leaf extracts is responsible for the multiple and diverse beneficial properties of the plant (Eshun and He 2004). The mucilaginous gel part of A. vera is used commercially as a softener in various cosmetic preparations, soaps and shampoos due to its glycoprotein content. The first known effects of A. vera after its cathartic activity, is the wound and burn healing effect of the leaves gel portion, widely supported in scientific literature (Capasso et al. 1998; Chithra et al. 1998; Hegggers et al. 1995). Because of this effect, the gel is also added to many preparations used for skin treatment.

Material and Method

Chemicals

The leaves of Aloe vera were collected from local areas of Satna M.P. (India). Authenticated by the botanist Dr. Manoj Tripathi of Deen Dayal Research Centre, Chitrakoot, Madhya Pradesh (India), where the herbarium was deposited.

Animals:

Random bred male Swiss Albino mice of (6-8 weeks old) of 15-20 grams body weight were obtained from the animal Colony of our research centre. They were kept on synthetic pellet diet and water ad libitum. The experiment was approved by the institutional animal ethics committee before conduction of experiments.

Preparation of Aloe vera extract-

Pulp was taken out from leaves and mixed with distilled water and methanol (1:1) and kept in separating funnel for 6 hours. The supernatant was collected and this process was repeated until cleared solution of supernatant was obtained. All supernatant was pulled together and dried to the power of 40°C water bath. The powder was dissolved in double distilled water before the each treatment at required concentrations.

Preliminary Phytochemical Screening

Standard screening test for various phytochemicals of methanolic extracts of Aloe vera were carried out. The crude extracts were screened for the presence or absence for primary and secondary metabolites such as flavonoids, steroids, alkaloids, phenolic compound, saponin, tannins etc.

Investigation of Phytochemical Analysis of Aloe Vera extract Test for Phytochemical Analysis

The extracts were analyzed for the presence of various phytochemicals by applying the standard methods in 50% and 100% methanolic extract.

Test for carbohydrate

A small quantity of the extract was dissolved in 4 ml of distilled water and filtered. The Molisch's test was performed with filtrate to detect the presence of carbohydrates and further addition of Fehling's reagent if showed the brick red colour confirming the presence of reducing sugar.

Tests for glycosides

Extract was hydrolyzed with hydrochloric acid for few hours on a water bath and the hydrolysate was subjected to Legal's and Borntrager's test to detect the presence of different glycosides. Ammonia layer acquires pink colour confirming the presence of glycoside.

Test for alkaloids

A 100 mg of an extract was dissolved in dilute hydrochloric acid solution was subjected to filtration filtrate was tested with Dragendorff's and Mayer's reagents the treated solution was observed for precipitation.

Confirmatory test

Five grams of the extract was treated with 40% calcium hydroxide solution until the extract was distinctly appears alkaline to Litmus Paper, and then extracted twice with 10 ml portion of chloroform then chloroform extracts were combined and concentrated to about 5 ml. Chloroform extract then spotted on thin layer plates solvent system(n-hexane-ethyl acetate, 4:1) was used to develop chromatogram and protected by spraying the chromatograms with freshly prepared Dragendorff's spray reagent. An orange or dark colour spots against a pale yellow background was confirmatory evidence for the presence of alkaloids.

Test for proteins

2 ml of filtrate was treated with 2 ml of 10 % sodium hydroxide solution in a test tube and heat it for 10 minutes. A drop of 7% to copper sulphate solution was added in the above mixture formation of purple violet colour indicates the presence of proteins

Test for flavonoids

0.5 g of the extract dissolved in water and added with 5 ml of Ethyl acetate then shaken well and allowed to settle down. After sometime inspected for the production of yellow colour in the organic layer, which is confirmatory for free flavonoids

Lead acetate test

0.5g extract dissolved in water and mixed about 1 ml of 10% lead acetate solution. Production of yellow precipitate is considered as positive for flavonoids.

Reaction with sodium hydroxide

Salkowski's Test

0.5 g e extracts were dissolved into 2 ml of chloroform in a test tube concentrated sulphuric acid was bored on the wall of test tube to form a lower layer further examined for the appearance of

a reddish brown colour ring at the interface which indicate the presence of Steroids (i.e., the aglycone portion of the glycoside).

Lieberman's Test 0.5g extract was dissolved in 2 ml of acetic anhydride and allowed to cool in an ice-bath. Concentrated sulphuric acid was then carefully added. Purple colour turned in to blue-green which indicated the presence of a steroid nucleus, i.e., aglycone portion of the cardiac glycosides

Test for saponin

Froth test

0.5 g extracts were dissolved in 10 ml of double distilled water for about 30 seconds and shaken vigorously for about 30 seconds. The test tube was put in a vertical position and observed over 30 minutes period of time. If a "honey comb" fraud above the surface of liquid persist after 30 minutes. Frothing confirmed presence of saponin.

Test for tannins

Ferric chloride test

Some amount of the extracts were dissolved in water and solution was filtered. 10% ferric chloride solution was added to the clear filtrate and observed for change in colour to bluish black confirming the presence of chloride.

Formaldehyde test

0.5 g extract in 5 ml water, three drops of formaldehyde, and 6 drop of dilute hydrochloric acid were added and heated to boil for 1 minute, then allowed to cool. The precipitate formed(if any) was washed with hot water, warm alcohol, and warm 5% potassium hydroxide successively. A balki precipitate, which leaves a coloured Residue after washing, indicated the presence of phlobatannins.

Test for anthraquinone

0.5 gm of crude powder was taken with 10 ml of benzene and was filtered 0.5 ml of 10% Ammonia solution was added to the filtrate and the mixture was shaken well and the presence of the violet colour in the layer face indicated the presence of the anthraquinones.

Test for fixed oils

Spot test

Small quantities of plant extracts were separately present between two filter papers. Appearance of oil stain on the paper indicates the presence of fixed oil. Few drops of 0.5 N alcoholic potassium hydroxide were added to a small quantity of various extract along with a drop of phenolphthalein. The mixture was heated on a water bath for 1 to 2 hours. Formation of soap or partial neutralization of alkali indicate the presence of fixed oil and fats.

Test for phytosterol 0.5 gm of extract was treated with 10 ml chloroform and filtered. The filtered was used to test the presence of phytosterols and triterpenoids. The extract was refluxed with alcoholic potassium hydroxide solution until complete saponification. The mixture was diluted allowed by extracted with ether. Ether layer was evaporated and the residue was tested for the presence of phytosterol. The residue was dissolved in few drops of dilute acetic acid, 3 ml of acetic anhydride followed by few drops of concentrated sulphuric acid.

Appearance of bluish green colour confirms the presence of phytosterol.

II. RESULTS

The results of phytochemical screening of Hydromethanolic leaf extract of Aloe vera are depicted in table no. 4.1. The extracts

were screened for preliminary phytochemical testing to detect for the presence of different chemical group of phytochemicals. The 50 % methanolic extract of Aloe vera showed the presence of Alkaloids, Carbohydrate, Resin, Saponins, Glycoside and Tanins whereas Protein, Starch, Flavonoids and Steroids were absent (Table 1) The different concentration of Resin (2.5 %), Tannin (1.95%), Carbohydrate (1.34%) and Alkaloids (0.67%) were quantified (Table 2)

Table-1: Preliminary phyto-chemical screening of (*Aloe vera* (Linn.) (Leaf))

S. No.	Name of Experiments	Observation	Result
1.	Alkaloids		
	a) Mayer's test	Yellow colour appear	Present
	b) Wagner's test	Brown colour appear	Present
	c) Dragendorff's test	Orange colour appear	Present
2.	Carbohydrate		
	a) Anthrone's test	Dark colour appear	Present
	b) Fehling's test	Green colour appear	Present
	c) Molisch's test	No red - violet ring disapper	Present
3.	Proteins		
	a) Bieuret's test	Green colour appear	Absent
	b) Millon's test	White ppt are not appear	Absent
5.	Resins	Turbidity are seen	Present
6.	Saponins	Honey comb - like structure are form	Present
7.	Starch	Red colour is formed	Absent
8.	Flavonoid		Absent
	a) Ferric chloride test	Reddis pink colour is appear	Absent
	b) Alkaline reagent test	On addition of dilute acid yellow colour disappear	Absent
9.	Steroid		
	a) Salkowski's reaction	A red colour is disappear in the chloroform layer	Absent
10.	Glycoside		
	a) Borntrager's Test	Colour is change	Present
11.	Tannin	Greenish colour appear	Present
	a) Lead acetate Test	Reddish brown bulky ppt. are formed	Present

Table-2. : Quantitative Phyto-chemical Analysis of Sample-1 (*Aloe vera* (Linn.) (Leaf))

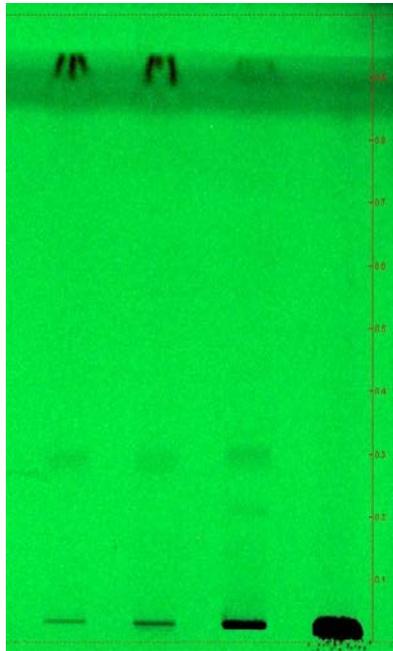
S. No.	Name of tests	Sample-1 <i>Aloe vera</i> (Linn.) (Leaf)
1	Resin	2.5%
2	Tannin	1.95%
3	Carbohydrate	1.34%
4	Alkaloid	0.67%

**Table-III : R_f values of HPTLC Fingerprints profile of Extract-1, 2, 3 & -4 (*Aloe vera* (Linn.) (Leaf)
 Plate-1: HPTLC Fingerprint Profile of Sample- 1 (*Aloe vera* (Linn.) (Leaf)**

R _f Values	Before derivatization			
	At 254nm			
	Track-A (Extract-Methanol)	Track-B (Extract-Ethanol)	Track-C (Extract -Benzene)	Track- D (Extract-Chloroform)
R _{f-1}	0.30(black)	0.30(black)	0.30(black)	-
R _{f-2}	0.90(black)	0.90(black)	0.90(black)	-
Before derivatization				
	At 366nm		At visible light	
	Track-A (Extract-Methanol)	Track-B (Extract-Ethanol)	Track-C (Extract -Benzene)	Track- D (Extract-Chloroform)
R _{f-1}	-	0.06(pink)	0.06(pink)	0.06(pink)
R _{f-2}	-	0.30 (brown)	0.30(brown)	-
R _{f-3}	-	0.40(brown)	0.40(pink)	-
R _{f-4}	-	0.56 (reddish brown)	0.56(reddish brown)	-
R _{f-5}	-	0.62 (reddish brown)	0.62 (reddish brown)	-
R _{f-6}	-	0.80(red)	0.80(red)	0.80(red)
R _{f-7}	-	0.90 (red)	0.90 (red)	0.90 (red)

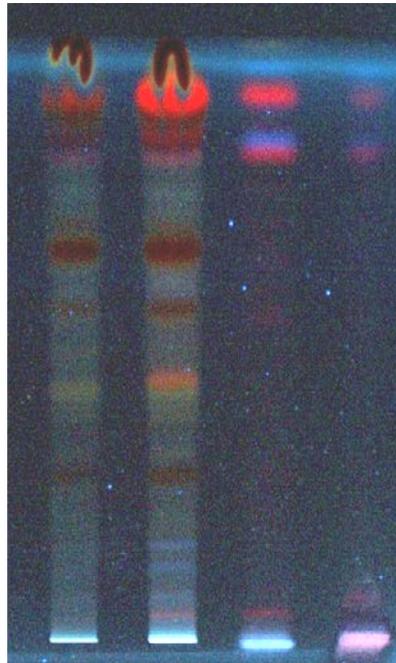
Rf Values	After derivatization			
	At 366nm			
	Track-A (Extract-Methanol)	Track-B (Extract-Ethanol)	Track-C (Extract-Benzene)	Track- D (Extract-Chloroform)
R _{f-1}	0.08 (white)	0.08 (white)	0.08 (white)	-
R _{f-2}	0.30 (light black)	0.30 (light black)	0.30 (light black)	-
R _{f-3}	0.50(sky blue)	0.50(sky blue)	0.50(sky blue)	-
R _{f-4}	0.60(brown)	0.60(brown)	0.60(brown)	-
R _{f-5}	0.68(sky blue)	0.68(sky blue)	0.68(sky blue)	-
R _{f-6}	0.72(brown)	0.72(brown)	0.72(brown)	-
R _{f-7}	0.78(sky blue)	0.78(sky blue)	0.78(sky blue)	-
R _{f-8}	0.80(red)	0.80(red)	0.80(red)	-
R _{f-9}	0.92(pink)	0.92(pink\)	0.92(pink)	-
	After derivatization			
	Day Light		At visible light	
	Track-A (Extract-Methanol)	Track-B (Extract-Ethanol)	Track-C (Extract-Benzene)	Track- D (Extract-Chloroform)
R _{f-1}	0.08(light black)	0.08(light black)	0.08(light black)	-
R _{f-2}	0.30(light black)	0.30(light black)	0.30(light black)	-
R _{f-3}	0.50(light black)	0.50(light black)	0.50(light black)	-
R _{f-4}	0.60(black)	0.60(black)	0.60(black)	-
R _{f-5}	0.70(brownish black)	0.70(brownish black)	0.70(brownish black)	-
R _{f-6}	0.72(brownish black)	0.72(brownish black)	0.72(brownish black)	-
R _{f-7}	0.78(brownish blue)	0.78(brownish blue)	0.78(brownish blue)	-
R _{f-8}	0.92(black)	0.92(black)	0.92(black)	-

Fig 1-Where Track A: Methanol extract; Track B: Ethanol extract; Track C: Benzene extract; Track D: Chloroform extract



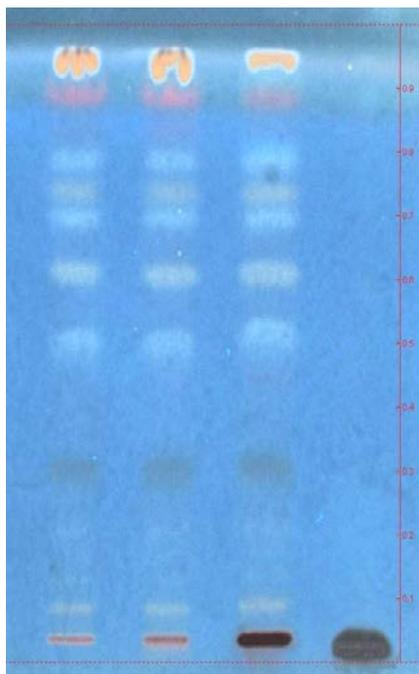
A B C D

At 254nm before derivatization



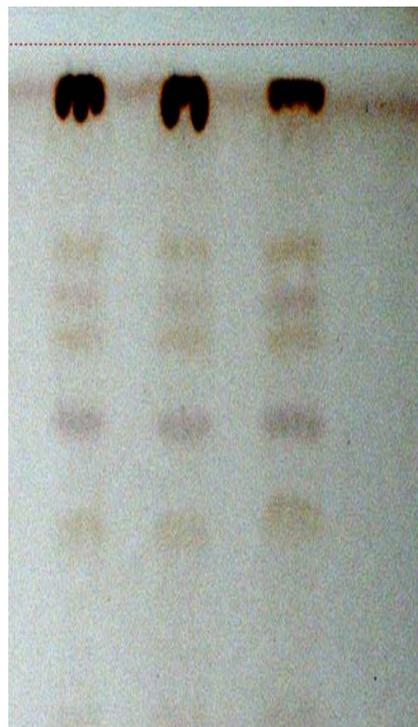
A B C D

At 366nm before derivatization



A B C

D
At 366nm after derivatization



At day light after derivatization

2. Antioxidant activity of *Aloe vera* extract using DPPH methods

The free radical scavenging capacity of the extracts of *Aloe vera* was determined using TBARS method and the data was furnished in Table 5. The stock solution of *Aloe vera* extract was prepared at the concentration of 10 mg/ml. Extent of hydroxyl radical scavenging activity was determined by decreased intensity of pink colored chromospheres in the form of IC 50 values which was determined at 532 nm. Lower IC 50 value represents higher antioxidant activity. The dose dependent inhibition of TBARS formation at the different concentration of *Aloe vera* extract ranging from 100 mg/ml to 1,000 mg/ml was studied. The Ascorbic acid was used as positive control. The IC 50 values of Ascorbic acid and of *Aloe vera* extract was found to be 40 µg/ml and 60µg/ml, respectively.

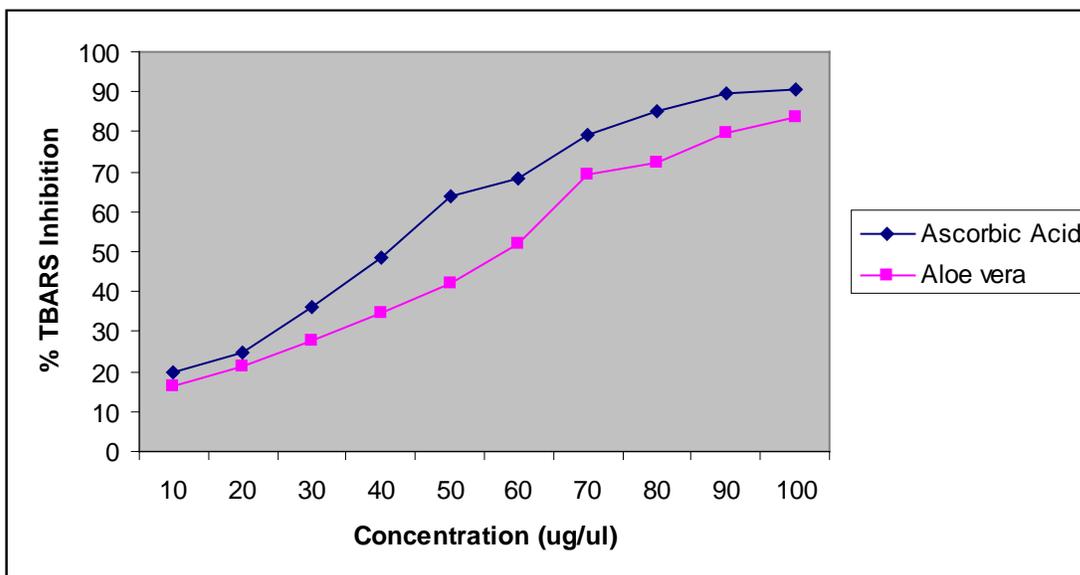


Table 4:- Antioxidant Activity of *Aloe vera*

S.No.	Concentration (ug/ ul)	Ascorbic Acid	<i>Aloe vera</i> Extract
1.	10	19.66	16.34
2.	20	24.85	21.09
3.	30	36.14	27.92
4.	40	48.41	34.75
5.	50	63.86	42.18
6.	60	68.21	51.88
7.	70	79.00	69.40
8.	80	85.35	72.17
9.	90	89.70	79.60
10.	100	90.69	83.66

3. Micronucleus assay

Single application of *Aloe Vera* ext. at the dose of 125 , 250 and 375 mg/kg b.wt.,24hours prior the i.p. administration of Cyclophosphamide (at the dose of 50 mg/kg) have significantly prevented the micronucleus formations in bone marrow cells of mice as compared to Cyclophosphamide group. It was also observed that single application of *aloe vera* extract at the dose of 250 mg/kg have not significantly induced micronuclei formation as compared to solvent control

Table no: Effect of Aloe Vera Ext. on micronucleus formation in mouse bone marrow cells:

<u>Group</u>	<u>MNPCE + SE RATIO</u>	<u>PCE/NCE RATIO</u>
Cyclophosphamide (50kg/ml)	3.5±1.1	0.99±0.08
Aloe Vera Ext. (125mg/kg body wt) + CP (50 mg/kg)	0.4±0.3	0.25±0.03
Aloe Vera Ext. (250mg/kg body wt)+ CP (50 mg/kg)	0.33±0.18*	0.30±0.01*
Aloe Vera Ext. (375mg/kg body wt)+ CP (50 mg/kg)	0.8±0.9*	0.3±0.1*
Aloe Vera Ext. Alone (250mg/kg body wt)	0.33±0.21	0.948±0.02
Solvent (Water)	0.45±0.03	0.549±0.08

III. DISCUSSION

There is a worldwide belief that herbal remedies are safer and less damaging to the human body than synthetic drugs. Our phytochemical screening of *Aloe vera* gave ideas regarding various secondary metabolites present in leaves. Phytochemical screening of the 50 % methanolic extract of *Aloe vera* showed the presence of Alkaloids, Carbohydrate, Resin, Saponins, Glycoside and Tanins whereas Protein, Starch, Flavonoids and Steroids were absent. Qualitative densitometric HPTLC fingerprint profile of methanolic extract can provide standard fingerprints and can be used as a reference for the identification and quality control of the leaves. The present study will provide the information with respect to identification and authentication of leaves.

Antioxidants are known to exhibit their biochemical effects through numerous mechanisms, including the prevention of chain initiation, reductive capacity and radical scavenging mechanisms. Several methods have been reported to measure the antioxidant activity of biological materials. In the present study, DPPH free radical scavenging activity, superoxide anion radical scavenging activity, ABTS radical scavenging activity, hydroxyl radical scavenging activity, ferric reducing antioxidant power and reducing capacity assessment were done (Deshpande et al. 2007).

Antioxidants help organisms deal with oxidative stress, caused by free radical damage. Free radicals are chemical species which contain one or more unpaired electrons due to which they are highly unstable and cause damage to other molecules by extracting electrons from them in order to attain stability. Medicinal plants often represent the only therapeutic resource for antioxidants. Lipids, proteins and DNA are all susceptible to attack by free radicals (Mondal, 2006). Antioxidants may offer resistance against oxidative stress by scavenging the free radicals, inhibiting lipid peroxidation etc. Our present study shows the antioxidant activity of *Lagenaria siceraria* extracts using DPPH method and it showed promising free radical scavenging property. Ascorbic acid was used as reference standard.

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Analysis of The Impact of Globalization And Mea On Quality-Based Education Planning

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DOI: 10.29322/IJSRP.9.08.2019.p9227

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9227>

ABSTRACT

Globalization has brought fresh air into education in Indonesia because it has inspired stakeholders in education in new breakthroughs and convenience in learning process. However, it also gives impacts that should be immediately stopped in order that the danger does not widely spread. In order to overcome such negative impacts, it is necessary to have a firm attitude, which is by making *Pancasila* as a filter to every external influence and to equip students with morality so that they are not only smart in a particular science. Globalization has positive and negative impacts on education in Indonesia. In order to overcome its negative impacts on education, the quality of education in this country should be enhanced. One of the methods to enhance the quality of education is by managing education using global perspective. Education with global perspective can be divided into two, namely Curricular Perspective and Reformation Perspective. The development of education in Indonesia cannot be separated from globalization in which science and technology has developed rapidly. Free market era is also a challenge to education in Indonesia since it opens opportunities for foreign teachers and institutions to penetrate. Accordingly, policy on national education should be able to improve management of education to be more productive and efficient both in academic and non-academic matters and provide everyone with access for education as widely as possible. Thus, there are three impacts of globalization that may occur in education. First, education would become a commodity and commercial object as the neoliberalism spreads across the world. Second, the control of education from the country will be loose. Third, globalization will lead to delocation, changes in technology and educational orientation.

Keywords: ASEAN Economic Community, Education

CHAPTER I INTRODUCTION

A. Background

Globalization can be understood as changes in social and economy, combined with an establishment of unique regional and global interconnection which is more extensive and intensive than the previous period, which challenges and reforms public community and, specifically, modern countries. (Held 2000, 397). These changes involve a number of developments which can be considered as something profound that occurs in present and involves structural transformation. Such changes include human rights regime which ensures that national sovereignty is unable to guarantee a country's legitimacy in international law; environmental shift in the form of global warming due to ozone layer leakage; revolution in communication and information technology which expands its coverage and intensity of all socio-political networking tools both inside and across a nation-state's territorial border; and deregulations of capital markets which strengthen capital authorities by providing them a number of choices to exit from their relation with labor and the state.

Eventually, all the changes have the implications to the capacity of the country in implementing regulations (Held 2000, 398). Nation-states are no longer autonomous in making decision without taking other parties into consideration in regional, national, and even global context. Accordingly, globalization can be regarded as a process which transfigures itself in a transformation of organizational space from 125 relations and social transactions are assessed based on the degree of extensity, intensity, velocity and its impacts which bring transcontinentalism or interregionalism and networking activities, interactions, and exercise of power (Held 1999, 16).

B. Objective

The article aims to analyze the impacts of globalization and ASEAN Economic Community on planning the Quality-based Education in Indonesia.

C. Benefits

The benefits of the article are as follows:

1. This article can be a reference in developing science related to globalization and improvement of education quality.
2. This article can enlarge author's knowledge of globalization and improvement of education quality.

CHAPTER II DISCUSSION

A. Definition of Globalization

The term 'globalization' was first used by Theodore Levitt in 1985, which referred to politics-economy, especially free market politics and financial transaction. Historically, globalization appeared as a result of electronics revolution and disintegration of communist countries. The term 'globalization' itself is taken from the word 'global', meaning universal. It means that the scope of globalization covers the whole world. According to John Huckle, globalization is a process in which an event, a decision, or an activity in a part of the world becomes a significant consequence to individuals and society in a distant location. Meanwhile, Priyono Tjiptoherjanto argues that the concept of globalization is basically referred to the concept of borderless world. Based on this argument, globalization can be defined as a process of human integration with all aspects into a bigger unity of society.

One of the myths of globalization is that it may make the world stand for uniformity. The process of globalization will remove the identity of a nation. It is supported by a statement that, "As a process, globalization occurs through two dimensions in an interaction between nations: dimensions of space and time. Space is narrowed and time is shortened in a world-scale." (Sujiyanto, 2007:97) Therefore, some parties use globalization to refer to the decreased role or border of country.

B. Globalization and Education

1. Traditional Teaching-Learning Process: Teacher as the Centre of Science.

Education at school in the past meant teacher. The teacher acts as the center or main source in education. Even Sayling Wen said that, "a teacher can influence one's student's thought, point of view and behavior throughout his life." (Sayling Wen, 2003:100). However, since globalization entered countries in the world, including Indonesia, the position of teacher has shifted. Teacher is no longer the center of education. The development of science and technology has made changes in almost all aspects of life in which various problems can be only solved by mastering and enhancing science and technology.

2. Students are required to be active in the teaching-learning process.

The different era would require different skill and specialization of individuals. Agricultural era is an era when people worked so hard to make a living through physical works. Industrial era required standardization and did not emphasize quality or talent of individuals. However, Internet era, like nowadays, is an era which liberates qualities of people which was oppressed in the industrial era. As a result, the education system needs changing. Otherwise, learning at school would be in vain without any clear purpose and goal. Therefore, new revolutions in education system has been applied in education system in Indonesia, including changing curriculum from the 1994 curriculum, teacher as the center of learning process to Competent-Based Curriculum and School-Based Curriculum through the implementation of Active Student Learning, in which students are involved in the teaching-learning process.

3. Material Delivery with the help of computer

Globalization has impact and effect on the education system in Indonesia. Such impacts can be both positive and negative. One of the positive impacts is Multimedia Interactive Learning. As a result of globalization, the development in technology changes the pattern of teaching in the education system. The classical teaching has changed into new technology-based teaching such as using the internet and computer.

In the past, teachers wrote on the blackboard using a chalk, once in a while they would make a simple drawing or made sounds and used other simple media to deliver knowledge and information to their students. Nowadays, the availability of computers makes writing, film, sounds, music and motion pictures possible to be combined as a process of communication.

4. Student-oriented learning system: Students are taught to find concepts by themselves.

In regard to the phenomenon of balloon or spring, we can see that power can change the shape of an object. In the past, when a teacher explained about how power could change the shape of an object without using any media to explain, the students might be hard to understand what the teacher had explained. The teacher obviously would teach with examples, but listening is not as effective as seeing directly. Levie and Levie (1975) in Arsyad (2005), who reviewed previous studies of learning through word, visual and verbal stimuli, conclude that visual stimulus produces better learning results such of memorizing, recognizing, recalling and connecting facts to concepts.

Changes in Pattern of Education: The government has started to lose power control over education. Demand for competition and pressure from global institutions such as IMF and World Bank make politicians and policymakers compromise to make a change. The amendment of the 1945 Constitution of the Republic of Indonesia, Law of the National Education System and Government Regulation Number 19 of 2005 concerning National Education Standards have made changes in education paradigm from centralized to decentralized one. Schools or other educational institutions have rights to create their own curricula if they find fit with the character of their schools. Convenience in Accessing Information. The convenience of accessing information in education is as a result of the rapid development of globalization such as the internet which help students access any kind of information and knowledge and share information to one student to another especially for those who live far to each other.

Student-oriented Learning.

In the past, the curriculum was based on the progress of the teacher, but now curriculum is based on the progress of the student. Initiated in 2004 Competence Based Curriculum was a start made by the government to actively involve students in the learning process. It was then followed by School-Based Curriculum. In the class, students are required to be active in the learning process. In the past, teachers were the ones who take the authority as if they were making a speech in front of the class while the students would only listen and take notes. Now, students are allowed to express their ideas through a presentation. In addition, students are not only able to memorize, but also able to find concepts and facts by themselves.

5. Negative Impacts of Globalization on Education in Indonesia

The commercialization of education

Globalization era threatens purity in education. Many schools are established for business purposes. On his book entitled "A Perfect Future ", John Micklethwait tells about a story of business competition that starts penetrating education in which education corporations come to use 'back to the future' approach. One of the characteristics is the spirit of testing students a la Victoria which made Mr. Gradgrind happy in one of the Dickens' works. Those companies have to prove that they bring good result not only for students, but also for stakeholders. (John Micklethwait, 2007:166). In 2008, there was a case in UTS campus which indicated the deterioration of noble values in education. College degree could be earned with such an easy way without having to go through a learning process in accordance with prevailing procedure. Competing in offering breakthroughs in education, exclusive private schools are established for business purposes only because they demand considerable amount of money.

a. Danger of Cyber world

In addition to a means of accessing information, cyber world also has negative impact on students. There are a lot of negative contents on the internet such as pornography, bullying, racism, violence, and so forth. News about pedophilia and sexual harassment could be easily accessed by anyone, including students. Things such as Viagra, alcohol and drug are offered through the internet. For example, on October 6, 2009, there was a news about a girl in East Java who left during class to meet a man she knew via "Facebook". This is really dangerous for the learning process. The dependence on machines that run globalization such as computer and internet could make students and teachers addicted. As a result, teachers and students do not look enthusiastic when they do not use those media in the learning process. As previously discussed, globalization is inevitable. It always carries two different sides, which are positive impact and negative impact. The positive impact could be taken to improve education in Indonesia, while the negative impacts should be eliminated and reduced because it would be hard to completely avoid and reject them. In order to deal with negative impacts of globalization on education in Indonesia, it is necessary to have a firm attitude from education community, one of which is making Pancasila as the reference. In addition to being an ideology, Pancasila also serves as a filter. The influences that come from foreign countries will be filtered. Such influences are classified into two categories. The first category is the category that is suitable to Indonesian character and personality. This category will be received and developed in order to make the category really fit for Indonesian character and personality. The second category is the category that is not suitable with Indonesian character and personality so that it is necessary to reduce their potential danger for Indonesia. Making moral subjects as compulsory subjects. Subjects that give moral debriefing and moral improvement (such as religious subject, Pancasila and civic education subject) should become compulsory subjects while making a curriculum so that students would not only be proficient on general knowledge or on other special knowledge, but also have good manner and moral that is reflected in what they do and what they say.

I. ASEAN Economic Community (AEC) and Good Quality Education

AEC is a form of economic integrity of ASEAN in which there is a free trade system among ASEAN countries. Indonesia and other 9 ASEAN countries agreed on AEC treaty on ASEAN Summit held in Kuala Lumpur in December 1997. ASEAN leaders decided to create stable, prosperous, and highly competitive ASEAN Economic Region with equitable economic development and reduce poverty and socio-economic disparities (ASEAN Vision 2020). In the 12th ASEAN Summit in January 2007, they emphasized their full commitment to accelerate the establishment of ASEAN community in 2015 as put forward in ASEAN Vision 2020 and ASEAN Concord II, and signed Cebu Declaration on the acceleration of the Establishment of ASEAN Community in 2015. Indonesia was currently preparing for the 2015 ASEAN Economic Community (AEC). The impact of AEC is free trade market in capital, goods and services, investment, and skilled workers. Therefore, the aims of the ASEAN Economic Community (AEC) are enhancing economic stability and expected to be able to deal with economic problems within ASEAN countries. ASEAN is the third biggest economic power after Japan and China, which consisting of 10 countries, namely Indonesia, Malaysia, Philippine, Singapore, Thailand, Brunei Darussalam, Vietnam, Laos, Myanmar, and Cambodia.

ASEAN Economic Community (AEC) was established based on the agreement of ASEAN leaders in ASEAN Summit in December 1997 held in Kuala Lumpur, Malaysia. The agreement was aimed to enhance ASEAN competitiveness and to compete China and India to attract foreign investments. Foreign capital is required to create more job opportunities and enhance prosperity for ASEAN people. In the next ASEAN Summit, held in Bali in October 2003, ASEAN leaders declared that AEC would be established in 2015.

There are some impacts as a consequence of AEC:

1. Free flow goods for ASEAN countries, free flow services, free flow investment, flow of skilled workforces, and free flow capital.
2. Not only the impacts, but there are also obstructions in facing AEC:
 - a) First, low-quality education of workforces. Until February 2014, the number of workforces with junior-high school education or below was about 76.4 million people or 64 percent out of 118 million workforces in Indonesia.
 - b) Second, inadequate infrastructure availability and quality which affects the flow of goods and services.
 - c) Third, vulnerable industrial sectors because of dependency upon imported raw materials and intermediate goods.
 - d) Fourth, limited energy supply.
 - e) Fifth, Indonesia has not been able to deal with import invasion. Currently, imported products from China have been flooding Indonesia.

Ahead of AEC, the Indonesian government is supposed to be able to prepare strategic actions for workforces, infrastructure, and industrial sectors. In the AEC concept, Indonesia is selected to be the host of free trade. Therefore, the government should be ready to prepare infrastructure up to skilled, qualified, and professional human resources. In order to create skilled, qualified, and professional human resources, it is necessary to have quality education. Without quality education, the expectation to create skilled, qualified, and professional human resources will remain an expectation. The competition of workforces in AEC will be very tight. In the free trade market of AEC, Indonesia will receive a flock of foreign workforces and businesspersons from other ASEAN countries. As a matter of fact, the quality of Indonesian human resources is on average below the quality of human resources among ASEAN countries.

Without skilled, qualified, and professional human resources, Indonesia will only create blue-collar workers such as laborers and maids. Similarly, Indonesian businesspersons will become spectators in AEC that will start soon in a few months. This context certainly raises a big question. Can Indonesia be the host at home in a euphoria of AEC free trade that will start at the end of 2015? Meanwhile, to date, Indonesian government gives an unfavorable response to AEC which first was planned to start in 2020. Tight competition between workforces in AEC is inevitable. This is such a new era for Indonesian workforces. Highly competent workforces will have a considerable opportunity in gaining economic advantages. Therefore, to create skilled, high competence, qualified, and professional workforces, education plays a fundamental role in improving the quality of human resources so that they can compete with other workforces among ASEAN countries. In other words, domestic workforces will be eliminated in the competition with those from other ASEAN countries if they are not quality human resources.

According to the data from the Central Bureau of Statistics in 2013, approximately 35,88 million workforces in Indonesia only have primary and non-formal educations. It shows that the Human Development Index (HDI) in Indonesia is still low. Indonesian HDI ranks 111th out of 182 countries in the world. Meanwhile, in ASEAN, Indonesian HDI ranks 6th out of 10 ten countries. The position of Indonesian HDI is still below Philippines, Thailand, Malaysia, Singapore, and Brunei Darussalam. This shows that the quality of human resources in Indonesia has not been competitive yet. Therefore, human resources in Indonesia should be improved at least equal to those from other ASEAN countries so that they are ready for AEC and not only have opportunity to be laborers. Due to such low quality of human resources, Indonesia is deemed not ready for AEC. They need to be improved and strengthened through various skills. Skilled manpower is more prioritized than educated manpower. Educated manpower without adequate competence will be eliminated by those who are skilled and well-trained.

The importance of the Socialization of ASEAN Economic Community

Government is required to socialize AEC to public. Education and training should be held based on their characters such as hard skill and soft skill education. For example, a training of use foreign language. People also need entrepreneurship training especially who manage small medium enterprise in order to play a significant role in AEC. The most important step is to improve higher education in Indonesia so that universities in Indonesia can produce qualified graduates with international quality and professional skills. They should also possess language and intercultural skills. Language skill is essential to facilitate communication between manpower in ASEAN. In addition, it is also important to realize that possessing foreign language skill for business must not eliminate their identity of Indonesian language. Government should establish limitations of the use of foreign languages in Indonesia. They are not always necessary to be used in public.

For example, Malaysia, the neighboring country, has been massively affected by English language. However, Malaysia government has established strict policy to when the language could be used. For daily life, the government orders the society to speak their mother tongue, Malay. As a result, they still maintain their national despite using foreign language. This should be of great concern to Indonesian government. Although the ability of using foreign language is relatively low, it does not mean that Indonesian people fall behind. Therefore, it is expected that education plays a considerable role in facing AEC through formal, non-formal, and informal education. Inevitably, AEC will create impact for Indonesian citizens to achieve competence so that they can compete with other countries in ASEAN.

Strengthening Indigenous Culture

Indonesian people will encounter international interaction. Certainly, many foreign cultures will enter Indonesia. Indonesian people should be able to filter those cultures if they are negative. Therefore, it is necessary to prepare a character of Indonesia through moral education. In informal education, the role of parents and family is

required to protect Indonesian youths from moral damage. To strengthen character of the youths, training about culture and moral should be held to prepare them to face AEC in the end of 2015. It also becomes a protection from foreign culture which could eliminate Indonesians identity. By reorganizing education system in Indonesia to be better, appropriate, and qualified, it is expected that Indonesian youth generation is able to face AEC which would be applied in 2015.

Moreover, AEC does not only open trade flow in goods and services, but also market for professional manpower, such as doctors, lawyers, accountants, and so forth. Consequently, Indonesia should increase qualified manpower at home and abroad in order to prevent the invasion of foreign skilled manpower. One of the big challenges for national education is raising collective awareness that Indonesians should endeavor to achieve and compete with other countries in many aspects, one of which is competent human resources. The quality of human resources is determinant of success of development and progress of a country. Manpower from AEC countries who possess more job competence would certainly have wider opportunity to acquire economic benefits in AEC. To welcome AEC in terms of education, there are several important things to prepare:

1. Skills

It is required for Indonesians to have skills so that they can compete with foreign human resources. Therefore, skills must be possessed. People should not only accept the current results, but also have to possess all skills. If they do not have skills, Indonesians will only become consumers in their own country. For those who are in productive age, qualified skills are required to compete in ASEAN countries.

2. Knowledge

Knowledge is the second important aspect to face ASEAN Economic Community. It is essential to reinforce competence in particular fields and to stay focus upon works. Therefore, each person needs to master at least one of the disciplines, for example general practitioners. It would be better for general practitioners, or doctors who do not specialize in one particular area of medicine, to proceed to medical specialists, or doctors who have undertaken specialized medical studies, so that they would be able to focus upon one specific area of medicine. Not only does this apply to doctors, but also applies to other people working on different fields.

3. Experience

Experience is the last aspect to face ASEAN Economic Community. It is said that experience is a ladder to success. Successful people should have numerous organizational and working experience. To put it in a nutshell, if 200 university graduates in Indonesian Language and Literature whose GPA is 3.5 on average apply for a job at educational institutions, those who will probably be shortlisted are those who have a lot of experience from their former universities. University graduates who were engaged in many organizations tend to have considerable experience, outstanding leadership, and increasing maturity. As Indonesian citizens, we need to develop these three qualities to be able to compete in the ASEAN Economic Community. Otherwise, we will only become spectators in our home country.

CHAPTER III CONCLUSION

A. Conclusion

Globalization is a gradual process which is indicated by indistinct state borders. The world looks like a housing complex in which information can spread very quickly. Not only does globalization appear in economic, technology, communication, transportation and political sector, but it is obvious to occur in education sector as well. Globalization inspires education community to achieve significant breakthrough and provide easy access to education. However, it has negative effects which should be prevented from spreading widely. One of the ways to prevent the negative effects of globalization is increasing the values of Pancasila to separate foreign influence out and to provide moral provisions to students because they need to be smart as well as having excellent moral character. Upon education, globalization has both positive and negative effects. To overcome the negative effects of globalization, it is necessary to improve the quality of education. It can be achieved by managing education considering global awareness and perspective. There are two types of global perspective in education: (1) curricular perspective; and (2) reformation perspective. The development of education in Indonesia cannot be separated from the influence of globalization in which science and technology grow rapidly. In addition to globalization, free market also emerges as a challenge to education in Indonesia since it provides opportunity for overseas educational institutions and teachers to come to Indonesia. Hence, policies should be made in order to face global market, some of which are (1) improving the quality of education, both academically and non-academically; (2) setting up more productive and more efficient management of education; and (3) providing considerable amount of opportunities for people to access education. There would be at least three effects of globalization in education sector. First, education would be a commodity and a commercial object as neoliberalism get stronger in the world. Second, the state would no longer have absolute control over education. Third, globalization would stimulate delocation, technology changes and educational orientation.

One of the most important things that our nation needs to prepare is experienced human resources because the quality of human resources determines success and development of a country. Manpower from ASEAN Economic Community countries who demonstrate great competence may get more opportunity for economic benefits from the community. In terms of education, there are several things that should be prepared. First, every citizen of the Republic of Indonesia should have considerable skills so that they will be able to compete with foreign citizens. Second, every citizen

should also acquire comprehensive knowledge relating to their chosen field. Comprehensive knowledge may support them in maintaining their focus. Third, Experience is the last important thing that needs to be prepared for it is said that experience is a ladder to success. Successful people should have numerous organizational and working experience. Indonesian citizens should develop these three qualities to be able to compete in ASEAN Economic Community. Otherwise, we will only become spectators in our home country.

B. Suggestions

The government of the Republic of Indonesia may take major steps in finding problems as well as offering solutions about education in Indonesia, one of which is providing excellent yet affordable education. Some regions in the Republic of Indonesia have provided free-tuition excellent education, but this regulation applies only to certain areas. Therefore, the Central Government of the Republic of Indonesia should also put the regulation into operation on a national scale. The Central Government, however, should eliminate unnecessary bureaucracy and corruption because they are two among other things that could put an end to our nation. Mohammad Nuh, the former Minister of Education of the Republic of Indonesia, said that education should outlaw discrimination emerging out of social gap between the rich and the poor because of distinctive factors between communities in cities and rural areas which prevented them from pursuing education (kompas.com, 3 November 2009). This should be implemented as soon as possible to fulfil the rights of every citizen of the Republic of Indonesia to get proper education and to encourage educational institutions to take low price methodologies and curricula into consideration.

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A Proof of Sendov's conjecture for Polynomials of degree Ten

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DOI: 10.29322/IJSRP.9.08.2019.p9228
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9228>

Abstract This paper is on the proof of the Sendov's conjecture for polynomials of degree 10. Sendov's conjecture deals with the location of roots and critical points of polynomials of complex variables. To prove it for polynomials of degree 10 is the central part of the paper.

Subject classification code (MSC 2010):30C15

Index Terms- Extremal Polynomials, Critical points, Derivatives, Complex Polynomials

I. INTRODUCTION

P_n is monic Polynomial of degree $n \geq 2$ of the form $p(z) = \prod_{k=1}^n (z - z_k)$, $|z_k| \leq 1$ ($k = 1, 2, \dots, n$) With
 $p'(z) = n \prod_{j=1}^{n-1} (z - \zeta_j)$, $|\zeta_j| \leq 1$ ($j = 1, 2, \dots, n-1$)

Write $I(z_k) = \min_{1 \leq j \leq n-1} |z_k - \zeta_j|$, $I(p) = \max_{1 \leq k \leq n} I(z_k)$ and $I(P_n) = \sup_{p \in P_n} I(p)$

It was showed By Brown that there exists an extremal polynomial p_n^* , i.e., $I(p_n) = I(p_n^*)$ and that p_n^* has at least one zero on each sub arc of the unit circle of length π

It is enough to prove the Sendov conjecture assuming p is an extremal polynomial of following form

$$p(z) = (z-a) \prod_{k=1}^{n-1} (z - z_k), |z_k| \leq 1 \quad (k = 1, 2, \dots, n-1)$$

Sendov's conjecture

If $P(z) = \prod_{k=1}^n (z - z_k)$ is a polynomial with all its zero's inside the closed unit disk then each of the disks $|z - z_k| \leq 1$ ($k = 1, 2, \dots, n$) must contain zero of p' With

$$p'(z) = n \prod_{j=1}^{n-1} (z - \zeta_j), |\zeta_j| \leq 1 \quad (j = 1, 2, \dots, n-1) \quad a \in [0, 1]$$

Let $r_k = |a - z_k|$, $\rho_j = |a - \zeta_j|$ for all $k, j = 1, 2, 3, \dots, n-1$

We suppose $\rho_1 \leq \rho_2 \leq \dots \leq \rho_{n-1}$ and $r_1 \leq r_2 \leq \dots \leq r_{n-1}$

We have form [3]

$$2\rho_1 \sin\left(\frac{\pi}{n}\right) \leq r_k \leq 1 + a, \quad k = 1, 2, \dots, n-1.$$

Theorem for $n=10$

The polynomial $p(z)$ has a critical point in the disk $|z-a| \leq 1$

In this paper we assume that $z_k \neq a$ for $k=1, 2, 3, \dots, n-1$ and $p(z)$ is the extremal form

$$I(p_n) = I(p) = I(a) = \rho_1$$

In this paper we need to prove the theorem for $a > 0.845$

1. Lemmas from references

In this section I will present few lemmas but not the proof as the proofs are present in the reference given in the reference section

Lemma 1

If $1 - (1 - |p'(0)|)^{1/n} \leq \lambda \leq \sin\left(\frac{\pi}{n}\right)$ and $\lambda < a$, $\rho_1 \geq 1$ then there exist a critical point $\zeta = a + \rho_0 e^{i\theta}$ such that

$$\operatorname{Re} \zeta^0 \geq \frac{1}{2} \left(a - \frac{\lambda(\lambda+2)}{a} \right).$$

Proof: Theorem 1 of [2]

Lemma 2

For $\rho > 0$ we have

$$\prod_{r_k \geq \rho} r_k \rho^{-1} \leq \prod_{\rho_k \geq \rho} \rho_j \rho^{-1} \prod_{2 \sin \frac{\pi k}{n} \geq 1} 2 \sin \frac{\pi k}{n}$$

This is theorem 3 of [2] by taking m=1

Lemma 3

If $c_k [k=1,2,\dots,N]$ m,M,c are positive constants with $m \leq c \leq M$, $\prod_1^N r_k \geq$ and $m^N \leq c \leq M^N$ then

$$\sum_{k=1}^N \frac{1}{r_k^2} \leq \frac{N-v}{m^2} + \frac{v-1}{M^2} + \left\{ \frac{m^{N-v} M^{v-1}}{c} \right\}$$

Proof: Lemma B of [2]

Lemma 4

$$\prod_{k=1}^{n-1} r_k = n \prod_{j=1}^{n-1} \rho_j$$

Proof: see [3]

Throughout this paper we let

$$\gamma_j = \frac{\zeta_j - a}{a \zeta_j - 1} \quad w_k = \frac{z_k - a}{a z_k - 1}$$

Now we take the assumption, the general form of assumption can be written as

$$\prod_{j=1}^{n-1} |\gamma_j| \leq \frac{\prod_{k=1}^{n-1} |w_k|}{n - \frac{4a^2}{1+a^2} - a \sum_{k=1}^{n-3} R e w_k}$$

For n=10 the assumption becomes

$$\prod_{j=1}^{n-1} |\gamma_j| \leq \frac{\prod_{k=1}^{n-1} |w_k|}{n - \frac{4a^2}{1+a^2} - 7a}$$

This assumption holds which can be checked easily

Next lemma is the last lemma in the reference Lemma section I have skipped Lemma 5 which will be presented in next section

Lemma 6: If

$$|\gamma_j| < \frac{1}{1+a+a^2} \text{ then } \rho_j \leq 1$$

Proof: see Lemma 1 of [4]

We can write Lemma 6 as

$$\prod_{j=1}^M |\gamma_j| < \frac{1}{(1+a+a^2)^M}$$

2. Lemmas with proof

Lemma 5: $\rho_1 > 1$, $\zeta_0 = a + \rho_0 e^{i\theta_0}$ is the critical point in Lemma 1

$$\gamma_0 = \frac{\zeta_0 - a}{a \zeta_0 - 1} \text{ then}$$

$$|\gamma_0| > \frac{1}{\sqrt{1+\lambda(\lambda+2)-a^2\lambda(\lambda+2)}}$$

Proof:

$$|\gamma_0|^2 = \frac{\rho_0^2}{a^2|\zeta_0|^2 - 2a\operatorname{Re}\zeta_0 + 1}$$

$$\operatorname{Re}\zeta_0 \geq \frac{1}{2}\left(a - \frac{\lambda(\lambda+2)}{a}\right) \text{ hence}$$

$$\rho_0 \cos\theta_0 \geq \frac{-1}{2}\left(a + \frac{\lambda(\lambda+2)}{a}\right)$$

$$|\gamma_0|^2 = \frac{\rho_0^2}{a^4 - 2a^2 + 1 + a^2\rho_0^2 + 2a(a^2 - 1)\rho_0 \cos\theta_0}$$

$$|\gamma_0|^2 = \left|\frac{\zeta_0 - a}{a\zeta_0 - 1}\right|^2$$

$$|\gamma_0|^2 = \frac{\rho_0^2}{a^4 - 2a^2 + 1 + a^2\rho_0^2 + 2a(a^2 - 1)\rho_0 \cos\theta_0} \geq \frac{\rho_0^2}{a^4 - 2a^2 + 1 + a^2\rho_0^2 + (1 - a^2)(a^2 + \lambda(\lambda + 2))} \geq \frac{1}{1 + \lambda(\lambda + 2) - a^2\lambda(\lambda + 2)}$$

$$|\gamma_0|^2 > \frac{1}{1 + \lambda(\lambda + 2) - a^2\lambda(\lambda + 2)}$$

Which proves the above lemma

Lemma 7

If $a \in [0.846, 1]$ and there exist $|z_k| \leq 0.56$ then $I(a) = \rho_1 \leq 1$

Proof: If $I(a) > 1$ and there exist $|z_k| \leq R$ then by then by above equation and lemma 5 there exists some γ_{j_0}

$$\frac{|\gamma_{j_0}|^8}{\sqrt{1 + \lambda(\lambda + 2) - a^2\lambda(\lambda + 2)}} \leq \prod_{j=1}^9 |\gamma_j| \leq \frac{B}{10 - \frac{4a^2}{1+a^2} - 7a}$$

Hence

$$|\gamma_{j_0}|^8 \leq \frac{\sqrt{1 + \lambda(\lambda + 2) - a^2\lambda(\lambda + 2)}}{9 - \frac{4a^2}{1+a^2} - 7a} B$$

By lemma 6 it suffices to show

$$\left(10 - \frac{4a^2}{(1+a^2)} - 6a\right) \frac{aR+1}{R+a} - \sqrt{1 + (1 - a^2)\lambda(\lambda + 2)} (1+a-a^2)^8 \geq 0$$

Considering following condition for λ

$$p(0) = a \prod_{k=1}^9 |z_k| \leq aR$$

$$1 - (1 - |p(0)|)^{\frac{1}{10}} \leq \lambda \leq \sin\left(\frac{\pi}{10}\right)$$

$$\lambda = 1 - (1 - aR)^{\frac{1}{10}}$$

And R satisfies $R \leq a^{-1}(1 - (1 - \sin(\pi/10))^{10})$

=

We have

$$\frac{p'(0)}{p(0)} = -\left(\frac{1}{a} + \sum_{k=1}^9 \frac{1}{z_k}\right)$$

$$\text{And } 10 \prod_{j=1}^9 |\zeta_j| = \left(a \prod_{j=1}^9 |z_k|\right) \left|\frac{1}{a} + \sum_{k=1}^9 \frac{1}{z_k}\right|$$

$$\text{Let } \Delta = \operatorname{Re} \left(\frac{1}{a} + \sum_{k=1}^9 \frac{1}{z_k} \right) \sigma = \sum_{k=1}^9 \frac{1}{r_k^2}$$

$$\text{Then } 10 \prod_{j=1}^9 |\zeta_j| \geq -a \prod_{k=1}^9 |z_k|$$

Lemma 8

If $\rho_1 > 1$, $a \in [0.846, 1]$ and $|z_k| \in [0.56, 1]$ $k=1, \dots, 10$ then

$$\Delta \leq \frac{-9}{8} + 9a + \frac{10}{9} (1 - a^2) \sigma$$

Proof: $z_k = |z_k|e^{i\theta_k} = a + \rho_j e^{it_j}$ $1 \leq k$ by Lemma 3.2 of [3] we have

$$\Delta = \frac{1}{a} + \operatorname{Re} \sum_{k=1}^9 z_k + \sum_{k=1}^9 \frac{1 - |z_k|^2}{|z_k|} \cos \theta_k$$

$$\Delta = \frac{1 - a^2}{a} + \frac{10}{9} \operatorname{Re} \sum_{j=1}^9 \zeta_j + \sum_{k=1}^9 \frac{1 - |z_k|^2}{|z_k|} \cos \theta_k$$

$$\sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} = 9 + a \sum_{j=1}^9 \frac{\cos \theta_j}{\rho_j}$$

Since $\rho_j > 1$ we deduce $\cos \theta_j \leq 0$

$$\sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} \geq 9 + a \sum_{j=1}^9 \frac{\cos \theta_j}{\rho_j}$$

$$\text{But } \operatorname{Re} \sum_{j=1}^9 \zeta_j = 9a + \sum_{j=1}^9 \rho_j \cos \theta_j \leq 9a + \sum_{j=1}^9 \cos \theta_j$$

Hence

$$\operatorname{Re} \sum_{j=1}^9 \zeta_j = a - \frac{9}{a} + \frac{1}{a} \sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2}$$

And by value of Δ we obtained in the previous equation of this lemma

$$\Delta \leq 9a - \frac{9}{a} + \sum_{k=1}^9 \left(\frac{10 |z_k|^2 - a^2}{9a r_k^2} + \frac{1 - |z_k|^2 \cos \theta_k}{|z_k|} \right)$$

To prove

$$\frac{10 |z_k|^2 - a^2}{9a r_k^2} + \frac{1 - |z_k|^2 \cos \theta_k}{|z_k|} \leq \frac{10}{9} \frac{1 - a^2}{r_k^2}$$

If $\cos \theta_k \leq 0$ above equation is valid

Assume $\cos \theta_k > 0$ and write $x = |z_k|$, $\theta = \theta_k$

Then

$$r_k^2 = a^2 + x^2 - 2ax \cos \theta$$

We want to show

$$x^2 + \frac{9a(1-x^2)(a^2+x^2-2ax\cos\theta)\cos\theta}{10x + \frac{(1-x^2)(a^2+x^2)}{10x^2}} \leq 1$$

It is enough to prove $x^2 + \frac{(1-x^2)(a^2+x^2)}{10x^2} \leq 1$
 For $a \in [0.846, 1]$ $x \in [0.56, 1]$ this is true by Lemma 3.8 of [3] the lemma follows

Lemma 9

Let $m=2/9$, $a \in [0.846, 1]$

$$f(x) = \frac{x^2-1}{(1-x^m)(x+a)^2} \text{ then } f'(x) > 0 \text{ for } x \in [0.56, 1]$$

Proof

$$\text{We have } f'(x) = \frac{Y}{(1-x^m)^2(x+a)^3}$$

$$Y = (m-2)x^{m-1} - mx^{m-1} + 2x)a + mx^{m+2} - (2+m)x^m + 2$$

If $Y=0$ we will obtain $a > 1$ for $x \in [0.56, 1]$ hence $Y \neq 0$ for $a \in [0.846, 1]$ $x \in [0.56, 1]$ when $a=x=0.9$

$Y > 0$ and the Lemma follows

Lemma 10

If $\rho_1 \geq 1$ we have the general form $\prod_{j=1}^{n-1} \zeta_j \leq (\prod_{j=1}^{n-1} \rho_j) [a^2 - 1 + (\frac{2}{n-1}) \{ \sum_{k=1}^{n-1} \frac{|z_k|^2 - a^2}{r_k^2} \}]^{\frac{n-1}{2}}$

For $n=10$ the general form becomes

$$\prod_{j=1}^9 \zeta_j \leq \left(\prod_{j=1}^9 \rho_j \right) [a^2 - 1 + \binom{2}{9} \left\{ \sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} \right\}]^{\frac{9}{2}}$$

Applying the following identities

$$\sum_{j=1}^{n-1} \frac{1}{a - \zeta_j} = \sum_{k=1}^{n-1} \frac{2}{a - z_k}$$

Let $r_k = |a - z_k|$ and $\rho_j = |a - \zeta_j|$ for $k = 1, 2, 3, \dots, n - 1$

$$\operatorname{Re} \left\{ \frac{1}{a - w} \right\} = \frac{1}{2a} - \frac{|w|^2 - a^2}{2a|a - w|^2}$$

It can be easily verified that this is true

$$\sum_{j=1}^9 \frac{a^2 - |\zeta_j|^2}{\rho_j^2} = 9 + 2 \sum_{k=1}^9 \frac{a^2 - |z_k|^2}{r_k^2}$$

And since $\rho_j \geq 1$ for $j=1, 2, 3, \dots, n-1$

$$\sum_{j=1}^9 \frac{|\zeta_j|^2}{\rho_j^2} \leq 2 \sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} - 9(1 - a^2)$$

Apply Arithmetic geometric inequality

$$\prod_{j=1}^9 \frac{|\zeta_j|}{\rho_j} = \left(\prod_{j=1}^9 \frac{|\zeta_j|^2}{\rho_j^2} \right)^{\frac{1}{2}} \leq \left[\left(\frac{1}{9} \sum_{j=1}^9 \frac{|\zeta_j|^2}{\rho_j^2} \right)^9 \right]^{\frac{1}{2}} \leq \left[\frac{2}{9} \sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} - (1 - a^2) \right]^{\frac{9}{2}}$$

$$\prod_{j=1}^9 \zeta_j \leq \left(\prod_{j=1}^9 \rho_j \right) [a^2 - 1 + \binom{2}{9} \left\{ \sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2} \right\}]^{\frac{9}{2}}$$

Hence the Lemma is proven

We will use the condition given below

$$\frac{x^2 - 1}{(1 - x^m)(x + a)^2} + (1 - a^2) \left(\sigma - \frac{9}{2} \right) \leq 0$$

$x \in [0.56, 1]$ and $a \in [0.85, 1]$

Lemma 11

If $\sigma > 9/2$ $\rho_1 > 1$ above condition holds with $m=2/9$

And $z_k \in [0.56, 1]$ $k=1, 2, 3, \dots, 9$ then

$$\frac{9}{2} \left(9 - \frac{10}{9} \sigma \right) (1 - a^2)^{-3} \leq \left(\sigma - \frac{9}{2} \right)^{\frac{9}{2}} 10 \sum_{j=1}^9 \rho_j$$

Proof

By lemma 8 and 10

$$(9 - 9a^2 - \frac{10}{9}(1 - a^2)\sigma) \sum_{k=1}^9 |z_k| \leq 10(\prod_{j=1}^9 \rho_j) [a^2 - 1 + (\frac{2}{9})\{\sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2}\}]^{\frac{9}{2}}$$

Write
 Write $x=|z_k|$, $z_k=xe^{i\theta}$

$$\Phi = a^2 - 1 + (\frac{2}{9})\{\sum_{k=1}^9 \frac{|z_k|^2 - a^2}{r_k^2}\}(\prod_{k=1}^9 z_k)^{\frac{-2}{9}}$$

$$(9 - 9a^2 - \frac{10}{9}(1 - a^2)\sigma) \leq 10(\prod_{j=1}^9 \rho_j) \Phi^{\frac{9}{2}}$$

$$\alpha = a^2 + x^2 - 2ax\cos\theta$$

$$\alpha = a^2 - 1 + \frac{2}{9} \sum_{l \neq k} \frac{|z_l|^2 - a^2}{r_l^2}$$

We will show $\alpha + \frac{2(x^2 - a^2)}{9} x^{\frac{-2}{9}} \leq \alpha + \frac{2(1 - a^2)}{9r_k^2}$ that is

$$\frac{x^2 - x^m}{1 - x^m} - a^2 + 4\alpha r_k^2 \leq 0$$

Since

$$\alpha \leq a^2 - 1 + \frac{1}{4} \sum_{l \neq k} \frac{1 - a^2}{r_l^2} \leq a^2 - 1 + \frac{2}{9}(1 - a^2)\sigma - \frac{2(1 - a^2)}{9r_k^2}$$

And $r_k < a+x$ it is sufficient to have $\frac{x^2 - 1}{(1 - x^m)(x+a)^2} + (1 - a^2)(\sigma - \frac{9}{2}) \leq 0$

For $\sigma > \frac{9}{2}$ we obtain $\alpha + \frac{2(x^2 - a^2)}{9} x^{\frac{-2}{9}} \leq \alpha + \frac{2(1 - a^2)}{9r_k^2}$

Applying above equation 9 times we have

$$\Phi \leq \frac{2(1 - a^2)(\sigma - \frac{9}{2})}{9}$$

Using inequality $(9 - 9a^2 - \frac{10}{9}(1 - a^2)\sigma) \leq 10(\prod_{j=1}^9 \rho_j) \Phi^{\frac{9}{2}}$

The lemma follows

$$\mu^*(a) \leq U^*(a)$$

$$\mu^*(a) \equiv \sum_{k=1}^{n-1} \frac{1}{r_k^2}$$

$$R_k = r_k \prod_{j=1}^{k-1} r_j^{-\frac{1}{9}} \text{ for } k = 1, 2, \dots, n - 1$$

$$U^*(a) = (9 - v^*) \left(\frac{2\sin \frac{\pi}{10}}{1+a}\right)^{-16} + (v^* - 1) \left(\frac{1+a}{10^9}\right)^{-2} + \left\{ \left(\frac{2\sin \frac{\pi}{10}}{1+a}\right)^{\frac{16}{9}} (9 - v^*) \left(\frac{1+a}{10^9}\right)^{v^*-1} \right\}^2$$

Where $v^* = \min\{j \in \mathbb{Z}; j \geq \lceil \{8 \log \left(\frac{1+a}{2\sin \frac{\pi}{10}}\right)\} (\log \left\{ \frac{(1+a)^{\frac{25}{9}}}{10^9 2\sin \frac{\pi}{9}} \right\})^{-1} \rceil \}$

Lemma 12

If $\rho_1 > 1$ then $\sum_{k=1}^9 \frac{1}{R_k^2} \leq U^*(a)$

proof

We have $\prod_{k=1}^9 R_k = 1$

$$\left(\frac{2\sin\frac{\pi}{10}}{1+a}\right)^{\frac{16}{9}} \leq R_k \leq \frac{1+a}{10^{\frac{1}{9}}}$$

Taking $N=9$ $C=1$ $m=\left(\frac{2\sin\frac{\pi}{10}}{1+a}\right)^{\frac{16}{9}}$ $M=\frac{1+a}{10^{\frac{1}{9}}}$ $C_k=R_k$ in $\sigma \leq U^a$

Where

$$U(a) = (9-v)(2\sin\frac{\pi}{10})^{-2} + (v-1)(1+a)^{-2} + \{(2\sin\frac{\pi}{10})^{9-v}(1+a)^{v-1}10^{-1}\}^2$$

$$v = \min\{j \in \mathbb{Z}: j \geq \log\{10(2\sin\frac{\pi}{10})^{-9}\}\{\log(1+a)(2\sin\frac{\pi}{10})^{-1}\}^{-1}\}$$

Lemma 13

if $\rho_1 > 1$ $\frac{9}{2} < \sigma \leq U(a) < \frac{(n-1)^2}{n}$

$$\frac{9}{2} < \sigma \leq U(a) < \frac{81}{10}$$

$$\frac{\frac{9}{2}U(a) - 9 - \frac{10}{9}U(a)}{U(a) - \frac{9}{2}} \left(\frac{1}{(1-a^2)^3}\right)^{\frac{1}{4}} \leq U^*(a)$$

Let $a \in [0.56, 0.96]$

$$\lim_{x \rightarrow 1-0} \frac{x^2 - 1}{(1-x^m)(x+a)^2} + (1-a^2)\left(\sigma - \frac{9}{2}\right) \leq 0$$

That is $\sigma \leq \frac{9}{2} + \frac{9}{(1+a)(1+a)^3}$ this is true for $\sigma < \frac{81}{10}$

Now by previous lemmas

$$9^{\frac{9}{2}}\left(9 - \frac{10\sigma}{9}\right)(1-a^2)^{-3} \leq \left(\sigma - \frac{9}{2}\right)^{\frac{9}{2}} 10 \prod_{j=1}^9 \rho_j$$

$$9^{\frac{9}{2}}\left(9 - \frac{10\sigma}{9}\right)(1-a^2)^{-3} \leq \left\{10 \prod_{j=1}^9 \rho_j\right\}^{\frac{2}{9}} \sigma - \frac{9}{2} \left\{10 \prod_{j=1}^9 \rho_j\right\}^{\frac{2}{9}}$$

$$\sum_{k=1}^9 \frac{1}{R_k^2} - \frac{9}{2} \left\{10 \prod_{j=1}^9 \rho_j\right\}^{\frac{2}{9}} \leq \left\{U^*(a) - \frac{9}{2}\right\} \left\{10 \prod_{j=1}^9 \rho_j\right\}^{\frac{2}{9}}$$

Using Lemma 11

$$\left[\left(9 - \frac{10\sigma}{9}\right)^{\frac{2}{9}}(1-a^2)^{-\frac{7}{9}} \leq \frac{2}{9}U^*(a) - \frac{9}{2}\left(9 - \frac{10\sigma}{9}\right)^{\frac{2}{9}}(1-a^2)^{-\frac{7}{9}}\left(\sigma - \frac{9}{2}\right)^{-1}\right]$$

Hence the Lemma follows

Proof of theorem

This is the main part of the paper here we prove the sendov conjecture for suppose $n=10$ We want a new upper bound to $U(a)$

$$n_1 = \#\{z_k: r_k < 1\}, n_2 = \#\{z_k: r_k \geq 1\}$$

$$n_1 + n_2 = 10$$

$$q = \prod_{r_k < 1} r_k, \sigma = \sum_{k=1}^9 \frac{1}{r_k^2} = \sum_{r_k < 1} \frac{1}{r_k^2} + \sum_{r_k \geq 1} \frac{1}{r_k^2} = \Sigma A + \Sigma B$$

Where $\Sigma A = \sum_{r_k < 1} \frac{1}{r_k^2}$, $\Sigma B = \sum_{r_k \geq 1} \frac{1}{r_k^2}$

Suppose $\rho_1 > 1$ by using Lemma 13 and the new upper bound of $U(a)$ we will get contradiction

If $\rho_1 > 1$ taking $\rho = 1$ in Lemma 2 we have

$$\prod_{r_k \geq 1} r_k \leq \prod_{j=1}^9 \rho_j \prod_{2\sin\frac{\pi k}{10} \geq 1} 2\sin\frac{\pi k}{10}$$

By Lemma 4

$$10 \leq \prod_{r_k < 1} r_k \prod_{2 \sin \frac{\pi k}{10} \geq 1} 2 \sin \frac{\pi k}{10}$$

Hence

$$q \geq 10 \left(\prod_{2 \sin \frac{\pi k}{10} \geq 1} 2 \sin \frac{\pi k}{10} \right)^{-1} = \left(2 \sin \frac{\pi}{10} \right)^2$$

By Lemma 4 in the sum $\sum B$ we have

$$\prod r_k \geq 9q^{-1}$$

$rk \geq 1$

In the sum $\sum A$, we have

$$\prod r_k = q < 1$$

$rk < 1$

By Lemma 4 and other equations we obtain

$$\prod_{k=1}^9 r_k = 9 \prod_{j=1}^9 \rho_j > 9$$

Then

$$2n^2 \geq (1+a)^2 > 9$$

Hence

$$n_2 \geq 4 \text{ and } n_1 < 4$$

We will consider four subcases for $n_1, a \in [0.846, 1)$.

(i) $n_1 = 0, n_2 = 9$

$$\sum A = 0 = U_A \text{ say}$$

In the sum $\sum B$ We have $1 \leq r_k \leq 1+a$ Hence by Lemma 3

$$\sum B \leq n_2 - v_1 + \frac{v_1 - 1}{(1+a)^2} + \left\{ \frac{(1+a)^{v_1-1}}{10} \right\}^2 = U_B \text{ say}$$

where $v_1 = \min\{j \in \mathbb{Z}: (1+a)^j \geq 10\}$

$$U(a) = U_A + U_B$$

Using the bound of $U(a)$, we get the contradiction to Lemma 13

(ii) $n_1 = 1, n_2 = 8$

$$\sum A = q^{-2} = U_A \text{ say}$$

In the sum $\sum B$ We have $1 \leq r_k \leq 1+a$ Hence by Lemma 3

$$\sum B \leq n_2 - v_1 + \frac{v_1 - 1}{(1+a)^2} + \left\{ \frac{(1+a)^{v_1-1}}{10 q^{-1}} \right\}^2 = U_B \text{ say}$$

where

$$v_1 = \min\{j \in \mathbb{Z}: (1+a)^j \geq 10q^{-1}\}$$

$$U(a) = U_A + U_B$$

Using the bound of $U(a)$, $q \geq 2 \sin \frac{\pi}{10}$ we get the desired contradiction to Lemma 2.13

(iii) $n_1 = 2, n_2 = 7$ or $n_1 = 3, n_2 = 6$

In the sum $\sum A$ We have $2 \sin \frac{\pi}{10} \leq r_k \leq 1+a$ Hence by Lemma 3

$$\sum A \leq \frac{n_1 - v_2}{2 \sin \frac{\pi}{10}} + v_2 - 1 + \left\{ \frac{(2 \sin \frac{\pi}{10})^{n_1 - v_2}}{q} \right\}^2 = U_A \text{ say}$$

Where $v_2 = \min\{j \in \mathbb{Z}: j \geq n_1 - \frac{\log q}{\log(2 \sin \frac{\pi}{10})}\}$

In the sum $\sum B$ We have $1 \leq r_k \leq 1 + a$ Hence by Lemma3

$$\sum B \leq n_2 - v_1 + \frac{v_1 - 1}{(1 + a)^2} + \left\{ \frac{(1 + a)^{v_1 - 1}}{10 q^{-1}} \right\}^2 = U_B \text{ say}$$

where

$$v_1 = \min\{j \in \mathbb{Z}: (1 + a)^j \geq 10q^{-1}\}$$

$$U(a) = U_A + U_B$$

Using the bound of $U(a) q \geq (2\sin \frac{\pi}{10})^2$ we get the desired contradiction

(iv) $n_1 = 4, n_2 = 5$ or $n_1 = 5, n_2 = 4$

In the sum $\sum A$ We have $2\sin \frac{\pi}{10} \leq r_k \leq 1 + a$ Hence by Lemma3

$$\sum A \leq \frac{n_1 - v_2}{2\sin \frac{\pi}{10}} + v_2 - 1 + \left\{ \frac{(2\sin \frac{\pi}{10})^{n_1 - v_2}}{q} \right\}^2 = U_A \text{ say}$$

Where $v_2 = \min\{j \in \mathbb{Z}: j \geq n_1 - \frac{\log q}{\log(2\sin \frac{\pi}{10})}\}$

In the sum $\sum B$ if $q(1 + a)^{n_2} \geq 9$ We have $1 \leq r_k \leq 1 + a$ Hence by Lemma3

$$\sum B \leq n_2 - v_1 + \frac{v_1 - 1}{(1 + a)^2} + \left\{ \frac{(1 + a)^{v_1 - 1}}{10 q^{-1}} \right\}^2 = U_B \text{ say}$$

where

$$v_1 = \min\{j \in \mathbb{Z}: (1 + a)^j \geq 10q^{-1}\}$$

if $(1 + a)^2 < 9$ then $\sum B = 0 = U_B$

$$U(a) = U_A + U_B$$

Using the bound of $U(a) q \geq (2\sin \frac{\pi}{10})^2$ we get the desired contradiction to Lemma 13 and by Lemma 7 we obtain the theorem.

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Mathematical Estimation for Maximum Flow in Electricity Distribution Network by Ford-Fulkerson Iteration Algorithm

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DOI: 10.29322/IJSRP.9.08.2019.p9229

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9229>

Abstract- In this paper, application of the graph theory to handle the function of power flow management will be introduced. Well known Ford-Fulkerson algorithm in graph theory is used to calculate the maximum flow in electricity distribution network. The maximum flow problem is one of the most fundamental problems in network flow theory and has been investigated extensively. The Ford-Fulkerson algorithm is a simple algorithm to solve the maximum flow problem and based on the idea of searching augmenting path from a started source node to a target sink node. It is one of the most widely used algorithms in optimization of flow networks and various computer applications. The implementations for the detail steps of algorithm will be illustrated by considering the maximum flow of proposed electricity distribution network in Kyaukse District, Mandalay Division, Myanmar as a case study. The goal of this paper is to find the maximum possible flow from the source node s to the target node t through a given proposed network.

Index Terms: Flow network, Ford-Fulkerson algorithm, Graph Theory, Maximum flow, Electricity distribution network.

1. INTRODUCTION

The maximum flow problem is a well-studied and widely applicable problem in algorithmic graph theory and optimization [1]. In many fields of applications, graphs theory [2] plays vital role for various modelling problems in real world such as travelling, transportation, traffic control, communications, and various computer applications and so on [3]. Graph is a mathematical representation of a network and it describes the relationship among a finite number of points connected by lines. The maximum flow problem is a type of network optimization problem in the flow graph theory [4]. Electric power distribution is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. Distribution substations connect to the transmission system and lower the transmission voltage to medium voltage ranging between 2 kV and 35 kV with the use of transformers. A flow network is a directed graph where each edge has a capacity and receives a flow as weighted values [5]. In practice, the flow problems can be seen in finding the maximum flows of currents in an electrical

circuit, water in pipes, cars on roads, people in a public transportation system, goods from a producer to consumers, and traffic in a computer network, and so on.

II. RESOURCES AND METHOD

Network flow problems are central problems in operations research, computer science, and engineering and they arise in many real world applications. A simple, connected, weighted, digraph G is called a transport network if the weighted value associated with every directed edge in G is a non-negative number. This number represents the capacity of the edge and it is denoted by c_{ij} for the directed edge from node i to node j in G [6]. We consider a network of electricity distribution system and the case of network of cables having values allowing flows only in one direction. This type of network is represented by weighted connected digraph in which transformers are represented by vertices and lines which given electricity flows through by edges and capacities by weights. To provide the maximum flow from source vertex to sink vertex is one of the most important things in all transmission network. Source vertex is produced flows along the edges of the digraph G and sink vertex is received [2]. The residual graph can be defined by providing a systematic way in order to find the maximum flow. The residual capacity of an edge can be obtained by using the formula $cf_{ij} = c_{ij} - f_{ij}$ and a residual network can be defined by giving the amount of available capacity.

A. Problem Definition

The problem is given by a digraph G and an associated set of flow constraints on the edges of the graph, to find the maximum amount of flow that may travel between a source node s and a sink node t . The maximum flow problems involve finding a possible maximum flow through a single-source to single-sink flow network. The maximum flow problem can be seen as a special case of more complex network flow problems, such as the circulation problem [7]. A flow in a network is a collection of chain flows which has the property that the sum of the number of all chain flows that contain any edge is no greater than the capacity of that edge [8]. The goal is to provide as much flow as possible from s to t in the graph. The flow in any edge is never exceeded its capacity, and for any vertex except for s and t , the flow in to the vertex must equal the flow out from the

vertex. On any edge we have $0 \leq f_{ij} \leq c_{ij}$. This is called capacity constraint or edge condition.

B. Ford-Fulkerson Algorithm for Maximum Flow

In 1955, Ford, L. R. Jr. and Fulkerson, D. R. created the Ford-Fulkerson Algorithm [8]. This algorithm starts from the initial flow and recursively constructs a sequence of flow of increasing value and terminates with a maximum flow [9]. The idea behind the algorithm is simple. We send flow along one of the paths from source to sink in a graph with available capacity on all edges in the path that is called an augmenting path and then we find another path, and so on [7].

1). Steps of the Algorithm

The Ford-Fulkerson algorithm has two main steps. The first step is a labelling process that searches for a flow augmenting path and the second step is to change the flow accordingly. Otherwise, no augmenting path exists, and then we get the maximum flow [5]. The detail steps of the algorithm are stated as follows [2]:

- Step 1. Assign an initial flow f_{ij} , compute f .
- Step 2. Label s by \emptyset . Mark the other vertices “unlabelled.”

Step 3. Find a labelled vertex i that has not yet been scanned. Scan i as follows. For every unlabelled adjacent vertex j , if $c_{ij} > f_{ij}$ compute

$$\Delta_{ij} = c_{ij} - f_{ij}$$

$$\text{and } \Delta_j = \begin{cases} \Delta_{ij} & \text{if } i = 1 \\ \min(\Delta_i, \Delta_{ij}) & \text{if } i > 1 \end{cases}$$

and label j with a “forward label” (i^+, Δ_j) or if $f_{ji} > 0$, compute $\Delta_j = \min(\Delta_i, f_{ji})$ and label j by a “backward label” (i^-, Δ_j) .

If no such j exists then OUTPUT f . Stop.
Else continue (i.e., go to step 4).

- Step 4. Repeat Step 3 until t is reached.
[This gives a flow augmenting path $P: s \rightarrow t$.]
If it is impossible to reach t , then OUTPUT f . Stop.
Else continue (i.e., go to Step 5).

- Step 5. Backtrack the path P , using the labels.
- Step 6. Using P , augment the existing flow by Δ_t . Set $f = f + \Delta_t$.
- Step 7. Remove all labels from vertices $2, \dots, n$. Go to Step 3.

This is the end of the algorithm. The flowchart for the maximum flow of electricity distribution network is as follow:

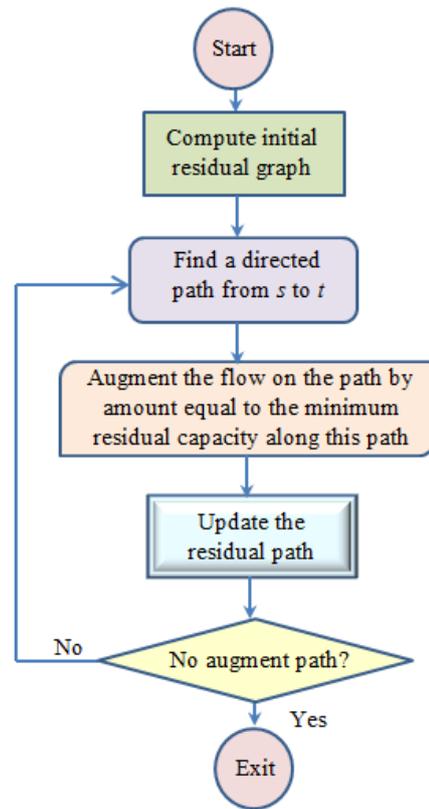


Fig. 1 Flowchart for maximum flow of electricity distribution network

III. RESULTS AND DISCUSSION

In this paper, the application of graph theory to find the maximum flow of electricity distribution network has been illustrated by using the Ford-Fulkerson algorithm [2] to the proposed electricity distribution network of Kyaukse District in Mandalay Division, Myanmar. The electrical flow will not necessarily preserve the capacity constraints that must be preserved in a maximum flow [1]. The weights on the links are referred as capacities and current flows for corresponding edges.

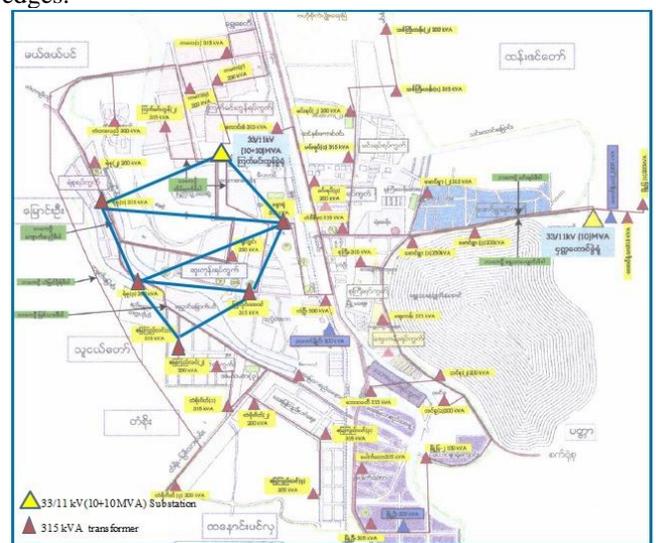


Fig. 2 Proposed network of electricity distribution network (blue) in Kyaukse District, Mandalay Division, Myanmar [10]

The flow network is a directed graph with two distinguished nodes; source and sink. Since the sizes of power cables used

in this network may not be the same, the capacity for each cable may also be different. So it can only maintain a flow of a certain amount of electricity. Anywhere those cables meet; we assumed that the total amount of electricity coming into that junction must be equal to the amount going out. Each edge between two nodes has a non-negative capacity c and receives a flow f where amount of flow on an edge cannot exceed its capacity [4]. The first number on each edge represents capacity and the second number represents current flow of electricity (kV). In this electricity distribution network, we denote the source node 1 as “ s ” and the sink (target) node 6 as “ t ” as shown in Fig. 3.

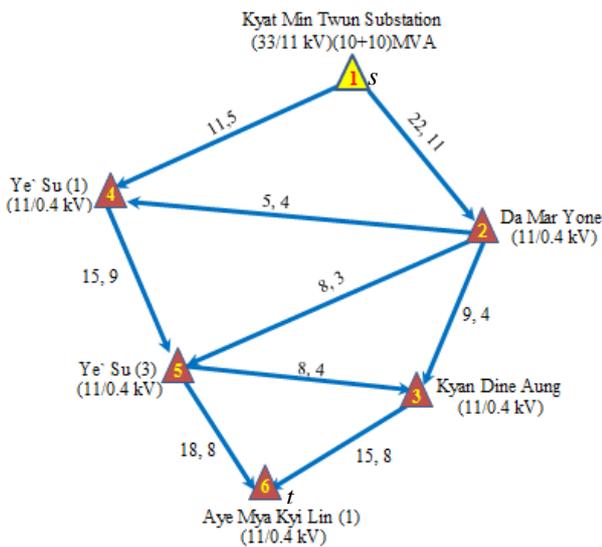


Fig. 3 Representation of digraph for proposed electricity distribution network in Kyaukse District, Mandalay Division, Myanmar

A. Implementation of the Algorithm

The implementation of the Ford-Fulkerson algorithm is illustrated to find the maximum flow for proposed electricity distribution network in Kyaukse District, Mandalay Division from source node s (Kyat Min Twun Substation) to sink node t (Aye Mya Kyi Lin (1) transformer). We can choose any path from source to sink for each iteration step as an augmenting path by using the edge with the non-zero residual capacity in previous step. This means that the edge with maximum flow cannot be used as a segment of augmenting path.

The detail implementation of algorithm can be seen as follows:

- Step 1. An initial flow $f = 11 + 5 = 16$ (Given).
- Step 2. Label ($s = 1$) by \emptyset . Mark 2, 3, 4, 5, 6 “unlabelled”
- Step 3. Scan 1
 - Compute $\Delta_{12} = 22 - 11 = 11 = \Delta_2$. Label 2 by $(1^+, 11)$.
 - Compute $\Delta_{14} = 11 - 5 = 6 = \Delta_4$. Label 4 by $(1^+, 6)$.
- Step 4. Scan 2.
 - Compute $\Delta_{23} = 9 - 4 = 5, \Delta_3 = \min(\Delta_2, \Delta_{23})$
 - $\Delta_3 = \min(11, 5) = 5$. Label 3 by $(2^+, 5)$.
- Scan 3.

Compute $\Delta_{36} = 15 - 8 = 7, \Delta_6 = \min(\Delta_3, \Delta_{36})$
 $\Delta_6 = \min(5, 7) = 5$. Label 6 by $(3^+, 5)$.

- Step 5. $P: s = 1 \rightarrow 2 \rightarrow 3 \rightarrow 6 = t$ is a flow augmenting path.
- Step 6. $\Delta_t = 5$. Augmentation gives $f_{12} = 16, f_{23} = 9, f_{36} = 13$.
 Augmented flow $f = 16 + 5 = 21$.
- Step 7. Remove labels on vertices 3, ..., 6. Go to Step 3.

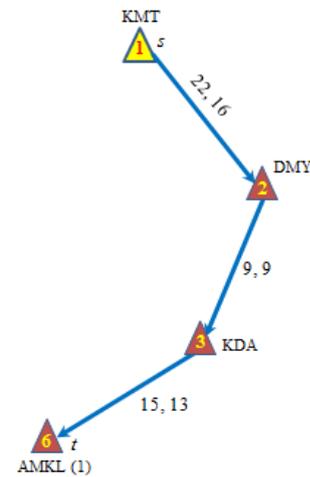


Fig. 4 Flow augmenting path 1-2-3-6

- Step 3. Scan 1
 - Compute $\Delta_{12} = 22 - 16 = 6 = \Delta_2$. Label 2 by $(1^+, 6)$
 - Compute $\Delta_{14} = 11 - 5 = 6 = \Delta_4$. Label 4 by $(1^+, 6)$
- Step 4. Scan 2.
 - Compute $\Delta_{25} = 8 - 3 = 5, \Delta_5 = \min(\Delta_2, \Delta_{25})$.
 - $\Delta_5 = \min(6, 5) = 5$. Label 5 by $(2^+, 5)$.
- Scan 5.
 - Compute $\Delta_{53} = 8 - 4 = 4, \Delta_3 = \min(\Delta_5, \Delta_{53})$
 - $\Delta_3 = \min(5, 4) = 4$. Label 3 by $(5^+, 4)$.
- Scan 3.
 - Compute $\Delta_{36} = 15 - 13 = 2, \Delta_6 = \min(\Delta_3, \Delta_{36})$.
 - $\Delta_6 = \min(4, 2) = 2$. Label 6 by $(3^+, 2)$.
- Step 5. $P: s = 1 \rightarrow 2 \rightarrow 5 \rightarrow 3 \rightarrow 6 = t$ is a flow augmenting path.
- Step 6. $\Delta_t = 2$. Augmentation gives $f_{12} = 18, f_{25} = 5, f_{53} = 6, f_{36} = 15$.
 Augmented flow $f = 21 + 2 = 23$.
- Step 7. Remove labels on vertices 2, ..., 6. Go to Step 3.

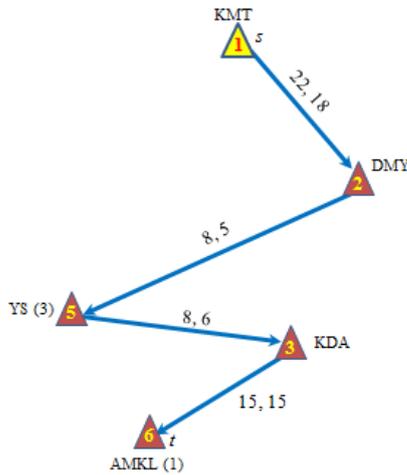


Fig. 5 Flow augmenting path 1-2-5-3-6

Step 3. Scan 1

Compute $\Delta_{12} = 22 - 18 = 4 = \Delta_2$. Label 2 by $(1^+, 4)$.

Compute $\Delta_{14} = 11 - 5 = 6 = \Delta_4$. Label 4 by $(1^+, 6)$.

Step 4. Scan 2.

Compute $\Delta_{25} = 8 - 5 = 3$, $\Delta_5 = \min(\Delta_2, \Delta_{25})$.

$\Delta_5 = \min(4, 3) = 3$. Label 5 by $(2^+, 3)$.

Scan 5.

Compute $\Delta_{56} = 18 - 8 = 10$, $\Delta_6 = \min(\Delta_5, \Delta_{56})$.

$\Delta_6 = \min(3, 10) = 3$. Label 6 by $(5^+, 3)$.

Step 5. $P: s = 1 \rightarrow 2 \rightarrow 5 \rightarrow 6 = t$ is a flow augmenting path.

Step 6. $\Delta_t = 3$. Augmentation gives $f_{12} = 21, f_{25} = 8,$

$f_{56} = 11$.

Augmented flow $f = 23 + 3 = 26$.

Step 7. Remove labels on vertices 2, ..., 6. Go to Step 3.

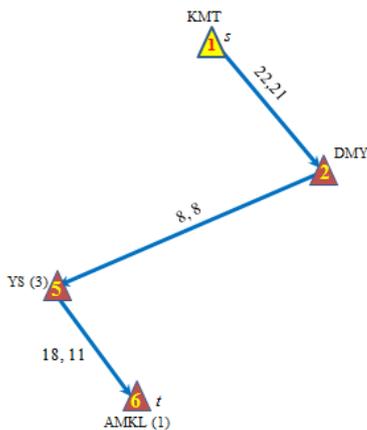


Fig. 6 Flow augmenting path 1-2-5-6

Step 3. Scan 1

Compute $\Delta_{14} = 11 - 5 = 6 = \Delta_4$. Label 4 by $(1^+, 6)$.

Step 4. Scan 4.

Compute $\Delta_{45} = 15 - 9 = 6$, $\Delta_5 = \min(\Delta_4, \Delta_{45})$.

$\Delta_5 = \min(6, 6) = 6$. Label 5 by $(4^+, 6)$.

Scan 5.

Compute $\Delta_{56} = 18 - 11 = 7$, $\Delta_6 = \min(\Delta_5, \Delta_{56})$.

$\Delta_6 = \min(6, 7) = 6$. Label 6 by $(5^+, 6)$.

Step 5. $P: s = 1 \rightarrow 4 \rightarrow 5 \rightarrow 6 = t$ is a flow augmenting path.

Step 6. $\Delta_t = 6$. Augmentation gives $f_{14} = 11, f_{45} = 8,$

$f_{56} = 17$.

Augmented flow $f = 26 + 6 = 32$.

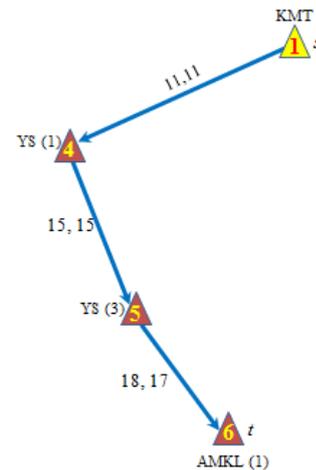


Fig. 7 Flow augmenting path 1-4-5-6

There are no augmenting paths possible from s to t , and then the flow is maximum flow. The maximum flows for all electricity in network have been calculated by iteration process of Ford-Fulkerson algorithm and can be seen in Fig. 8.

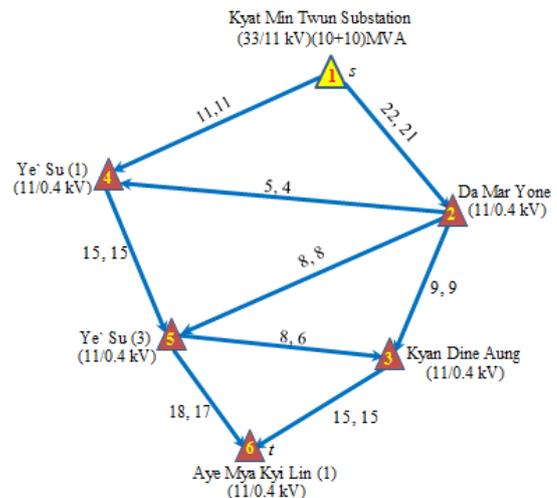


Fig. 8 Maximum flows in electricity distribution network from source node s to sink node t

The maximum flow will be the total flow out of source node which is also equal to total flow in to the sink node. In this case, total flow (maximum flow) out from source node s is $21 + 11 = 32$ and total flow in to the sink node t is

$17+15 = 32$ and hence maximum possible flow for this network is 32 kV.

IV. CONCLUSION

Nowadays, electricity is an important part of homes and industries. Almost whole the devices at homes, businesses and industries are running because of electricity. In this paper, Ford-Fulkerson algorithm has been implemented to find the maximum possible electrical flow in electricity distribution network of Kyaukse District, Mandalay Division, Myanmar. The main idea of the algorithm is to find a path through the graph from the source to the sink, in order to send a flow through this path without exceeding its capacity. Then we find another path, and so on. Maximum flow for proposed electricity distribution network has been developed to implement the algorithm by considering the capacity and flow rate of electricity in the network. The Ford-Fulkerson algorithm is guaranteed to terminate if the edge capacities are nonnegative real values. For this reason, we strongly recommend that Ford-Fulkerson algorithm is an algorithm to get the solution for finding maximum flow with simple procedure [12].

ACKNOWLEDGMENT

The author would like to acknowledge her thank to Dr. Myint Myint Khaing, Principal, University of Computer Studies, Pinlon for her permission to submit this paper in this journals. And Dr. Su Su Win, Associate Professor and Head, Faculty of Computing, University of Computer Studies, Pinlon, for her proofreading and recommendation to submit this research paper. The author would like to express her deeply gratitude to Dr. San San Maw, Professor, Department of Engineering Mathematics, Mandalay Technological University for her active encouragement, and perfect supervision throughout her research work and Dr. Lin Lin Naing, Professor and Head, Faculty of Computing, University of Computer Studies, Hinthada, Ayeyarwady Division, Myanmar, for his valuable ideas, advices and comments. Her special thanks are due to U Thein Hlaing Oo and U Win Naung Lin, Electricity Managers, Kyaukse District Electricity Manager Office under the Ministry of Electricity and Energy, for their help to collect the required data and information to her research. Finally, the author's thanks are to her beloved parents, brothers and sister because her research cannot be done successfully unless they support it.

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USE OF dsRNA WSSV VP19 WITH DIFFERENT DOSE FOR INFECTION CONTROL White Spote Syndrome Virus (WSSV) IN VANAME SHRIMP *Litopenaeus vannamei*

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DOI: 10.29322/IJSRP.9.08.2019.p9230

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9230>

Abstract- Increased production of lithopanaeus vannamei vannamei shrimp continues to be pursued, one of which is by increasing shrimp immune response to infection with WSSV disease. This study aims to evaluate the best dosage of dsRNA VP19 WSSV *in-vitro* production to increase the immune response of vannamei shrimp (*L. vannamei*). The isolation of the VP19 gene and the construction of the VP19 vaccines were carried out using the Megascript kit with VP 19 genomic DNA as a template. Vaccination was carried out by injection method on vannamei shrimp with an average weight of 10.5 ± 3.5 g and a length of 11.05 ± 1.95 cm. The vaccine dose tested was 0.02 μ g; 0.2 μ g; 2 μ g; and as controls are shrimp that are not vaccinated. The study consisted of four vaccine dose treatments with each of two replication and maintained for five days. The challenge test was carried out for five days by injecting the WSSV virus in saline solution (1:3 v/v). The differential hemocyte count (DHC) calculation was carried out before the challenge test and after the challenge test on days 1, 2, and 3. Data analysis was performed statistically by analysis of variance (ANOVA). VP19 gene isolation, construction with T7 promoter, and making of WSSV VP19 dsRNA were successfully carried out, and application of dsRNA vaccine in vannamei shrimp with a dose of dsRNA vaccine of 2.0 μ g had a significant effect ($P < 0.05$) on granular hemocytes cells

Index Terms- VP19 dsRNA, differential hemocyte count (DHC), vannamei shrimp, dose.

I. INTRODUCTION

Shrimp is one of the fisheries commodities which have high economic value and are widely cultivated in Indonesia, especially vannamei shrimp (*Litopenaeus vannamei*) and Black tiger *Penaeus monodon* (Tassanakajon et al., 2013). Vannamei *L.vannamei* shrimp is widely cultivated today, because it is known to have superior resistance to virus attacks and environmental changes compared to tiger shrimp. But the current reality of vannamei shrimp cultivation also often fails due to virus attacks

(Subyakto et al., 2009). One common virus that infects shrimp is white spot syndrome virus (WSSV). During the last 20 years, WSSV has been considered a viral pathogen that has the most negative impact on the shrimp culture industry. This is due to its high virulence, rapid spread, occurring in all shrimp producing countries, and mass mortality which can reach up to 100% within 3 to 7 days after the first clinical signs seem, reducing production with a large economic loss (Lucero at all, 2016)..

Prevention and treatment of viral infections is very challenging because the virus uses stem cell structures to replicate, inhibiting viral replication without damaging the structure of the host cell. Researchers have recently begun to use RNA interference (RNAi) technology to selectively inhibit viral genes that are important for virulence (Shuey et al, 2002). The RNAi technology has the role of inhibiting post-gene transcription through formation of dsRNA segments in the mRNA transcript, resulting in proper mRNA degradation. Vaccination technology uses viral dsRNA agents to develop very rapidly, especially in the fields of medical, agricultural, and aquaculture (Jin et al., 2010; Lichner et al., 2003; Rowley & Pope, 2012). In the field of aquaculture, this technology developed to overcome diseases caused by viruses in shrimp (Mejía-Ruíz et al., 2011; Ahanger et al., 2014). Some shrimp vaccination studies using WSSV agents as vaccine sources have shown progress and obtained encouraging results (Huang et al., 2014; Kumar et al., 2015; Puneeth et al., 2017).

WSSV is a double-stranded DNA (dsDNA) virus formed from complex macromolecules that are specifically attached and arranged for the protection and transfer of viral genomes. WSSV genes transcribed in the late phase include genes that encode WSSV main structural proteins, namely VP28, VP26, VP24, VP19, and VP-15. Where, this viral protein is likely to be used as a recombinant vaccine (Sánchez-Paz, 2010). VP19 is a WSSV wrap protein that is important because of its involvement in systemic infections in shrimp (Nadala et al., 1998; van Hulst, 2001b; Zhang et al., 2002). The latest results of the study were reported by Nurhaeda (2017), who succeeded in making VP19 dsRNA vaccine which was able to increase the survival, immune response and histology of vannamei shrimp.

Isolation and characterization of the WSSV VP19 virulent gene has been successfully carried out (Nurhaeda, 2017), but as a dsRNA vaccine in increasing survival, immune response and histology of shrimp with various doses after challenge tests WSSV is still lacking, so this study needs developed with using various doses as an effort to control WSSV infection in vannamei shrimp. This study aims to evaluate the best dosage of WSSV VP19 DNARNA *in-vitro* production to increase the immune response of vannamei shrimp (*L. vannamei*).

II. MATERIALS AND METHODS

2.1 Research Materials

The shrimp genome material that was use was the vannamei that was positively infected with the WSSV virus. The genomic DNA collection from the Laboratory of Brackish Biotechnology Research Center for Brackish Water Aquaculture and Maros Fisheries Extension (BRPBAP3) in Maros.

2.2 Research Methods

Stages carried out in the research to produce VP19 dsRNA are: Isolation of VP19 gene, Construction of VP19 WSSV gene with *in-vitro* RNAi method, and production of WSSV VP19 dsRNA, then application to test animals to see Differential Haemocyte Count (DHC) after challenge test.

a. Isolation of WSSV VP19 Encoding Genes

Isolation of the VP19 gene carried out using the PCR technique. The DNA genome that has been isolated from vannamei shrimp used as a template for DNA (template) in the PCR process, using the forward primer VP19 F 5'-CGC GGA TCC GAT CAC CAC GAC TAA CAC-3 and reverse VP19 R 5'-CCG primer GAA TTC TTA CTG CCT CCT CTT GGG-3 with a target of 366 bp (Sarathi *et al.*, 2010).

Amplification performed on the System 2700 PCR GeneAmp PCR engine (Applied Biosystem). The PCR reaction used is the PureTaq Ready-To-Go PCR Beads-GE Healthcare kit (2.5 units of PuReTaq DNA polymerase; 200 μ M each dNTP; 10 mM Tris-HCl pH 9 at room temperature; 50 mM KCl; 1.5 mM MgCl₂) and primer 1 μ L each, 0.5 μ L vannamei shrimp DNA genome, and nuclease free water 22.3 μ L with a last volume of 25 μ L.

Then sample the spin down for \pm 10-15 seconds. Samples entered into PCR machines with PCR amplification reactions as follows: pre-denaturation 94°C for 5 minutes in 1 cycle; 35 cycles for denaturation of 94°C for 30 seconds, annealing 53°C for 30 seconds, extension 72°C for 30 seconds; and the last 72°C extension for 7 minutes then added 4°C at the end of the cycle.

Next to see the success of amplification of target DNA fragments, 1 μ L sample was electrophoresis on 1% agarose gel with 20 mL TAE 1 buffer solvent, then 1 μ L gelred added documented with Gel Documentation System. The molecular weight of the DNA fragment determined using a 100 bp plus marker.

b. WSSV VP19 Gen Construction with T7 Promoter

Construction of WSSV VP19 gene with T7 promoter carried out by PCR technique. The VP19 WSSV gene is used as a template using the T7 VP19 primer: 5'-TAA TAC

GAC TCA CTA GAC GGA GCG GAT CCG ATG GCC ACC CTA ACC-3 CTA 'and T7 VP19R primer: 5'-TAA TAC GAC TCA CTA TAG GGA CGG AAT TCT TAC TGC CTC CTC TTG GGG-3'(bottom line is T7 primary sequence).

Amplification performed on the System 2700 PCR GeneAmp PCR engine (Applied Biosystem). The PCR reaction used was the PureTaq Ready-To-Go PCR Beads-GE Healthcare kit by adding primers of 2.5 μ L, 0.5 μ L of the mold genome, and nuclease-free water 19.5 μ L with a final volume of 25 μ L.

Samples were inserted into the PCR machine with PCR conditions as follows: 94°C for 5 minutes, followed by 25 cycles of 94°C for 30 seconds, annealing temperature of 72°C for 30 seconds and extension 72°C for 30 seconds, followed by last extension of 72°C for 7 minutes.

Next to see the success of amplification of target DNA fragments, 1 μ l sample was electrophoresed on 1% agarose gel with 20 ml TAE 1 buffer solvent, then added 1 μ l of gel documented with Gel Documentation System. The molecular weight of the DNA fragment determined using a 100 bp plus marker.

Nexted PCR with the premier T7 VP19, on the PC 27 GeneAmp PCR (Applied Biosystem) PCR engine. The PCR reaction used was the PureTaq Ready-To-Go PCR Beads-GE Healthcare kit by adding primers of 2.5 μ L each, 0.5 μ L of the mold genome and nuclease-free water 19.5 μ L with a final volume of 25 ML.

Samples were inserted into the PCR machine with PCR conditions as follows: 94°C for 5 minutes, followed by 25 cycles of 94°C for 30 seconds, annealing temperature of 72°C for 30 seconds and extension 72°C for 30 seconds, followed by last extension of 72°C for 7 minutes.

Next to see the success of amplification of target DNA fragments, 1 μ l sample was electrophoresis on 1% agarose gel with 20 ml TAE 1 buffer solvent, then added 1 μ l of gel documented with Gel Documentation System. The molecular weight of the DNA fragment determined using a 100 bp plus marker.

c. Manufactures WSSV dsRNA-VP19

The PCR results used for the synthesis of dsRNA using the MEGAscript RNAi (Ambion) kit. The sample used to produce dsRNA is a sample that was successfully constructed with the T7 promoter.

The concentration of PCR products measured to find the number of PCR products to be used in making the RNase transcript reaction. Subsequently added to the new tube: Adenine triphosphate (ATP), Cystidine triphosphate (CTP), Guanosine triphosphate (GTP), Uridine triphosphate (UTP) (2 μ L); 10x T7 Buffer (2 μ L); T7 enzyme mix (2 μ L); PCR products (1.5 μ L); Nuclease-free water 6.5 μ L; Total tube 1 (20 μ L) Appendix 1.

Then in the spin down at medium speed and incubated at the incubator at 37°C for 6 hours (every 30 minutes the sample shaken). For the Annealing process, it was re-incubated at 75°C for 5 minutes then cooled to room temperature for about 3 hours then the dsRNA stored at -20°C and -80°C until it reused.

Then the process of Digestion DNA and ssRNA uses MEGAscript RNAi kit (Ambion) with the following composition: dsRNA VP19 (tube 1) 20 μ L; Nuclease-free water (21 μ L); Digestion buffer (5 μ L); DNase I (2 μ L); RNase A (2 μ L) Total tube 1 (50 μ L).

After all the ingredients mixed then spindown and incubated at 37°C for 1 hour (not more than 2 hours). Then leave it at room temperature for 5 minutes. The next process is purification which aims to remove proteins, free nucleotides, and nucleic acid degradation products from dsRNA, namely dsRNA (tube 1) (50 µL); 10x binding buffer 50 µL; Nucleace-free water (150 µL); 100x ethanol (250µL); Total tube 1 (500 µL).

These ingredients added to tube 1 and spin down, after which th added to the fliter cartidg. Then centrifuge at a speed of 14,000 rpm at 4°C for 2 minutes. The supernatant is remove, add 500 µL wash solution and centrifuge at a speed of 14,000 rpm at 4°C for 2 minutes. The supernatant is discard, add 500 MI wash solution and centrifuge with a speed of 14,000 rpm at 4°C for 2 minutes. The supernatant removed and repeat the dry centrifuge, homogenized it with 50 µL elution solution (95°C), centrifuge at a speed of 14,000 rpm at 4°C for 2 minutes. homogenized again with 50 µL elution solution (95°C), centrifuge at 14,000 rpm at 4°C for 2 minutes. Homogenate is remove and the supernatant is remove. Furthermore, measuring WSSV VP 19 dsRNA concentration and to see the success of the target RNA in electrophoresis by using agarose 1% with TAE 1x buffer solvents as much as 20 mL and added as much as 1 µL and documented with Gel Documentation System (Appendix 2). The molecular weight of the DNA fragment determined using a 100 bp plus marker.

d. Application of WSSV dsRNA-VP19 to Vannamei Shrimp

Experiments conducted to test whether dsRNA VP19 with different doses can improve the survival and immune response of vannamei shrimp against WSSV virus infection and to see the level of hepatopancreas tissue damage in test animals. The limits to observed are DHC.

The study will be designed using a Completely Randomized Design (CRD) with 4 treatments and each treatment each has 3 replications. Thus this study consisted of 12 experimental units. The vaccine dose tested refers to the study of Loy et al. (2012) namely: a. Shrimp injected with saline solution (SS) without vaccine (control), 0.02 µg, 0.2 µg and 2.0 µg

1. experiment animals

The vannamei shrimp used came from Barru Regency ponds with an average weight of 10.5 ± 3.5 g and an average length of 11.05 ± 1.95 cm. The shrimp have been vaccinated maintained in a fiber-controlled tub measuring 80 cm x 80 cm x 60 cm which equipped with aeration, with density of 10 fish / tub, using sea water media and fed with commercial feed 2% of body weight and

given 2 times a day before the challenge test and 4 times a day after the challenge test.

2. dsRNA vaccine

On the first day, the shrimp in each treatment injected with VP19 dsRNA with the dose tested in the second segment of the abdominal section using a syringe volume of 1 mL and 0.1 mL in each test shrimp. The test animals were then maintained until the third day, then tested challenged with the WSSV virus.

3. Test challenges using the WSSV virus

The challenge test was to infect the WSSV virus through the injection method into vannamei shrimp. WSSV isolates came from the Maros BRPBAP3 Fish and Environmental Health Laboratory which been tested molecular. On the 3rd day after vaccination, challenge tests carried out by injecting 0.1 mL WSSV virus in each test shrimp. Before the challenge tes carried out, first take a hemolim sample from each treatment randomly (4 individuals per treatment group) to observe the immune response. During the study, observation carried out.

4. Differential Haemocyte Count (DHC)

Differential hemocytes are then calculated by grouping hemocytes into 3 cell types (granular, semi granular, and hyaline), the percentage of each cell type calculated using the formula:

$$DHC (\%) = \frac{\text{number of each type of hemocyte cell}}{\text{hemocyte count}} \times 100\%$$

2.3 Data Analysis

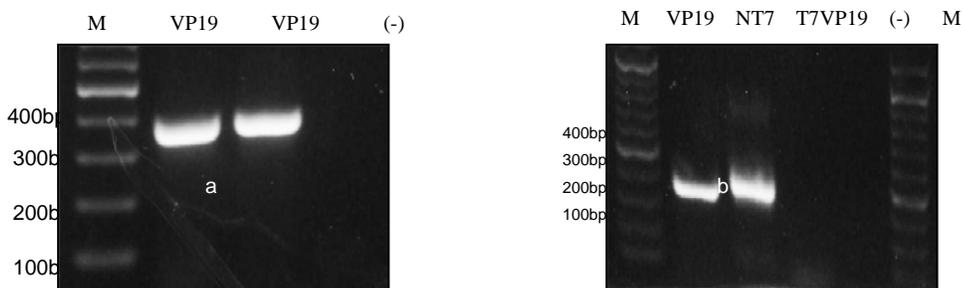
The parameters of the DHC immune response were analyzed using the ANOVA test at the level of 0.05.

III. RESULTS AND DISCUSSION

1. Characteristics of the WSSV VP19 gene

a. Isolation of WSSV VP19 encoding gene

The VP19 encoding gene was successfully isolated from WSSV on the vannamei shrimp genome DNA which was positively infected with white spot disease using the PCR technique using VP19F and VP19R specific primer. Electrophoresis results showed that one DNA fragment at position of around 366 bp (Figure 1a) and VP19 gene construction was also successfully carried out on the nexted promoter T7 (T7 VP19). Can be seen in (Figure 1b) which shows an increase in DNA fragments from VP19 position between 400-500bp.



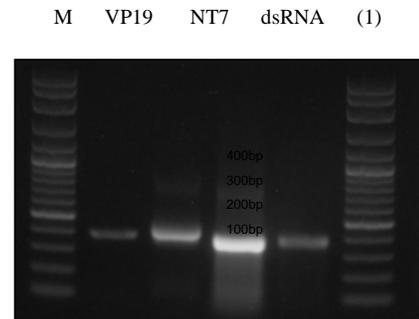
Gambar 1. Electrophoresis results of PCS VP19 WSSV (a) and nexted PCR T7 VP19 WSSV (b) isolated from the vannamei shrimp genome that were positively infected by WSSV. M = marker 100+, VP19 = gene VP19, NT7 = nexted T7 PCR, T7VP19 = promoter T7 VP19, (-) = negative control.

The results of PCR amplification and authentication with VP19 WSSV encoding gene electrophoresis, DNA fragment bands at position of around 366 bp which showed that the VP19 encoding gene was successfully isolated from the vannamei shrimp genome that was positively infected with the WSSV virus. This has also been successfully carried out in isolating other VP19 and VP-WSSV encoding genes in both vannamei shrimp and tiger shrimp. The results of the study carried out by Alim *et al.* (2011), reported that isolation of the WSSV VP19 gene encoding in tiger shrimp Situbondo isolates was 366 bp; Tenriulo *et al.* (2015), showed that the VP24 WSSV encoding gene was successfully isolated from tiger shrimp with a sequence length of about 641-648 bp; Parenrengi *et al.* (2017), reported that VP15 was successfully isolated from tiger shrimp with ORF DNA fragment length (open reading frame) of 243 bp; Hidayani *et al.* (2016), showed the success of isolating the coding gene for WSSV VP19 protein in vannamei juvenile of Indonesian isolates with a DNA fragment length of 387 bp; Hidayani *et al.* (2013), reported that gene encoding of the VP19 WSSV protein in tiger shrimp had a size of 386 bp; Malina *et al.* (2013), reported that isolation of VP28 surface protein encoding genes from tiger shrimp was successfully carried out with a fragment length of 672 bp. The results of the VP-WSSV encoding genes isolated from the shrimp genome infected with WSSV showed that the primary pair was specifically able to amplify the VP-WSSV gene from the shrimp genome infected with WSSV. Furthermore, it said that differences in genome size show chance of mutations caused either by deletion or presence of certain sizes of insertion in the WSSV genome (Yang *et al.*, 2001).

b. Production of WSSV dsRNA-VP19 *in-vitro*

Production of WSSV VP19 dsRNA was successfully carried out *in-vitro* using the MEGAscript RNAi kit with purity of 1.96 and a concentration 850 µg / mL, where a purity level above 1.8 was indicated as a product for production of dsRNA. Linacero *et al.* (1998), recommend the ratio value for pure double-stranded DNA between 1.8–2.0. The same method carried out for production of *in-vitro* gonad inhibiting hormone (GIH) dsRNA using the MEGAscript RNAi kit (Wulandari, 2010). The success of *in-vitro* dsRNA production using the MEGAscript kit is characteristic by high levels of purity, and an increase in fragments or parallel to the control fragments, and the WSSV

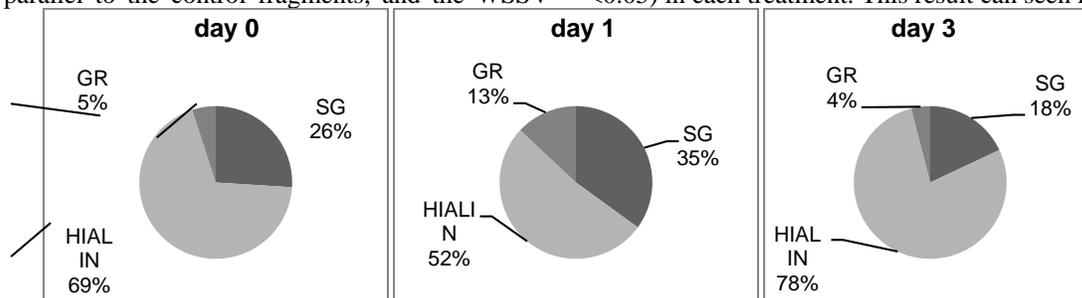
VP19 dsRNA fragment band seen as verified by 1% agarose electrophoresis. This result can be seen in (Figure 2) there is a VP19 DNA fragment that constructed with the T7 promoter.

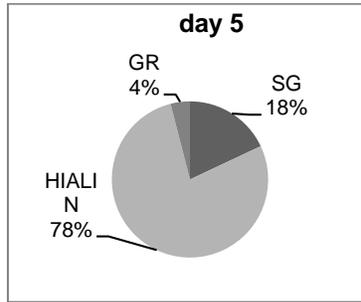


Gambar 2. Electrophoresis produced by WSSV dsRNA-VP19. M = marker100 +, VP19 = VP19 gene, NT7 = nexted promoter T7, dsRNA = WSSV dsRNA-VP19 production.

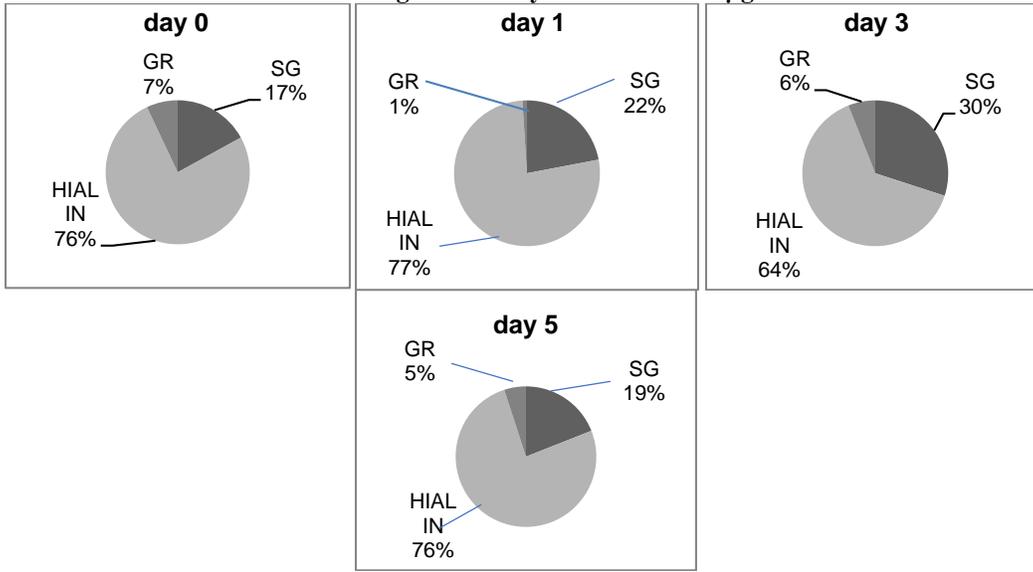
2. Differential Haemocyte Count (DHC)

Based on the results of the study before and after the challenge test with the WSSV virus at each dose showed an average DHC value, the number of hyaline hemocytes cells dose 0 µg, 0.02 µg, 0.2 µg, and 2 µg before the challenge test which is 69%, 76 %, 74% and 72%. After that, semi granular 26%, 17%, 20%, and 22%. Furthermore, granular is 5%, 7%, 7% and 6%. The results after the challenge test were obtained for the average DHC values of hyaline, semi granular, and granular hemocytes with doses of 0 µg, 0.02 µg, 0.2 µg, and 2 µg on days 1, 3 and 5th is hyaline (52%, 77%, 64%, and 68%), (78%, 64%, 64%, and 68%), (69%, 76%, 69%, and 69%), Variety analysis showed no significant difference (P> 0.05) in each treatment. Semigranular (35%, 21%, 27% and 25%), (18%, 30%, 24%, and 20%), (7%, 19%, 20%, and 17%), variance analysis showed no significant influence (P> 0.05) on each treatment. Granular (13%, 1%, 9%, and 7%), (4%, 6%, 13% and 12%), (4%, 5%, 11% and 14%) the results of the tukey advanced test show differences that real (P <0.05) in each treatment. This result can be seen in Figure 3.

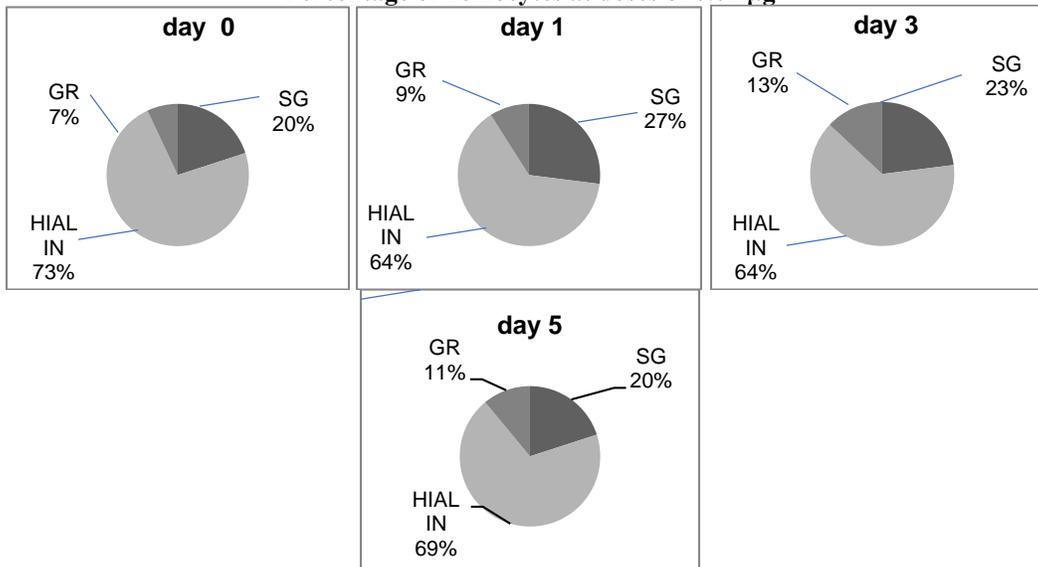




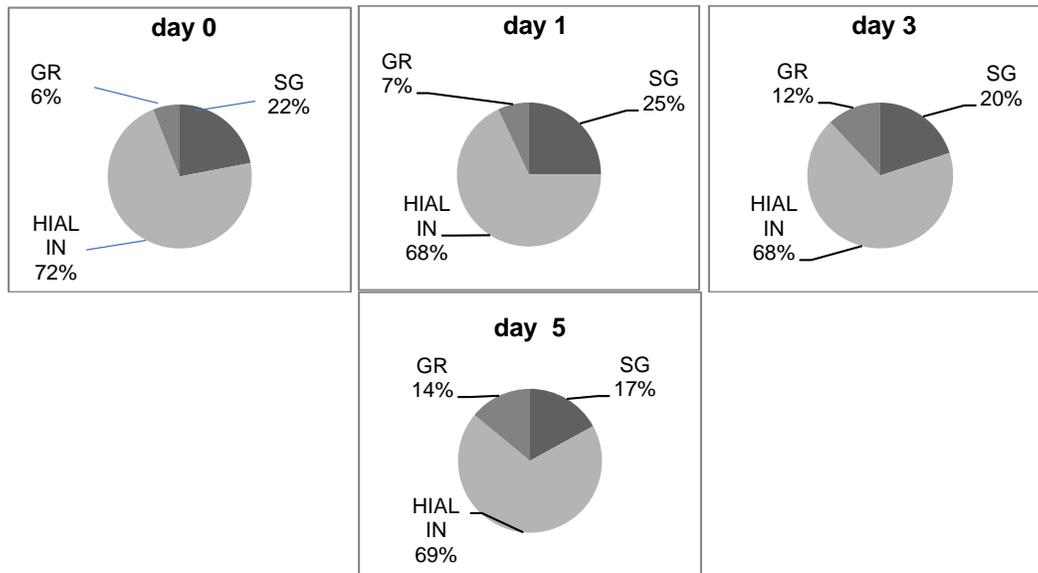
Percentage of hemocytes at doses of 0 µg



Percentage of hemocytes at doses of 0.02 µg



Percentage of hemocytes at doses of 0.2 µg



Percentage of hemocytes at doses of 2,0 µg

Gambar 3. Percentage of differential haemocyte count (DHC) of vannamei *P. vannamei* shrimp before and after testing challenged with WSSV virus. ANOVA analysis showed no significant difference ($P > 0.05$) hemocytes cells in each treatment.

The results of the study of hemocyte cell differentiation consisting of hyaline, semigranular, and granular cells of vannamei shrimp before and after the challenge test showed differences in the effect that varied in (Figure 3). Hyaline cell results showed no significant difference ($P > 0.05$) in each treatment. Vannamei shrimp hyaline cells were vaccinated and then injected with WSSV decreased on day 1 and day 3, while on day 5 there was an increase compared to controls. Hyaline cells depicted by the absence granular function as cells that do phagocytosis (Smith et al. 2003). Increasing hyaline cells can increase phagocytes activity against pathogens that enter the crustacean body (Le Moullac et al. 1998; Smith et al. 2003).

Semigranular cells described as having small granules, which function in recognizing and responding to pathogens that enter the crustacean body (Soderhall and Cerenius 1992). While granular cells described as cells that have a large number of granules which function in storing and releasing the proPO system and as toxicity together with semigranular cells (Smith et al, 2003). Although there was a decrease in the percentage of semigranular in this study, granular cells showed a significant effect ($P < 0.05$) which was able to increase phenoloxidase activity which plays a role in the melanization process. Each active cell type in the immune reaction, such as hyaline cells involved in phagocytosis, semigranular cells are active in encapsulation, and granular cells are active in the storage and release of proPO and cytotoxic systems.

IV. CONCLUSION

The results showed that VP19 gene isolation, construction with T7 promoter, and making of WSSV VP19 dsRNA were successfully carried out, and the application of dsRNA vaccine in vannamei shrimp with a dose of dsRNA vaccine of 2.0 µg had a significant effect on granular hemocytes

V. SUGGESTION

Further research needs to developed on vaccine production in-vivo and evaluates on the day that vaccines increase and survive.

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Influence Of The Inquiry Learning Model Of “Pictorial Riddle” On Critical Thinking Skills Of Man Karimun Students In Social Conflict Materials

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DOI: 10.29322/IJSRP.9.08.2019.p9231

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9231>

Abstract- This research aims to describes the influence of the Pictorial Riddle method of inquiry learning model on critical thinking skills in the material of social conflict in class XI IIS MAN Karimun. The experimental research design method True experiment, with Pretest-Posttest Control Group Design design cluster random sampling technique is divided into two classes, namely class XI IIS1 as the experimental class that received learning treatment using the inquiry pictorial type riddle learning model, and class XI IIS2 as a class control who received treatment using PBL learning model (Problem Based Learning). The research data was obtained through essay tests to measure students' critical thinking skills. Data analysis using analysis techniques Independent Test Samples T-test and N-Gain Test. The results of the calculation of data analysis obtained an average value of the experimental class 79.32 and the average value of the control class 71.76 with a significant level of $\alpha = 0.05$ having a significance value of $\alpha < 0.05$, namely Sig (2 - tailed) 0.0007 < 0.05 . Based on the calculation results there is a significant effect of inquiry learning model on the pictorial riddle method on critical thinking skills of students of class XI IIS MAN Karimun

Keyword: *Inquiry Learning Model, Pictorial Riddle, Critical Thinking Skills*

I. INTRODUCTION

Education is a factor that determines the quality of life of a nation. The quality of life of the nation is produced through the implementation of quality education. The government has made efforts, among others, by developing a curriculum starting from the Competency Based Curriculum (CBC), Education Unit Level Curriculum (KTSP) to the current 2013 Curriculum. In the 2013 curriculum emphasizing emancipatory-transformative education is an educational model that seeks to develop all the abilities of students towards a more free and creative process of thinking. Transformative learning (transformative learning) which is a model of learning is more oriented towards the transformation (change or repair) perspective or the perspective of the learners so that they can become a person who is more wise in acting, mature in thinking, wise in making decisions, regardless of whether the process traversed more relies on rational-cognitive aspects as well as active psychiatric dimensions (Hardika, 2013 p. 12).

So far the learning process in the classroom is still focused on the teacher (teacher centered) as the main source of education. This pattern of bank style education (banking system education) as mentioned by Paolo Freire (2000) only transfers knowledge from teacher to student, the role of the teacher is too dominant to turn off the role and actualization of students. Learning bank style is learning figurative, not operative. Such a situation certainly does not involve students in developing problems so that it can reduce or even kill students' mindsets, creativity, and activeness.

Critical thinking is important to deal with changes that are so rapid and rapid (Slavin, 2017, p.137). The goal is to make rational decisions about what he can believe to be true (Suprijono, 2013, p. 42-43). With critical thinking skills can help students reprocess information obtained in the learning process to be able to combine, apply, analyze and can help students solve problems (Solange Muglia Wechsler et al., 2018).

Djunadi (2014), states that sociology lessons are boring because the approach applied by the teacher in classroom learning is less attractive where most students only memorize concepts and are less able to connect what they have learned with applications in society, so the class is still focused on the teacher as the main source of knowledge, then lecture as the main choice in determining the Sholahudin learning method (2008).

To anticipate these problems, the right learning method so that it can improve students' critical thinking skills, namely through the inquiry approach. Inquiry is a way of learning that is intended to develop problem solving skills using the critical mindset of Hamalik

(2001). The inquiry model is based on observations and scientific studies so that it is suitable for use in social studies learning especially Sociology subjects where students are directly involved with the object being studied, by giving problems or providing very effective assignments to trigger student involvement (Gwo-Jen Hwanget al., 2015)

The material sociology subjects suitable for-assisted inquiry learning models Pictorial Riddle are material social conflicts. The material of social conflict chosen in this study is because in human life it will not be separated from conflict. (Wirawan, 2010, p. 5) Conflict is one of the essence of human life and development which has diverse characteristics. Humans have different sexes, social and economic strata, legal systems, nations, ethnicities, religions, beliefs, political streams, and cultures and goals in their lives. In the history of mankind, this difference always causes conflict. As long as there are still differences, conflicts cannot be avoided and will always occur. A problem, both individual and group, must be handled quickly so that problems such as conflicts can be resolved, even though conflicts can arise again at some time. Based on the description above, the researcher is interested in conducting research on the influence of the inquiry learning model riddle pictorial on students' critical thinking skills in social conflict material.

II. RESEARCH METHODS

This study was conducted at MAN KARIMUN in class XI IIS semester 2 of the 2018/2019 academic year. The population in this study were 43 students of IIS MAN KARIMUN class XI. The sample was selected by cluster random Sampling. The sample was divided into one control class and one experimental class. The experimental class was treated using a-based inquiry learning model pictorial riddle, while in the control class was given a learning treatment of Problem Base Learning. The experimental design for this study was True Experiment Design Pretest-posttest Group Design control. Data collection techniques in this study used test questions to determine students' critical thinking skills. The research implementation instruments were syllabus, Learning Implementation Plan (RPP) and Student Worksheet (LKS). Instruments for retrieving data using essay test questions that are used to measure students' critical thinking skills. The normality test of the data used is non parametric Kolmogorov-Smirnov and the homogeneity test used is the Test of Homogeneity of Variance. Hypothesis testing in this study uses Independent Samples T-test and N-Gain test with the help of SPSS 23 for window.

III. RESULTS AND DISCUSSION

Description of Data

Description of data for the two classes that received treatment with the method pictorial riddle and the base learning problem in critical thinking skills can be seen in table 2.

Table 2
Description of Data PostTest Critical Thinking Ability Students

Descriptive Statistics Results	Experimental	Class Control Class
N Valid	22	21
Missing	0	0
Mean	79.32	71.76
Median	43.00	43.00
Std Deviation	9,021	7,758
Variance	81,370	60,190
Minimum	67	63
Maximum	92	83

Source: Primary Data Processed

Table 2 shows that the average critical thinking ability in the class using the method pictorial riddle better than the class that gets treatment with the method problem base learning. After testing hypotheses using the independent test sample t-test and N-Gain test results of the analysis can be seen in table 3.

Table 3
Test Results Independent Sample t-test Final Value of Research Student Critical Thinking Ability Test (Post-test)

		t-test for Equality of Means			
Mean	T	D	Sig.	Mean	
		f	(2-tailed)	Difference	
Contro l	Experi mental)		
71.76	79.32	-	4	.007	
				-	

2,845	1	7,223
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Source: Primary Data Processed

The calculation results of SPSS 23 for the window in the table are known that the value of t_{count} is -2.854 and t_{table} with significance level (5%) 0.05, degree of freedom (db) = (n-2) then obtained $t(0.05)$ (41) table = -2,019. Then the results of the value of $t_{count} > t_{table}$, which shows the results of -2,854 > -2,019. The significance level of 5% (0.05) has a significance value of $\alpha < 0.05$, which is sig (2-tailed) 0.007 < 0.05. So it can be concluded that there is a significant difference in critical thinking skills between the experimental class and the control class after being given treatment, meaning the results of the experimental class critical thinking ability after being treated with the inquiry learning model Riddle pictorial are better than the control class using the PBL learning model (problem based learning). This is reinforced by the experimental class having an average value of 79.32 and the control class has an average value of 71.76.

Based on the results of the N-gain score calculation, it shows that the N-gain score for the experimental class (inquiry learning model riddle pictorial) is 65.145 or 65.14% including the quite effective category. With a minimum N-gain score of 38.89% and a maximum of 88.06%. While the average N-gain score for the control class (PBL model) is 53.146 or 53.14% included in the less effective category with a minimum N-gain score of 31.48 and a maximum of 74.63.

Thus it can be concluded that the use of the learning model Riddle pictorial has a better influence and effectiveness than the use of the PBL model on students towards critical thinking skills in material social conflict.

Discussion on the Effect of Pictorial Inquiry Learning Riddle Model on Critical Thinking of Students Based on the above results, it shows that the two research classes, both experimental and control classes, have a pre-test value that is not too far away. The value obtained during the pre-test is caused by students not yet fully knowledgeable about the material to be studied. Students are able to work on several questions but the answer is not right. Whereas it was different at the time of the post-test when the students had obtained the material given by the teacher, both classes had an increase in the average value of the post-test. The difference is the number of increases in the average post-test value is different between the experimental class and the control class, where the experimental class has a higher average value than the control class.

The results of this study found that the t-test test aimed to find out the difference between students' critical thinking skills before applying the inquiry learning model riddle pictorial in the experimental class and PBL learning model (Problem Base Learning) in the control class obtained $t_{value} < t_{table}$, namely -0.568 < -2.019 and the significant value of $\alpha > 0.05$, ie (2-tailed) 0.573 > 0.05, then H_0 is received and H_1 rejected. So there was no difference between the experimental class and the control class before being given treatment. That is, the two experimental classes were no better than the control class in critical thinking skills students from both classes had the same ability in critical thinking skills.

Whereas after being given treatment, where the experimental class was given inquiry model learning riddle pictorial and the control class was given PBL learning model (Problem Base Learning) obtained a value $>$ that is the result of -2,845 > -2,019. while the significance level of 5% (0.05) has a value of < 0.05 , namely sig (2-tailed) of 0.007 < 0.05, then there is a significant difference in critical thinking skills between the experimental class and the control class after being given treatment. This means that the results of the experimental class critical thinking ability after being treated with the inquiry learning model Riddle pictorial are better than the control class that uses the PBL learning model (Problem Base Learning).

These results are also in accordance with previous studies, as conducted by Kristianingsih (2010), Nurseptia (2013) Jane Arantika (2014) shows that learning with the inquiry learning model is Riddle pictorial able to improve students' critical thinking skills, so students are easier to solve problems existing by providing various alternative answers, so that student learning outcomes become maximum.

The difference in the results of the critical thinking ability test scores between the experimental class students and the control class is most likely due to inquiry learning riddle pictorial used to improve thinking skills, communication and encourage students to express opinions in discussion groups. In the classroom with the inquiry learning model the method pictorial riddle, the teacher divides students into heterogeneous groups. Group division is done randomly by considering the level of ability of students. So that in one group will consist of weak students who are accustomed to repeating lessons and students who often get the value of a pictorial riddle where students use the inquiry model Riddle pictorial and control class using PBL models (Problem Base Learning) is possible because each treatment has characteristic in its application. In the experimental class was taught using assisted inquiry learning model pictorial riddle that has 6 phases. The orientation phase in the experimental class, the teacher gives a small demonstration in the form of giving pictures related to the material given. Based on the demonstration given, students are given the opportunity to ask questions or give their responses.

According to Wina Sanjaya (2011), the orientation phase where the teacher conditions so that students are ready to accept the lesson, the teacher stimulates and invites students to start using their abilities to solve problems through an apperception. The purpose of apperception is so that students can relate their initial knowledge to the new knowledge they will receive, this is reflected by the teacher giving small questions to be solved by students based on demonstrations or phenomena displayed by the teacher. Students are expected to provide answers with clear and logical reasons. These questions orient students at the beginning of learning so students have a real picture of the problem. In the control class, the apperception given is almost the same. The aim is to condition students. The treatment given by the teacher during the orientation phase is a way to develop students' thinking skills.

The phase of formulating the problem conditions students to be directed at a problem that must be solved. Phase formulating a problem focuses students on recognizing a given problem. Formulating problems helps students to form critical thoughts that need to live smart and lifelong learning. The problems presented are problems that challenge students to think about solving related problems. Students are encouraged to find the right answer. The process of finding this answer becomes very important in inquiry because students will gain valuable experience as an effort to develop mentally through the process of thinking. The problems that are displayed in the form of riddles tucked into LKS are problems that must be resolved in thinking. Different treatments were given to the control class because the problem presented was not in the form of a riddle. This results in the majority of students not having an interest or not having the belief that the problems learned are difficult to solve.

Phase formulates prediction of answers, students first seek as much relevant information as possible through the literature. This information search will make it easier for students to provide predictions of temporary answers to the problems given. Making predictions of answers, guessing or guessing an answer to a problem is the beginning of a thought process. This is in line with Wina Sanjaya (2011) who said that when an individual or student can provide predictions and then prove his predictions, he will arrive at a position that can encourage further thinking. Learning in the control class, there is no hypothesis formulation made by students. Students are only given problems to be solved directly without going through the stages of inquiry. The phase of collecting data is a phase that contains the activities of students capturing information needed to test the predictions of the answers submitted. According to Permendiknas Number 81a of 2013, the activity of collecting information is done through experiments, reading sources or literature other than textbooks, and so on. Questions that are guiding students are given to direct students to the concept of the problem referred to in the LKS. Data collection provides opportunities for students to think. Independent activities are intended so that students can find ideas, facts, concepts, want to understand themselves in groups. Based on the questions given, students are asked to complete the data obtained through reading references, then connecting with the knowledge they have, as well as connecting with problems at Riddle.

Stage of discussing the prediction of answers, students are asked to present the results of their group discussions alternately. Students are given the freedom to express predictions of answers that are equipped with data from problems that must be resolved. Other students provide responses or questions related to the presenter's presentation. Students can develop their ability to ask questions, answer a number of questions and provide logical reasons, which are part of a series of critical thinking activities. The stage of discussing predictive answers, students can develop their ability to think rationally. According to Wina Sanjaya (2011) at this stage of inquiry students can develop rational thinking skills, which means that the truth of the answers given is not only based on argumentation, but must be supported by data collected in the previous stages of the arguments proposed can be accounted for. The final stage is formulating conclusions, students process and analyze the results of the discussions they get. Students are asked to conclude based on the results of hypothesis testing. The aim is to get accurate conclusions based on the results of discussing predictions of answers. In the control class, the formulation of conclusions emphasizes the formulation of important conclusions or points according to the material they are explained by the teacher. So that students find more conclusions on the process of remembering the information delivered, not processing it.

Murwani, 2006 learning in the experimental class, students are also equipped with riddle which makes it easier for students to understand problems and worksheets that contain questions guiding students to find answers. In the inquiry process the teacher provides assistance to students through guiding questions, so that students in groups learn by guided questions in the LKS and their implementation is assisted by Riddle followed by discussion. In line with scaffolding Vygotsky's "" theory which states that the stages in student learning start from the assistance provided in stages, where at the beginning of learning students get a lot of help later in the next lesson the amount of aid is getting smaller until finally students are able take charge of themselves independently. As for the assistance meant by Vygotsky, students have two levels of development, namely the actual level of development and the level of potential development. Where the level of actual development is the determination of individual intellectual functions and the ability to learn certain things themselves. While the level of potential development is a level that is functioned with the help of others, both from teachers, parents, and peers (Arend, 2008: p. 47). This has led to interactions between students and others in cultural concepts, which later became known in Vygotsky's theory as Zone of proximal Development (ZPD).

In discussion activities, students are faced with several arguments. Students are indirectly trained to think how they defend their opinions and encourage students to think and work on their own initiative, students will understand concepts and ideas better, help use memory and transfer to new learning situations. Riddle given is an explanatory image of the problem given. Riddle in the form of images can stimulate students' thinking power, especially after students observe riddle and answer guiding questions, students are invited to discuss the problems presented. Learning directly from the problem given will make it easier for students to understand the concept and provide broad opportunities for students to explore themselves through the learning activities undertaken (Kristianingsih, 2010).

According to Zaman, et al. (2015) students can think critically if they have a good understanding of a concept. A good understanding is obtained because students have a thinking framework that supports problem solving and critical thinking (Cutrer, et al., 2011). To foster understanding of concepts in the cognitive structure of students, a meaningful learning process is needed. In the view of constructivism, to build a new knowledge, students will adapt new information or experiences they have through interacting with people and the surrounding environment. Through the inquiry learning model, pictorial students are more enthusiastic and enthusiastic in carrying out the investigation process to collect data in the form of facts and process these facts so that students are able to build

conclusions independently. Vygotsky believes that encouraging cognitive development is social interaction / children's experience with others.

According to Vygotsky, the experience of students will accelerate cognitive development or critical thinking skills. A person's learning outcomes are obtained through direct experience (concrete), reality that exists in one's life environment then through artificial objects, to the verbal symbol (abstract). In the cone of experience, Edgar Dale's the cone peak was getting more and more abstract the message media. The process of learning and teaching interaction does not have to be from direct experience, but begins with the type of experience that best fits the needs and abilities of the group of students faced by considering the learning situation. Direct experience will provide information and ideas contained in that experience, because it involves the senses of sight, hearing, feeling, smell, and touch. In this study the level of student involvement is visually leading to involvement. Visual is paying attention to the picture, involved is the process of discussion with his friend / teacher. By being involved, the child's learning experience is increasingly imprinting, so lessons are easy to remember.

IV. CONCLUSION

Based on the results of hypothesis testing, students who use the inquiry learning model Riddle pictorial are better than PBL learning models (Problem Based Learning). This is because the inquiry learning model Riddle pictorial is encouraging students to think and work on their own initiative, students will understand concepts and ideas better, help use memory and transfer to new learning situations. Riddle given is an explanatory image of the problem given. Riddle in the form of images can stimulate students' thinking power, especially after students observe riddle and answer guiding questions, students are invited to discuss the problems presented. So that students more easily understand the steps in formulating problems to find solutions to problems in a way together with peers communicate with each other to give information to one another with students. This then has implications for the results of students' critical thinking skills.

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Analytical Thinking Skills Through The 4A Learning Models on Science Education

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DOI: 10.29322/IJSRP.9.08.2019.p9232

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9232>

Abstract- The study aims to investigate the improvement of analytical thinking skills through the 4A (analysis phenomenon, analysis information, analysis data, and analysis finding) learning models on science education. Research methods use the quasi-experiment, with one group pre-test and post-test design with a class VII sample on the subject matter of climate change. Through the gain-score test, the results of the 4A learning model that has the syntax of phenomenon analysis, information analysis, data analysis, and analysis of findings were able to improve the analytical thinking skills moderate level average of secondary school students in natural science subjects.

Keywords- 4A learning models, analytical thinking skills, secondary school, natural science subject

I. INTRODUCTION

The analysis is used to identify intense and actual relationships as long as the statements, questions, concepts, descriptions or forms of representation are expressed to express a belief, justification, experience, reaction, information, and opinion [1]. Analysis and evaluation are recognized skills required by each student in various fields of science, such as analyzing computer programs, laboratory test results, infographics, and so on [2]. Natural Sciences is one of the disciplines that study the symptoms of nature and its interactions. The essence of natural science consists of scientific attitudes, scientific processes, and scientific

products. This scientific process is known as the scientific method. According to [3], a simple experimental method consists of three (3) operations, i.e., observing, explaining, and testing from the described event based on Lampiran Permendikbud No. 68 Tahun 2013 [4]. The objectives of science learning revitalize the natural science process skills for students, teachers, and prospective teachers as the main mission of learning science teaching in school to develop observation skills, plan investigations, interpret (interpretation) data and information (narrative, drawings, charts, tables) and conclude. To be able to conclude then needed analysis thinking skills.

Amer et al. [5] expressed thought analysis is a powerful thinking tool to understand the parts of the situation, defined as 1) the ability to examine and parse the facts and thoughts into strengths and weaknesses and 2) Develop the capacity to think wisely, intelligently, resolve problems, analyze data, remember and use information.

Students' analytical thinking skills are still low. It is based on The Global index of cognitive skills and educational achievement of The Learning Curve Pearson of The Year 2014 [6], Indonesia is ranked at 40 from 40 countries, where students are still at a low level of thought, namely knowledge and Understanding. This also emphasized with preliminary studies conducted by researchers at Secondary school in Sidoarjo that the skills of

analytical thinking students are categorized low because of the ability of students still stage of memorizing, understanding, and applying yet at stage analyzing [7]. Normally, every problem has a constraint, uncertainties, and various solutions, and there are no formal techniques that can produce the best solution [8].

Thinking analysis is a relationship with the scientific process; thinking synthesis is expressed in planning, building, and developing the essence of the design process [9]. Thinking analysis is also a part of high-level complex thinking with the application of important learning for students [10]. According to [2], analysis and evaluation are recognized as crucial skills that all students must master. On learning activities need to guide teachers about: 1) basic knowledge of thinking analysis; 2) analysis thinking process, and 3) Manage classes to develop analysis thinking [11]. Based on the study, a model of learning is needed to practice analytical thinking skills. Another way is to teach by following the objectives of the curriculum. Teachers can apply teaching methods emphasizing on thinking development to improve their students' ability. It is not only in content but the thinking skills as well [12].

Actual learning models, among others, help students acquire skills, ideas, information, grades, ways of thinking, and self-expressing and also teach how to acquire them. The 4A learning model is a valid model of content and a construct to practice the analytical thinking skills of junior high school students in science subjects. The 4A learning Model has four syntaxes: phenomenon analysis, information analysis, data analysis, and findings analysis.

Fourth learning model syntax 4A theoretically and empirically trained analysis thinking skills. The syntax of analysis phenomenon aims to distinguish contrasting phenomena to formulate problems. The syntax of information analysis aims to organize relevant and irrelevant information so that students

can formulate hypotheses. The data analysis syntax aims to obtain findings from experiments/ experiments to distinguish and organize the data that is further analyzed. The syntax of the findings aims to attribute or to make conclusions from the results of previous findings. Thus the indicators of the analysis thinking include distinguishing, organizing, and catalyzing the training in each syntax.

In preparing the students for creative thinking skills and analysis required a balance between inter and transdisciplinary as well as a habit of mind patterns to cultivate the skills of the 21st century [13]. Also, empirical learning of science improves student confidence and motivation; Help learns about yourself; Develop problem-solving, psychomotor, and mental skills; give meaningful lessons; Improve analytical thinking skills; and support the relationship between natural science and everyday life [14]. Thus it is very appropriate if the analytical thinking skills begin to be trained for students.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Research design using one group pre-tests and Post-test group for, with class VII trial class in secondary school. The technique of data collection using test techniques, i.e., giving test thinking analysis skills before and after given treatment by applying learning model 4A. The data analysis technique uses the gain score from the pre-tests and post-test values. The value of this increase was used as a reference model of the 4A learning can improve the analytical skills of secondary school students in natural science subjects.

III. RESULTS OF FINDINGS

Data on analytical thinking skills that contain analysis indicators: distinguish, classify, and attribute can be seen in the following Table 1:

Table 1. Percentage of Improved Analytical Thinking Skills

N-gain	Level	Percentage (%)
0.91	High	9.68
0.61	Moderate	90.32

Based on Table 1, it is acquired that improved analytical thinking skills at a moderate level average in 90.32%. This is evidenced by the performance of a 4A learning model syntax that includes analysis phenomenon, analysis information, analysis data, and analysis finding was a good category.

The assessment of the students' answers when the tests were carried out is the data describing the level of students' analytical thinking skills [15]. Students' analytical thinking skills are measured using analytical thinking skills tests that contain analytical indicators, including distinguishing, classifying, and attributes. Test result analytical skills students with strong analytical skills have a pattern and detail, able to identify the elements of the situation and determine the parts that have relations [16]. By observing the results of increased tests gained that the criteria for improvement are moderate and high, it means that students have a pattern and detail.

According to Mulyasa [17], good planning will help teachers in the process of teaching and learning activities. The achievement of learning objectives is also influenced by how to lesson plan strategies are designed that is certainly by the characteristics of students to be taught. Teachers in teaching natural science subjects in addition to the characteristics of students also need to pay attention to the characteristics of teaching materials.

The process of analytical thinking skills is the development of activities directly through the process of thinking [18]. Analyzing means breaking material into constituent parts and determining the relationship between the parts and the relationship between those parts with the overall structure or purpose [10]. Anderson and Krathwol [19] expressed analysis involving separation of material into its core parts and determining how those parts relate to each other or overall. This category of

processes includes cognitive processes that distinguish, organize, and attribute. Analytical thinking is blended with critical thinking, especially as a part of the problem-solving process, considered essential for providing the skills required to prepare children for more complex life and work environment in 21st century [20].

Robbins expressed thought analysis was a chain of uniform behavior but involved an element of investigation and further situation with the results and parameters that were poorly structured [21]. Thinking analysis is needed when the ambiguous situation that students need in identifying or creating problems to be resolved. Courses in Computational Thinking have demonstrated success in many schools; however, this research demonstrates its effectiveness in improving analytical skills in majors as well as non-majors [22].

A basic skill requires the foundation for analysis thinking that is not only done by data [23]. Literacy is a way to develop logic, analysis, and scientific Thinking [24]. Thinking analysis is the competency of identifying and classifying is a different aspect where objects, stories, or events are a small part that fused and found the relationship of components, cause consequences, to understand Relation [11]. Thus the analysis is done for some things, not just for data analysis. Based on learning theory, a dynamic process results from interactions with both individuals and the environment, intelligence as a creation from prior knowledge and understandings, and cognitive growth as autonomous which includes both social settings and the physical environment of the learning [25].

IV. CONCLUSIONS

Based on data analysis results, it was acquired that a significant learning model 4A was able to improve the analytical thinking skills of secondary school students in natural science subjects.

ACKNOWLEDGEMENTS

The author thanked:

1. Prof. Dr. Endang Susantini, M. Pd., as Promotor and Prof. Dr. Budi Jatmiko, M. Pd., as the co-promoter who has guided to complete this article.
2. Prof. Dr. Rudiana Agustini, M. Pd., Prof. Dr. Mundilarto, M. Pd., and Z.A. Imam Supardi, Ph.D., as testers who have given criticism and suggestion.
3. Prof. Dr. Erman, M. Pd., Dr. Wahono Widodo, M. Pd., and Dr. Rinie Pratiwi P, M.Si., as the model validator following its supporting devices.
4. Dr. Wasis, M.Si., Prof. Dr. Suyatno, M.Si., Dr. Nur Efendi, M.Pd., Dr. Wahono Widodo, M.Pd., and Prof. Dr. Erman, M.Pd. as the testers who have given criticism and suggestion.
5. All friends in Doctoral of Science Education post-graduate Program, Surabaya State University that always provide support and passion.

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Factors Affecting Incident Reporting – A Qualitative Study

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DOI: 10.29322/IJSRP.9.08.2019.p9233

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9233>

Abstract- Incident reporting is an integral part of patient safety. Therefore, studying enablers and barriers to incident reporting is important to improve quality of patient care. Nursing Officers, who are front line health care providers, play an important role in incident reporting in hospital setup. The objective of this study was to describe enablers and barriers for incident reporting by Nursing Officers in Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards in the Teaching Hospital, Kandy. This was a qualitative study, and the study instrument was key informant interview. Key informants were selected within the Teaching Hospital, Kandy using maximum variation sampling technique. Qualitative analysis of the key informant interviews was done with thematic analysis. Lengthy process of incident reporting, presence of culture of blame, insufficient knowledge on incident reporting, presence of heavy work load and lack of feedback for the reported incidents acted as barriers for incident reporting while training on incident reporting acted as an enabler. Simplification of the process, formalizing the feedback mechanism, changing the blame culture and continuation of training programmes can be recommended to improve incident reporting in these selected wards in the Teaching Hospital, Kandy.

Index Terms- Incident reporting, Patient safety, Barriers, Enablers, Teaching Hospital, Kandy

I. INTRODUCTION

The Institute of Medicine stated “To err is human”, highlighting the possibility of making errors by healthcare providers (Kohn et al., 1999). Harvard Medical Practice Study reveals that the death toll due to medical errors each year in the United States is equivalent of a jumbo jet crashing each and every day (Watcher, 2012). Similarly, World Health Organization states that every tenth patient in Europe faces a preventable adverse event (World Health Organization, 2014). However, with the socio economic development of the society, the patients’ expectations for healthcare is increasing. In order to maintain the quality of a service, the gap between customers’ expectations and their perceptions on the service that they receive has to be reduced (Parasuraman, Zeithaml and Berry, 1985). As medical errors have significant impact on

patients’ perceived service, errors have to be reduced in order to improve service quality in healthcare settings.

For the purpose of reducing errors, it is important for healthcare providers to learn from errors occurring in healthcare settings. The ancient Greek philosopher Aristotle had mentioned ‘Quality is not an act, it is a habit’, and this quote emphasizes the importance of the learned behavior in this context (Kaizen Institute - India, 2013). However, adverse events are not only due to personnel factors such as carelessness and incompetency of health care providers; underlying problems prevailing in those settings also contribute greatly to such incidents (Morath and Turnbull, 2005). An expert group in the national health system of the United Kingdom has also recommended learning from failures (Department of Health - London, 2000).

In order to learn from errors and failures, data on patient safety incidents should be available. Patient safety related data can be used in identifying health hazards, determining where to allocate resources, and in deciding interventions for the purpose of improving patient safety (Pronovost et al., 2008).

The way of gathering patient safety related data is incident reporting. Many researchers consider incident reporting system as an effective tool for learning from incidents (Pfeiffer, Mansor and Wehner, 2009; Vincent, 2007). Moreover, incident reporting highlights the areas where improvements are needed (Elder et al., 2007). The Institute of Medicine also, in their four tiered strategic approach, has recommended incident reporting for learning from errors (Kohn et al., 1999). The World Alliance for Patient Safety, in their forward programme published in 2005, has taken the theme “Reporting and Learning” as their sixth action area (World Health Organization, 2004).

Literature has shown that there are weaknesses in incident reporting all around the world. (Cullen, et al., 1995; Elder et al. 2007; Pfeiffer et al. 2009)

II. METHODOLOGY

This was a hospital based analytical cross sectional study and was carried out in selected ward in the Teaching Hospital, Kandy. Key informant interviews were done to collect data and therefore this was a qualitative study.

The main objective of this was to describe enablers and barriers to incident reporting by Nursing Officers in Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards in the Teaching Hospital, Kandy.

Maximum variation sampling, which is a type of purposive sampling, was taken for the selection of key informants for key informant interviews. The Director, Deputy Directors, Medical Officer in charge of the QMU, Nursing Officer in charge of the QMU, and Ward Sisters in Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards were taken to the study population. The reason for selecting maximum variation sampling was to assess the phenomenon related to research questions broadly as seen by different people (Cohen and Crabtree, 2006).

The unit of analysis of this study was a Nursing Officer attached to a basic specialty ward i.e. Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards, of the Teaching Hospital, Kandy.

The study was conducted from September 2016 to August 2017. The data was collected from 15th of April, 2017 to 15th of May, 2017.

Ethical clearance was obtained from the Ethics Review Committee of the Post Graduate Institute of Medicine, which is an affiliated institute of the University of Colombo. Approval for data collection was taken from the Director of the Teaching Hospital, Kandy.

Data was analyzed with thematic analysis technique as described by Braun and Clarke, (2006).

III. RESULTS

Findings of the key informant interviews were thematized as shown in the Table 1.

Table 1: Thematic Analysis – Factors Affecting

Incident Reporting

Theme
Process
Culture of blame
Knowledge
Workload
Feedback

Figure 4.2 shows the pattern diagram developed after thematic analysis.



Figure 1: Thematic Analysis – Patterns

IV. DISCUSSION

Process in relation to incident reporting was one the most prominent findings of the key informant interviews, and it was mentioned as one of the most important barriers for incident reporting.

Many key informants mentioned that books were available at section matrons’ offices for documentation of the incidents happening in wards. Once an incident happened in a certain ward, a nursing officer was supposed to write the complaint book and go to the relevant section matron’s office at a convenient time and he or she had to document the incident in that book according to a given format. That was an established practice in this setting. In addition to that process, the formal incident reporting form introduced by the Ministry of Health was brought to the ward from the Quality Management Unit and filled. Thus, it can be noted that there were two processes. i.e. the well-established traditional incident reporting form by the Ministry of Health according to the circular 01-38/2016 (Ministry of Health, 2016). Some Ward Sisters, in their interviews, stated that there were two processes for reporting an incident. They felt that documentation in a book and filling the newly introduced incident reporting form as a duplication of work. As one key informant stated “There are too many steps in the incident reporting process.” Ward Sisters act as leaders for the nursing staff, their views on the currently practicing process might have transmitted to the Nursing Officers. That might have given the nursing staff the feeling of additional burden in reporting an incident. According to the study done by Elder et al. (2007), lack of time was a barrier for reporting. Therefore, presence of two processes would have further hindered their incident reporting behaviour in this setting.

At the same time, one of the key informants revealed “Training programmes affected as enablers to incident reporting”. Therefore, extension of training programmes to build leadership skills in middle level and operational level managers would be beneficial in an attempt of improving incident reporting.

According to the analyzed data of the key informant interviews, feedback was one of the factors acting as a barrier for incident reporting in this study (Figure 1). It was reported

that the Nursing Officers were not well aware of the actions taken for the incidents reported by them, and as a consequence they might tend to believe that it was useless to report. These findings tally with the results of the qualitative study done by Kingston et al (2004) and with study done in six South Australian hospitals by Evans et al (2006).

Streamlining the process of incident reporting, Creating a supportive environment for incident reporting, Formalizing the incident reporting forms, Continuation of training on incident reporting, Formalizing the feedback mechanism, Appraising for reporting incidents, Application of digital Technology to report incidents can be recommended to improve incident reporting.

V. CONCLUSION

Lengthy process of incident reporting, presence of culture of blame, insufficient knowledge on incident reporting, presence of heavy work load and lack of feedback for the reported incidents acted as barriers for incident reporting while training on incident reporting acted as an enabler for the Nursing Officers employed in Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards in the Teaching Hospital, Kandy.

ACKNOWLEDGEMENTS

The Director and the Deputy Directors of the Teaching Hospital, Kandy are acknowledged.

LIMITATIONS

This study was conducted in Medical, Surgical, Paediatric, Gynaecology and Obstetrics wards in the Teaching Hospital, Kandy. Many factors can vary between region to region and hospital to hospital. Thus the results may not be generalized to all of the hospitals in Sri Lanka.

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Validity of Science Student's Book to Practice Critical Thinking Skills

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DOI: 10.29322/IJSRP.9.08.2019.p9234

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9234>

Abstract- This research aims to describe validity of students' book for practicing students' critical thinking skills. The research used descriptive quantitative method. Instruments data collection used validation questionnaires. Data analytical techniques used quantitative descriptive data analysis. Research result shows that the validity of students' book and related instruments are declared very valid. Based on the discussion of the results and findings, it was concluded that students' book that have been developed in natural science subject are suitable to be used to practice students' critical thinking skills.

Index Terms- science, students' book, critical thinking skills

I. INTRODUCTION

Critical thinking skills are skills that are very much needed in the 21st century. This critical thinking skill is a challenge in the education system in Indonesia [1]. The importance of having critical thinking skills is also a major aspect of education in Indonesia which is reflected in the Graduates' Competency Standards (SKL) of elementary school students (SD) [2].

But the facts that occur in the field are the implementation of learning does not encourage the emergence of children's critical and creative thinking skills [3]. One of the things that causes the lack of critical thinking skills of children is because when the learning process in the teacher class does not provide opportunities for students to express opinions that are in the minds of students [4].

Based on the results of interviews conducted to elementary school teachers, in terms of learning, subject teachers still explain the material using the lecture method [5]. In the learning process, the teacher has not been able to create conditions and situations that allow students to build critical thinking processes [6]. This can be seen from the activities of teachers and students during teaching and learning activities. The teacher explains the material that has been prepared and provides routine and continuous practice questions. Students only record, copy, and tend to memorize without meaning and understanding.

Furthermore, in terms of the quality of textbooks used by students, the textbooks used do not include indicators of critical thinking [7]. Textbooks are learning manuals that students use to help achieve national education goals [8]. In helping to achieve national education goals, textbooks that are a guide for students must be appropriate. In this case the textbook can function as an intermediary in achieving national education goals. But in fact, the textbooks that hold students in check are not enough to help students achieve national education goals.

To be able to train critical thinking skills, facilitation is needed which can be used as a tool in applying it, one of which can be through textbooks. Validation of textbooks that can train critical thinking skills is needed to provide confidence that the textbooks compiled have relevance of content in the 2013 Curriculum. Therefore, this study was conducted to answer the question of how the validity of science teaching books to train critical thinking skills of elementary school students? The purpose of this study is to describe science teaching books to train critical thinking skills of elementary school students.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

This research is a quantitative descriptive study to describe the validity of Natural Science teaching books based on metacognitive strategies to train critical thinking skills of fifth grade elementary school students. The validity of the teaching book is a very valid, valid, quite valid, and invalid statement made by the validator based on the feasibility mode of the assessment points on the aspects of textbooks. The research subjects were students of Al-Hikmah Elementary School V Surabaya in the even semester of the academic year 2018/2019. Data collection techniques for validating textbooks to train students' critical thinking skills are carried out through validation questionnaires. Validation sheet from experts by giving textbooks that have been designed to two experts (validators) to be assessed and given input in the form of suggestions and criticism. The results of the validation questionnaire and suggestions from the validator are documented. The validator gives an assessment by checking (√) in the appropriate value column. The column contains the assessment scores that have been

determined, on each validation sheet there are four categories, namely: (a) not good (value 1), (b) quite good (value 2), (c) good (value 3), and (d) very good (value 4).

Analysis of data from the teaching book validation was obtained through the values on the expert validation questionnaire sheet. This analysis is done by averaging the scores of each component given by the validators. Data analysis techniques model validation includes textbook validation instruments to train students' critical thinking skills. The data obtained were analyzed by the average score of each aspect. The results of the validation conducted by the validator indicate that the validated textbooks are valid to train students' critical thinking skills.

III. RESULT AND DISCUSSION

This textbook is validated by two validators who are experts in the fields of basic education and learning technology. Validation of textbooks includes the components of content feasibility, components of feasibility of presentation, components of language feasibility, and components of the feasibility of graphics.

A. Component of Feasibility to Fill

The details of the results of the validation of the science textbook developed in the component eligibility content by the two validators are presented in table 1.

Table 1. Results of Content Feasibility Validation

No.	Assessment Aspect	Score			K
		V ₁	V ₂	M	
1.	Completeness of material	4	4	4	Very Valid
2.	Material depth	3	4	3.5	Valid
3.	Accuracy of facts, concepts and principles	4	4	4	Very Valid
4.	Accuracy and suitability of examples/illustrations and questions	3	4	3.5	Valid
5.	Free of SARA, pornography and bias	3	4	3.5	Valid
Validity category mode					Valid

Keterangan:

V1 = Validator 1

V2 = Validator 2

M = Mean value of two validators

K = Category

The results of the validation component of the content obtained from the two validators can be used with a slight revision. Suggestions obtained from the two validators are presented in Table 2.

Table 2. Suggestions for revision of textbooks based on the component of content igibility

Validator	Suggestions	Revision
Validator 1	Water cycle testing steps need to be reviewed. Use easy-to-use ingredients	The material used in the water cycle experiment step is replaced using easily available materials

Based on the data presented in the table 2 . , in terms of the components of content feasibility , the IPA teaching book received an assessment from both validators with the validity of the textbook category category.

B. Component of Content Feasibility

The results of the validation component of the presentation feasibility obtained from both validators can be used (without revision). However, there is one input from the validator 2 to revise the deficiencies in the science teaching book that will be presented in the third paragraph

Table 3. Suggestions for revision of textbooks based on the component of presentation feasibility

Validator	Saran	Perbaikan
Validator 2	1) The space on page 31 needs to be reviewed	1) Spaces are corrected according to the suggestions submitted

The details of the results of the validation of science teaching books developed in the component of the feasibility of presentation by the two validators are presented in T- 4.

Table 4. Results of Validation of Feasibility of Presentation

No.	Aspek Penilaian	Skor			K
		V ₁	V ₂	M	
1.	Systematic consistency in the chapter	4	4	4	Very Valid
2.	Logic / presentation	4	4	4	Very Valid
3.	<i>Advance organizer</i> (learning motivation generator)	3	4	3.5	Valid
4.	There are practice questions at the end of the chapter	3	4	3.5	Valid
5.	There are references / reference sources for text, image tables, and attachments	3	4	3.5	Valid
6.	The accuracy of numbering and naming tables, images, and attachments	3	4	3.5	Valid
7.	Presentation orientation is student-centered	4	4	4	Very Valid
8.	preliminary	4	4	4	Very Valid
9.	Table of contents	4	4	4	Very Valid
10	Glossary	4	4	4	Very Valid
11	Bibliography	4	4	4	Very Valid
Category Validity mode					Very Valid

Keterangan:

V1 = Validator 1

V2 = Validator 2

M = Mean value of two validators

K = Category

Based on the data that has been presented in table 4. , in terms of the components of the feasibility of presenting textbooks, the textbooks for science received an assessment from both validators with the validity of the textbook category category.

C. Component of Language Feasibility

The results of the language feasibility validation obtained from the two validators can be used with a slight revision. Suggestions obtained from the two validators are presented in table 5.

Table 5.
Suggestions for revision of textbooks based on the component of language feasibility

Validator	Suggestion	Repair
Validator 1	There are a number of words that are still incorrectly written	Some incorrectly written words are corrected according to PUEBI

The details of the results of the validation of the IPA teaching books are the components of linguistic feasibility by the two validators presented in table 6 .

Table 6. Validity of Language Feasibility Results

No.	Assessment Aspect	Score			K
		V ₁	V ₂	M	
1.	Conformity with the level of development of students' thinking	4	4	4	Very Valid
2.	Understanding of students about the message	3	4	3.5	Valid
3.	The ability to motivate students	3	4	3.5	Valid
4.	The accuracy of grammar and sentence structure as well as the consistency and consistency of the use of symbols / symbols / terms	4	4	4	Very Valid
5.	Linkage and integrity of meaning	3	4	3.5	Valid
Validity category mode					Valid

Keterangan:

V1 = Validator 1

V2 = Validator 2

M= Mean value of two validators

K = Category

Based on the data presented in Table 6 . In terms of the linguistic feasibility component of the textbook, the IPA teaching book received an evaluation from the two validators with the validity of the textbook category category .

D. Kegrafikaan Feasibility Components

The results of the validation of the grammatical feasibility component obtained from the two validators can be used with a slight revision. Suggestions were obtained from both validators presented in Table 7.

Table 7. S aran revision of textbooks based components eligibility kegrafikaan

Validator	Suggestion	Repair
Validator 1	The font type on the cover must be consistent	The font on the cover is consistent

The details of the validation results of the feasibility IPA textbook kegrafikaan by both validators are presented in Table 8.

Table 8. Results of Kegrafikaan Feasibility Validation

No.	Assessment Aspect	Score			K
		V ₁	V ₂	R	
1.	Book size conformity with ISO standards	3	4	3.5	Valid
2.	Suitability with the contents of the book	3	4	3.5	Valid
3.	The appearance of elements of the layout on the front, back, and back cover has unity	3	4	3.5	Valid

No.	Assessment Aspect	Score			K
		V ₁	V ₂	R	
4.	The appearance of elements of the layout on the front, back, and back covers gives the impression of a good and harmonious rhythm	3	4	3.5	Valid
5.	A good center of view on titles and illustrations	3	4	3.5	Valid
6.	The composition of the layout elements (titles, authors, illustrations, logos, etc.) is balanced and has a pattern that matches the layout of the contents of the book	3	4	3.5	Valid
7.	Size comparison of proportional layout elements	3	4	3.5	Valid
8.	Have a good contrast	3	4	3.5	Valid
Validity category mode					Valid

Keterangan:

V1 = Validator 1

V2 = Validator 2

R = Rata-rata nilai dua validator

K = Kategori

Based on the data presented in Table 8, in terms of the components of the feasibility of the academic textbooks, the science teaching books received an assessment from the two validators with the validity of the textbook category category

A. Recapitulation of Results of Science Textbook Validation

Based on the results of the textbook validation in each component of feasibility, the following is the recapitulation of the category of validity mode in each component of the validity of the textbook.

Table 9. Recapitulation of Modes of Validity Category for each Textbook Component

No.	Component of Feasibility	Component Feasibility Category Mode
1.	Content Feasibility	Valid
2.	Feasibility of Presentation	Very Valid
3.	Feasibility of Language	Valid
4.	Feasibility of Kefrafikaan	Valid
Mode for the Feasibility of Textbook		Valid

Based on the data presented in Table 9 . , from the validation of each component of the textbook feasibility, the science teaching book received an evaluation from both validators with valid textbook category validity mode so it can be concluded that science teaching books are based on valid metacognitive strategies to train critical thinking skills of elementary school students

VI. CONCLUSION

The validity of textbooks fulfills very valid criteria, namely in terms of the component of feasibility of contents with an average score of 4, the component of feasibility of presentation with an average score of 4, the component of language feasibility with an average score of 4, and the feasibility component of the average score of 4.

ACKNOWLEDGMEN

T

We are especially grateful to Universitas Negeri Surabaya lecturer, validator, and all those who directly and indirectly helped us in this research

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Human Resource Management

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DOI: 10.29322/IJSRP.9.08.2019.p9235

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9235>

Abstract- Obviously, due to scarcity of skilled workforce organizations are establishing and consistently modifying HR Plan to stand out in order to attract and retain the best talented workforce necessary for efficiency, enhanced organizational productivity and profitability. Scrummy Food, Inc. is a young company that has the desire to increase its market share and beating competitive edge through a systematic market system enhanced by talented and skilled workforce but lacks the capacity of well-established human resource department with goal oriented HR manager. The human resource plan (HRP) is the paramount responsibilities of the human resource department headed by the HR manager who is responsible for the establishment and execution of the HR Plan which is a scheme that enables companies to plan ahead in order to maintain a steady supply of skilled workforce, evaluate organizational needs and as well plan ahead to meet those obligations. HR planning plays a significant role in an organization because since employees are the most internal valuable assets of the company, they should be available when needed, placed in appropriate positions, given trainings, benefits, compensations and be rewarded adequately.

Index Terms- management, human resources, planning, diversity, recruitment, selection, training, compensation, benefits, retention, bonus

I. INTRODUCTION

Organizations embark on human resource planning (HRP) to enable them move from the current skilled workforce position to the desired skill workforce position, and is a process that begins with the company's estimation for employee requirements and thereafter sources are found from where this need can be fulfilled (Kenton, 2019). HR Plan is mostly vested in the hands of the human resources manager who is responsible for the arrangement of the appropriate people for the right job from all the variable sources (Kenton, 2019).

Obviously, investing in HRP is one of the most crucial decisions an organization can make because "a company is only as good as the employees" (Kenton, 2019), therefore, many organizations especially young companies are undergoing rapid changes especially due to globalization and technological advancement and innovation couple with their inclination to return to their normal positions of efficiency and profitability caused by the last economic downturn. Thus, companies are striving to win and retain the best and most talented employees in order to beating competition, innovate and increase productivity and profitability (Armstrong and Stephen, 2005). However, the human resource department of many large organizations are developing their HR

Plan with the notion of attracting the most lucrative employee for efficient workforce.

Obviously, some national organizations continue to develop and change their HR Plan to attract and hire quality candidates and as well position them appropriately through periodic examination of employment needs, forecasting demand and supply of employees, and enhanced policies of recruitment, training, performance appraisal and benefits (Maharjan, 2018). Furthermore, to get the best outputs the HR Plan of many organizations now include attractive compensation and benefits packages rooted in their organization's culture, purpose and values because compensation and benefits are essential in the recruitment, retention and motivation of employees (Lonsdale & Milano, 2016).

Certainly, effective training of employees is crucial to the long-term success of any organization, thus, carefully planned and properly implemented training programs provide multiple benefits for the employees (Anderson, 2012). HR Plan benefits the company because it leads to clear understanding of the company's policies, job functions, goals and the company's philosophy thus leading to increased employee motivation, morale and productivity as well as higher profits for the organization (Muzumdar, 2017). Certainly, companies with the most strategic training programs will develop the needed skilled workforce to cope with the challenges of the fast complex technological changing business environment.

Furthermore, being a preferred employer is integral to competing for talent, because job applicants do not like to take jobs with employers who have little or no defined HR plan and employees discriminate against employers who take their contributions for granted (Maina & Kwaisira, 2015). However, candidates prefer to apply for job openings with clearly defined recruitment processes, descriptions of their work duties, opportunities for growth and development, and company's policy on compensation and benefits (Maina & Kwaisira, 2015). Therefore, to be a preferred employer, the HR Plan should be structured in way that it will attract the most desired talents from candidates, and fortified with the elements that will fulfill people training and development, compensation and benefits needs (Maina & Kwaisira, 2015).

Apparently, organizations continue to embrace performance management as a holistic, largely participatory and goal congruent process of managing and supervising employees, however, it is viewed as a methodical, structured procedure to the management and reward of performance through the generation and sustenance of positive employee motivation (Narayana, 2010). Moreover, organizations are adopting performance measures that will lead to the most accurate appraisal of their

employee performance because it is through performance measurement outcomes that employee's future training mostly depends on (Anderson, 2012).

This project focuses on HR plan for Scrummy Food, Inc. with the view of providing the company with a fundamental Human Resource Plan in the areas of recruitment and selection, training, compensation and benefits, performance management respectively. This project is essential because it will supply Scrummy Food, Inc. with cutting-edge HR plan essential for the attraction, recruitment and retention of some of the most knowledge and skilled employees necessary for achieving its long term goals of productivity and profitability.

II. DISCUSSION

Scrummy Food, Inc. is a foreign owned food packaging and Distribution Company located in Europe, it was established 5 years ago. The company currently employs 250 people and has a combined revenue of \$12,800,000 and profit of \$1,600,000 annually. Scrummy Food, Inc. is a company that packages, sales, and distributes various types of foods in major designated areas of the state such as canned food, grains, tubers, vegetables, and snacks, carbonated and non-carbonated drinks.

Scrummy Food a is growing company with the prospect of becoming one of the leading food distribution companies, however, it intends to acquire more distribution trucks to enable it attain its desired status of a big food distribution company. The company plans to hire more employees in the future to enable it pursue its expansion drive, however, the company is currently operating mostly with traditional employees, Therefore, many of its employees are yet to establish a long-term career goal with the company due to lack of well-established human resources department with a goal oriented human resources manager. Obviously, Scrummy Food, Inc. faces brand competition from other companies who also fight along with it to gain market niche and win the acceptance and admiration of customers, to remain on top. The company faces competition from other food distribution

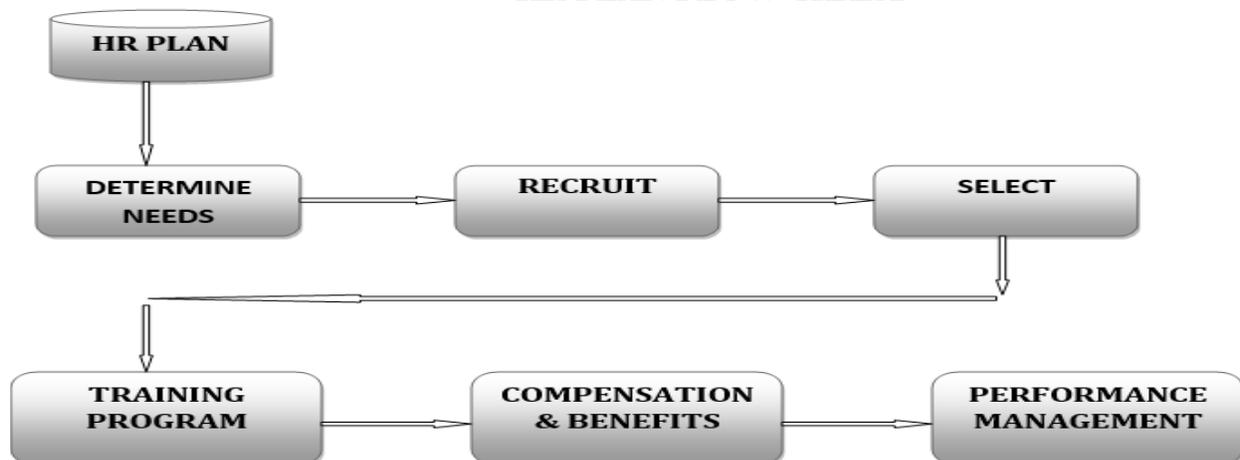
companies especially those that have stayed in business for years before its establishment.

III. DETERMINING HUMAN RESOURCE NEEDS

The first step of HR plan should involve the determination of the number of people needed to be hired coupled with order factors, thus, this step entails examination of Scrummy Food operations over the last year and pondering on specific questions to determine whether enough people were hired, whether the HR struggled to hire people at the last minute (Green, 2016). More so, this is the time to determine the company's current employee skills, the skills the employees need to gain to keep up with technology, the number of employees to be replaced due to retirement and whether there is someone available to replace them, the company's sales forecast and whether it might affect hiring (Green, 2016). To obtain accurate estimate of recruitment needs for now and in the future, other departments, managers and executives should be involved. Thus, it is a management function to assist the human resource manager to develop the HR Plan in order to recruit, select, train and develops employees for the company (Kenton, 2019).

To help determine the exact number of employees due for retirement and who will be absent needing temporary replacement, Scrummy Food should prepare an inventory of all current employees including their educational level and abilities because this will give the manager the big picture of what current employees can do (Kenton, 2019). Thus, keeping inventory will assist the HR manager to know where there are the likelihood for the existence of gaps and enables the filling of such gaps, more so, it can serve as a tool to develop employees' skills and abilities (Green, 2016). The company should also conduct job component analysis to fully understand the types of employee skills required to perform the job successfully, however, after the performance of the needs assessment and the comprehension of the exact number of people that will be hired, into what positions and time frame they need to be hired (Kenton, 2019), the next thing is recruitment.

HR PLAN FLOW CHART



IV. RECRUITMENT AND SELECTION

Recruitment and selection is directly linked to an organizations performance, productivity, profitability and turnover, however, finding the right candidate requires prudent planning, organizing, directing and control before the interview process, to ensure the hiring of trusted candidates with good proven track record, people oriented traits and good communication skills (Elsie, 2017).

The recruitment and selection program starts with the assessment of needs, and definition of the needs and requirements for new workers and professionals for outlined job postings, more so, roles, responsibilities, skill sets and qualifications are carefully developed and defined (Jaiswal, 2013), thereafter, the job vacancies are made known and advertised accordingly.

V. RECRUITMENT

Recruitment is the process of the identification of vacant positions and taking of steps to filling such vacancy in the organization (Maharjan, 2018). Recruitment is the process of searching and appointing prospective candidates in an organization (Jaiswal, 2013). In addition, recruitment is a continuous process during which companies try to develop a pool of qualified applicants in anticipation of future human resources needs even though specific vacancies do not exist (Jaiswal, 2013). Apart from recruitment through *Internal Sources* which is notorious among organizations, Scrummy Food should use an enhanced recruitment technique through *External Sources* of recruitment, this is necessary to attract more potential job seekers. Scrummy Food' external sources of recruitment should comprise; a) Direct recruitment, or Campus recruitment, b) Indirect recruitment, c) Placement consultants, d) Head hunter (Jaiswal, 2013). In the direct recruitment method candidates will be screened and shortlisted from the Institutions, while in the indirect recruitment, the human resource department places advertisement in the Newspaper, Magazines, and the news media such as Radio, Television, and Internet and social media sites such as LinkedIn, Facebook, and Twitter and its company website (James, 2018). In the placement consultant, jobs will be placed with consultants who undertake the job of identifying suitable candidates for the company (Anderson, 2012). More so, head hunters will be used to recruit candidates especially nationally since they also specialize in matching jobs with people (Green, 2016).

Obviously, these outlined recruitment methods will enable Scrummy Food to attract a diverse group of candidates willing (Anderson 2012) to apply as potential employees, however, after receiving applications from job applicants, the selection process takes place. In doing recruitment, irrespective of the location or place, it is important to note that recruiting should be fair and equitable, more so, diversity should be considered (Muzumdar, 2017). Once recruitment is complete selection follows next.

VI. SELECTION

Selection is the process by which qualified and suitable employees are chosen and placed on the jobs in accordance with their competencies and company's requirements, according to

Thomas Stone, "Selection is the process of differentiating between applicants in order to identify those with greater likelihood of success in the job" (Agarwal, 2019). In addition, selection is the procedure of selecting the best candidates from the pool of job applicants, however, Selection is a tool in the hands of management to differentiate the suitable and unsuitable applicants by applying various techniques such as group discussions, personal interviews (Agarwal, 2019).

Once the desired number of applicants successfully applied to the advertised vacancies, the human resources manager of the company should ensure appropriate review of the applications without bias. During the review HR manager should consider important factors such as work experience, education, certification, and credentials of each applicant to make sure each applicant is fit for the job (Anderson, 2012), more so, the applicants culture should be considered because for making a smooth transition having similar culture is key (Anderson, 2012). Reference checks are also conducted which is necessary to gather factual evidence from third parties who have observed the candidate at work (Elsie, 2017). Besides, background and credit checks should be conducted to determine whether the applicant is legally qualified to work in the United States and to determine his credit history which is a predictor of his ability to meet obligations (Elsie, 2017).

Once the review process is complete applicants should be asked to complete an online tests and a comprehensive personality questionnaire (*but to cut cost and save time, the test and personality questionnaire should be done along with the application form*). However, the online test and personality questionnaire is to determine the applicant's suitability because the human resource department should apply evaluation tools before arranging for the final interview, so that it can properly predict the future behavior of the employee in the workplace (Elsie, 2017).

The tests should include *Cognitive Ability Test* - an assessment that measure a variety of applicant mental abilities such as verbal and mathematical abilities and reading comprehension (Pulakos, 2005). *Job Knowledge Test* which measure critical knowledge areas required to perform a job effectively, *Personality Test* which assess an applicant's qualities such as industriousness, extraversion, friendliness, openness to experience and emotional ability (Pulakos, 2005) important for job performance, and *Biographical Data Test* which ask applicants questions relating to their personal; background, characteristics or interest (Pulakos, 2005). All these tests should comprise mostly multiple-choice questions.

Those who are found suitable and best fit for the jobs after the online tests having passed their background and reference checks in particular, should be sent invitations to come to the company's site, for interview on a specified date and time. The interview should be structured, which is designed to ask applicants different types of interviewing questions in order to and provide information to determine the verbal communication potency of the candidate and to ascertain whether his/her tone is of consistent audibility at all times (Elsie, 2017).

The interview should depend on the resume of the candidate regarding experience with specific questions asked such as; how did you hear about us? Have you worked for Scrummy Food before? How many years of working experience do you

have? (Glassdoor, 2019). Why did you leave your last job? (Haden, 2019) and more. Depending on the position being hired, the candidate should also be evaluated on; *Product knowledge* question such as, do you have some industry or related industry experience or education? (Haden, 2019). *Management ability* question such as, how many people have you managed before? Do you feel comfortable managing other people? (Glassdoor, 2019), *Ability to prospect* questions such as, how you would get a qualified potential buyers for this company? (Glassdoor, 2019). *Problem solving* questions such as, do you understand a problem fully before trying to find solution to it? (Enns, 2019). *Reporting* question such as, do you communicate information back to management in a timely manner? (Haden, 2019). *Diversity* questions such as, describe what diversity and inclusion means to you, and why it is important in this position? (Enns, 2019).

Furthermore, the human resources staff should ask the candidates to complete short-form similar follow-up test comprising of few questions under his or her supervision (depending on where the application took place) to verify performance between the two test results (Glassdoor, 2019). More so, the candidates who successfully passed the final interview gets selected for the jobs, however, at this point salary, benefits, vacation time may be negotiated (Green, 2016), or they should be sent offer notifications with the date of orientation.

VII. TRAINING PROGRAM

There is a dynamic change in the talent's landscape due to global developments such as urbanization, demographic changes, and technological innovation, however, these trends result to shifts in the supply of talented employees when demand for skills is increasing sharply (Duggan, 2018). More so, through effective employee training programs HR professionals could offer employee supports in the most cost-effective and consistent manner (Duggan, 2018). Managing a business has become increasingly complex in today's global economy. Obviously, as industries become digitalized and tasks become automated, there is a shift in the kinds of skills required by organizations, with profound implications for how individuals will approach their career paths (Zhao, 2019). Besides, according to a recent report by McKinsey Global Institute titled, *Jobs lost, jobs gained: Workforce transitions in a time of automation*, indicates that by 2030 as many as 375 million workers or approximately 14 percent of the global workforce may need to switch occupational categories, however, many companies are facing a shortage of talent (Zhao, 2019).

Skilled and talented workforce is the greatest assets an organization has. Therefore, many young companies conscious for sustainable growth pay adequate attention to the training of their employees, as they are committed to providing them with opportunities and experiences that strengthen their skills and capabilities (Elsie, 2017). Obviously, 94 percent of employees would stay longer at a company if it invested in their career, through training (Zhao, 2019) alone which is the panacea for employee development.

Employee trainings are done for three main reasons: a) to ensure that employees have the skills needed to do the jobs today, b) to ensure that employees have the capabilities to support future business growth and c) to keep talented employees aboard (Zhao,

2019). Moreover, Scrummy Food should analyze training requirements to ensure the development of new training programs or modifications of the already existing ones (Duggan, 2018). The company should train instructors and supervisors in techniques and skills for training and dealing with every employee, and conduct an orientation sessions and arrange on-the-job training for new employees (Elsie, 2017). Furthermore, Scrummy Food should establish employee development programs, using the knowledge of effectiveness of methods such as classroom training, demonstration, on the job training, conferences, and workshops (Muzumdar, 2017).

Scrummy Food should develop and arrange training manuals, multimedia visual aids, educational materials, and testing and evaluation processes (Duggan, 2018). Besides, it should use the result of its periodic reviews to engage employees about the kinds of career opportunities the employees' desire, and incorporates their desires into the training program (Muzumdar, 2017). More so, Scrummy Food needs to include soft skills such as critical thinking, creativity and complex problem-solving to navigate through unforeseen challenges because while technical skills and competencies are needed, modern businesses require employees who are skillful in a variety of things (Zhao, 2019).

Scrummy Food needs to maintain sequence planning and benchmark strength for the workforce to make sure that the company is effectively resourced for the future in accordance with management development and career planning goals coupled with future demands of the company (Muzumdar, 2017). More so, it should set well-defined goals for the training program, and communicate the benefits and purpose of the program clearly, to all employees (Zhao, 2019)

The outlined training procedures are necessary because Scrummy Food appears to be one of the companies that still relying on dated, long-form training content that's subpar to the standards of today's workforce (Zhao, 2019).

VIII. COMPENSATION AND BENEFITS

The purpose of compensation and benefits systems is to align the performance of the organization with the way it rewards its employees, thus, providing the essential incentives and motivation required of an organization to achieve its goals (Allen, 2002). An organization's life cycle might determine its compensation strategy, thus, the supply and demand of desired skills in the market, economy, region or location where the company is located is a determinant factor in compensation strategy (Green, 2016). However, organizations must design compensation systems that motivate employees and embody fairness to everyone in the organization (Lonsdale & Milano, 2016).

Clearly, because of budget constraints, organizations cannot offer every benefit and incentive. Therefore, Scrummy Food should only offer comprehensive compensation and benefit packages whose components are a combination of base pay bonuses, profit sharing, share options, and a range of appropriate benefits (Allen, 2002). Such healthcare benefits should have reduced employee contribution determined usually based on market or competitor norms and the organization's ability to pay (Allen, 2002) and sick leave.

The company's reward program should incorporate employee recognition incentive schemes such as Employee of the Week, Employee of the Month, and Employee of the Year, team bonuses (Indiana State University, 2019). Moreover, there is need for other incentives such as award of points to employees that are based on performance, travel allowance, retail vouchers and coupons that may be exchanged for activities or trips (Allen, 2002). Obviously, poorly developed reward system might lead to increased employee anxiety and hostility, and eventual meagre use of both human and non-human resources, increased costs, and reducing productivity (Amiller, 2010). Nonetheless, there is evidence that companies view compensation as a strategic management lever and are increasingly experimenting with new practices geared towards the improvement of performance or skills of the workforce or reinforce culture or behavior change (Allen, 2002). The compensation program must accommodate diversity and shun all forms of discrimination.

Due to diversity Scrummy Food benefit packages should be structured to be attractive to all generations because compensation and benefit programs are essential in the recruitment, retention and motivation of employees, and such benefit plans should buttress their organizations culture, purpose and values (Lonsdale & Milano, 2016). Accordingly, organizations faces the challenges of designing employee benefits packages that will be suitable to the various levels of employees who are especially of different age groups (Lonsdale & Milano, 2016). Therefore, an organization's planning of the appropriate compensation and benefits for the current multicultural, and multi-generational workforce (Lonsdale & Milano, 2016) should be done prudently putting into considerations diversity.

Scrummy Food employees should be provided with voluntary benefits packages whereby employees are allowed the options to select benefits best tailored to their personal and perhaps family needs. Certainly, diversity in the workforce impacts the development of employee benefits packages by making an increasing number of employers to provide flexible benefits packages, a reflection of the understanding of employees' divers' needs that demand for different benefit packages (Indiana State University, 2019).

IX. PERFORMANCE MANAGEMENT

Performance management as a continuous and on-going function in an organization, it is an important tool for organizational success and productivity (Elsie, 2017), besides, it assist the organization in the identification of the right capabilities and retention of competitive knowledge for sustainable future (Narayana, 2010). (Băgu, Cătălina & Grigore, 2014) defined performance management as a planned and incorporated approach to delivering sustained success to organizations through improving the performance of the people who work in them and by developing the competences of individuals and teams. In addition, performance management/appraisal is the evaluation of an individual's performance in a systematic way (Elsie, 2017). Thus, it is a methodical and periodic way of conducting an unbiased rating of an employee's excellence in matters relating to the employee's present job and his potentialities for improvement on the job (Bhosle, 2012).

Performance appraisal at Scrummy Food should be designed with the objective of assisting employees with constructive criticism and guidance for the purpose of their improvement, for enhanced communication between employees and their leaders, and for improved understanding of personal goals and concerns (Elsie, 2017). Scrummy Food should have its performance management system incorporate the following phases; *Planning, Developing, Monitoring, Rating* (Elsie, 2017) respectively. However, Scrummy Food needs to create and install a reboots performance management procedure that sets out performance objectives for all employees (Allen, 2002). Besides, The HR manager must make sure that all the managers in the company receives training on how to fill out the assessment forms, particularly how to discuss job performance with the employee

Scrummy Food should put in place strategic plan for the flexible workforce, with clearly stated job description, total time allowed to be worked per week or per month, and the organizational goals (Elsie, 2017). More so, the company should set out its performance standard and ensure that employees meet the company's expectations (Elsie, 2017). The manager must notify newly hired employees how their jobs are to be performed and their capabilities in meeting the company's expectations should be evaluated as work performance later (Elsie, 2017). Scrummy Food should monitor the employees' job performance and with provision of adequate periodic feedback to them, in order to improve and maintain their work performance (Elsie, 2017). According to Allen (2002) the most critical aspect of performance management is a robust performance review process that gives employees feedback about the level of their achievement and what areas that deserve improvement.

Scrummy Food should conduct proper assessment of employees performance using the most appropriate and accurate rating method, however, the performance should be measured using the 360 or 720 degree appraisal technique for the most accurate result (Elsie, 2017). 360 or 720 Degree performance appraisal method is the assessment of employee performance from all the aspects and giving timely feedback to ensure that the person is able to achieve the set goals before the next appraisal (Anupama, Binu & Dulababu, 2011). Moreover, unlike the previous methods that did not guide the employee, 720 Degree appraisal aims at monitoring, measuring, giving feedback, inspiring employees to accomplish the objectives and for the organization in turn (Anupama et al. 2011). However, the fundamental need of the 360 or 720 Degree performance appraisal is the improvement of the employees in their jobs and ensuring that employer's expectations, and that of the employees and customers are met (Anupama et al. 2011). Furthermore, the Scrummy Food should put in place plans for the improvement of work related skills or knowledge for the employees, to encourage them to grow their performance standard and quality of work to meet the company's objectives (Elsie, 2017).

Performance management reflects organizational performance, and it provides a link and rational for other HR activity, and the highest opportunity to directly affect business success, enhancing HR's reputation and contribution (Elsie, 2017). Scrummy Food should establish a robust performance management strategy because performance indicates the level of employees expertise, and performance is used for; compensation adjustment, promotions, how well the HR is functioning,

feedback, job design errors and deficiencies – bad performance implies weakness in the personnel department’s staffing procedures Bâgu et al (2014).

Diversity



Human resource manager’s main role is in management and leadership that creates and empowers a diverse culture, thus, a culture that is respectful and inclusive and offers every employee the chance to learn, grow and contribute to the company. However, workplace diversity affects the development of interpersonal relationships, the nature of interaction and relationship between managers and employees, it also impact human resource functions, and however, workplace diversity increases HR duties in many ways, and holds the department of human resources accountable for functions mandated by law. Diversity can assist organizations to gain a competitive edge in global markets and when targeting business segments that require input from diverse perspectives. HR expertise is useful in evaluating where candidates should be placed in a company in order to extract the most valuable contributions from them. Indeed, the workplace is becoming increasingly more global, therefore, diversity translates into a competitive advantage for companies who embrace it, because it enables those companies to find and leverage untapped opportunities (Stevenson, 2019). More so, diversity offers companies the opportunity for the identification of new trends, thus, diversity increases motivation, reduces absenteeism and increases productivity levels by creating an inclusive environment (Stevenson, 2019). The first step in enforcing workplace diversity in the workplace is to ensure that published notices about workplace diversity are posted in conspicuous places throughout the workplace such as break rooms, restrooms, parking lots, and walkways. Obviously, the posters furnishes employees with the information about their civil rights, federal and state laws that stresses equal opportunity for employment, irrespective of national origin, genetics, race,

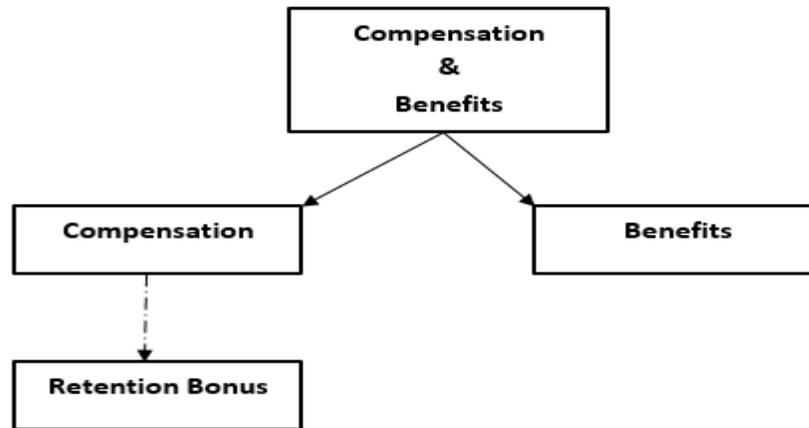
religion, sex, sexual orientation and veteran status. Moreover, HR should conduct periodic walkthroughs to ensure that the company’s posters are intact and up-to-date. Besides, the company’s recruitment advertisements should also reflect the message that the company is an *equal opportunity employer*, this procedure will encourage divers’ job seekers to submit their resumes for considerations.

The company should develop written affirmative action programs that include record keeping obligations for applicant logs, adverse impact analyses and workforce utilization calculations to support the company’s outreach efforts to achieve workplace diversity (Mayhew, 2019). Certainly, managing a diverse workforce can contribute to increased employee/staff retention and productivity, besides, it enhances the organizations responsiveness to an increasing diverse array of customers, improve relations with the surrounding community, increase the organization’s ability to cope with change, and expand the creativity of the organization.

Human Resources should contract diversity consultants or experts or evaluate training modules that are suitable for the workforce, and in situations whereby certain jurisdictions prohibits particular trainings, HR should be involved in the determination of whether to make diversity training mandatory, because the decision to mandate workforce training is a strategic function of HR since it involves the assessment of the workplace climate and whether supervisors and managers would benefit from mandatory training or if informal activities are enough to buttress the organization’s workplace diversity values (Mayhew, 2019). More so, HR manager should monitor diversity which might be done through audit, not only for current employees, but in recruitment practices as well, certainly, monitoring diversity enables progress to be measured effectively (Stevenson, 2019). In a global marketplace, there is more likelihood for an organization to be able to meet its customers’ needs and gain access to new markets with a diverse workforce, in addition, bringing in talent into the workplace whose experience or background pertains to these new markets could be an effective solution to accessing these markets because differing skills are needed to break initial barriers to entry. Apart from recruitment and selection, training, compensation, and performance appraisal, diversity should also be incorporated in other areas such as mentoring, supplier chain diversity, development and leadership to make sure that the company is aiding ethnic minority progression.

Retention Bonus

The gradual scarcity of skilled employees with expert experience has forced many companies to adopt retention bonus as the most assured way of retaining skilled employees, thus, most organizations find losing good employees worrisome irrespective of the size of the existing labor pool or state of the economy (Lohrey, 2019). Obviously, many organizations have discovered the benefits associated with offering retention bonuses and therefore they currently see it as a successful tactic for retaining important employees (Schechtman, 2019).



A retention bonus is a form of financial incentive designed to keep an employee at a company, however, retention bonus is generally given during stressful times at an organization such as acquisition or merger, and they may be offered to important employees intending to leave the company. Obviously, organizations may offer a significant bonus in order to keep key employees, nonetheless, these bonuses are singular transactions in order for an organization to express its appreciation for a job well done. During an acquisition or merger, retention bonuses are usually given as opposed to salary raises because the company might be short off the necessary finances required to commit to a permanent raise.

Without the payment of retention bonuses there is increase likelihood of the erosion of good skilled and talented employees from the organization. Accordingly, a 2016 *World at Work Survey* shows that, of the 673 respondent received, 74% of companies use retention bonuses, and that 77% of respondents offering retention bonuses did so at the discretion of management (Lohrey, 2019). Moreover, Scrummy Food should establish retention bonus programs basing it rate depending on the financial state and information on what competitors are paying (Lohrey, 2019). Information obtained from Salary.com indicates that retention bonuses are normally about 10 to 15 percent of salary (Lohrey, 2019).

X. CONCLUSION

An efficient HR plan is the most essential aspect of Scrummy Food growth strategy as a young company, for employee recruitment, provision of leadership and direction to the employees of the company, and to ensure thorough training of its employees and to provide them with career development as well as compensation and benefits options. Besides, it will assist the company to ensure that it has the proper ongoing recruitment and selection processes, performance evaluation methods, compensation and benefits programs, and most regular training and development programs for employees.

A standard HR plan will assist the HR manager to ensure that performance appraisals are going on continually thus enabling employees to understand the level of their inputs and to make needed necessary corrections. More so, it will assist the company to ensure that the right people are hired as need arises, emphasis

on improving the skills with the intention of equipping them with the skills needed in future for the attainment of the company's goals. Furthermore, it will enhance the company's productivity and reduces employee turnover by attracting the best employees in place. Obviously, diversity has become an intricate part of the HR plan as it is directly related to the company's productivity, profitability, public perception and external relations, more so, the inclusion of retention bonuses in the HR plan is necessary to ensure the retention of some of the highly valued employees who are viewed as assets to the company.

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THE IMPACT OF ORGANIZATIONAL CULTURE AND TRANSACTIONAL LEADERSHIP STYLE ON EMPLOYEE PERFORMANCE IN PT. PEGADAIAN (PERSERO) OFFICE REGION III PALEMBANG

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DOI: 10.29322/IJSRP.9.08.2019.p9236

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9236>

ABSTRACT : The purpose of this study is to show the influence of organizational culture and transactional leadership style and to know the variables that have dominant influence on the performance of employees of PT. Pegadaian (Persero) Regional Office III Palembang. Qualitative data is used in this study in the form of a questionnaire with the use of the Likert scale. In this study the population used is all employees of PT. Pegadaian (Persero) Palembang Regional Office III as many as 105 respondents with saturated sampling technique. The results obtained are organizational culture and leadership style able to influence the performance of employees of PT. Pegadaian (Persero) Palembang Regional Office III positively and significantly. The results of the F test show that together the variable organizational culture and transactional leadership style can significantly influence employee performance

KEYWORDS : organizational culture, transactional leadership style, employee performance

INTRODUCTION

The number of human resources (employees), an organization must think of ways to be able to utilize and optimize the performance of employees. This is because employees are one of the important assets needed by the organization to carry out the production process which is a problem is how to produce employees who have optimal performance. Optimal employee performance is one of the goals of the organization to achieve high work productivity.

Employee performance effectiveness can be influenced by an organization with a strong culture. In addition, the application of culture in a company will also shape the character of its employees by themselves in carrying out their duties and achieving the goals of the company. In addition to organizational culture, leadership style also affects employee performance in a company.

According to Stephen P. Robbins (2016), leadership is the ability to influence a group toward achieving goals. On the side of Maulizar (2012; 4) argues that the concept of leadership that is growing rapidly is the concept of transactional and transformational leadership which was later popularized by Bass in 1985. Transactional leadership refers to the concept of barter between leaders and staff, good subordinate performance is the leader's expectations, while staff expect economic rewards and rewards from the leader. Whereas transformational leadership refers to the concept of subordinate development.

PT Pegadaian (Persero) Regional Office III Palembang is an Indonesian state-owned financial sector engaged in three business lines of the company, namely financing, gold and various services that have operational areas covering 5 provinces, namely South Sumatra, Bandar Lampung, Jambi, Bengkulu and Bangka Belitung Like other operational areas. In line with the improvement of the strategic initiative program 2019, Palembang Regional Office III made the planned target to be increased in terms of quantity and quality so that all elements of management and workers must understand so that the company's target, vision and mission can be carried out properly.

PT Pegadaian (Persero) has a good organizational culture and has been used as a guide and direction to be adhered to in achieving organizational goals, but informally there have emerged unhealthy cultures such as employee mentality which have resulted in less creative and innovative behavior, less attitudes respecting colleagues and leaders, lack of discipline, and lack of competencies related to understanding corporate culture. This results in employee performance not being optimal, such as unfinished work on time and the quality of work that does not meet the standards.

Apart from unhealthy cultures, there are also behaviors of the low performance of PT Pegadaian (Persero) employees. in the form of lack of responsibility for carrying out tasks, procedural deviations from SOPs, low discipline.

PT Pegadaian (Persero) performance data in Regional Office III Palembang that PT Pegadaian (Persero) Palembang Regional Office III has 32 branch offices spread in 3 cluster areas namely Palembang, Jambi, Lampung. Overall there are 93.75% or 30 branch outlets that do not reach the set target. There are even around 25 branch outlets that get realization below 80% of the target set. The best achievement came from 2 outlets that managed to record the realization above 100% of the target set.

The lack of achievement of PT Pegadaian (Persero) performance in Palembang Regional III Office according to the possibility caused by several things, such as: employers who are less able to influence employees to be disciplined and comply with rules set by the company and the ability to bring employees to the goals to be achieved by the organization. The lack of functioning of the organizational culture that has existed in the organization as a norm in behaving in the organization, and the lack of education and training that can provide additional knowledge for employees to achieve the expected target.

The indicator of employee performance measurement according to Robbins (2015) in the form of work quality, timeliness, initiative, capability and communication becomes a matter that needs special attention so that companies can compete with other companies in the current era of globalization.

LITERATURE REVIEW

Organizational culture

According to Boke and Nalla (2011) organizational culture can be measured by five indicators as follows: (1) regulations are implemented uniformly for all parties without regard to certain conditions or certain problems. (2) Distance with superiors, each employee can freely express opinions and ideas that are different from his superiors. (3) trust where employees are open to other employees. (4) professionalism by carrying out work with very good quality can develop employee capabilities. (5) integration where employees are friendly in their association.

Human resources are part of a culture that affects each other. That is because the culture that forms the predecessors in the organization then creates norms and values according to ideology that can help in achieving organizational goals.

In the end the culture formed will affect human resources and then new resources in the organization can influence the formation of culture itself.

Transactional Leadership Style

According to Robbins & Judge (2015) transactional leadership style is a type of leadership where leaders integrate or motivate their followers in the direction of goals that are upheld by clarifying the roles and demands of the task. In Robbins & Coulter (2012: 497), transactional leadership is a leader who guides and motivates followers in the form of appreciation for their productivity / performance.

Employee performance

Performance is a work performance or a real achievement achieved by someone. According to Robbins (2012), performance is the actual performance of employees compared to the expected performance of employees.

Dimensions of employee performance according to Robbins (2016), namely as follows:

1. Quantity

Quantity is a measurement of the performance of an employee by assessing the quantity of work completed in a period.

2. Quality

Quality measurement of an employee's performance by assessing the quality of work performed as expected.

3. Timeliness

Is a measure of performance based on the accuracy of the time planned. Timekeeping measurement is a special type of quantitative measurement that determines the timeliness of completion of an activity. We can see this from the level of employee attendance, employee compliance at work.

RESEARCH METODOLOGY

In accordance with the issues to be discussed and so as not to widen the discussion, the authors need to make the scope of the discussion only on the aspects of relationship Organizational culture and Transactional leadership style on the performance of PT Pegadaian (Persero) Regional III Palembang employees.

Data source

1. Primary data is a source that provides data to researchers found from direct observations or observations to PT Pegadaian (Persero) Palembang Regional Office III, besides that the author distributes questionnaires and interviews directly to employees of PT Pegadaian (Persero) Regional Office III Palembang.

2. Secondary data, namely data that has been collected in advance from other parties such as the company's official website, journals relevant to research, articles in newspapers, HR management books related to the object of research.

Population

In this study the population used was employees of PT Pegadaian (Persero) Palembang Regional Office III as many as 105 people.

RESULTS AND DISCUSSION

Coefficient of Determination (R²)

Table 1. Coefficient of Determination (R²)

Model	R	R Square	Adjusted R Square	Std. Error Of The Estimate
1	.583 ^a	.340	.327	5.578

From the table above explains the value of R² (coefficient of determination) of 0.340 means that the independent variable can explain the effect of the dependent variable by 34% while the remaining 66% (100% -34% = 66%) is explained by other factors not discussed in this study.

Analysis of Multiple Linear Regression

From the test results, the equations that can be formed are as follows:

$$Y = a + b_1X_1 + b_2X_2$$
$$Y = 26.208 + 0,1986X_1 + 0,381X_2$$

From the results of the equation, it is obtained that the constant results of 26.208 are positive which means that the independent variables of organizational culture are 0.196 and transactional leadership is 0.381 against the dependent variable of employee performance.

Model Feasibility Test (F Test)

In principle, F-test analysis (ANNOVA) is used to show the effect of organizational culture variables and transactional leadership styles on employee performance. The following testing criteria:

- If prob F is greater than 0.05 it means no significant effect
- If prob F is smaller than the meaning it has a significant effect

The following are the results of ANNOVA testing which can be seen in the table below:

Table 2. F Test

		ANNOVA ^b				
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1632,965	2	816.482	26.239	.000^a
	Residual	3173,950	102	31.117		
	Total	4806,914	104			

Independent Variable : Organizational Culture and Transactional Leadership Style
Dependent Variable : Employee performance

The results of multiple regression tests on the level of confidence of 94% obtained a value of Fcount of 26.239 greater than the value of F table. The results of F table are 2.69% calculated from $(n-k) = 105-3 = 102$ and F count is 26,239 with a probability level of 0,000 which means that Fcount is greater than F table and Prob Significance is smaller than 0.05. it can be concluded that the independent variable (Organizational Culture and Transactional Leadership Style) has a significant effect on Employee Performance.

Individual Parameter Significance Test (t Test).

The t test basically shows how far the influence of an explanatory variable is (variable X1, X2) partially (individually) in explaining variable variations bound.

Table 3. Regression Coefficients

Model	Coefficients			t	Sig.
	Unstandardized Coefficients	Std. Error	Standardized Coefficients		
1	B		Beta		
	(Constant)	26.208	4.551		5.759
	Organizational Culture	0,196	0,070	0.262	2.804
	Transactional Leadership Style	0,381	0,088	0.403	4.307

Dependent Variable : Employee performance

Data Source: Processed from the Questionnaire

From the results of the t test it can be concluded that:

1. Beta value in the organizational culture variable is 0.262 with the sig value. 0.006 smaller than 0.05. meaning that organizational culture can affect employee performance positively and significantly.
2. The beta value of the transactional leadership style variable is 0.403 with the sig value. 0,000 is smaller than 0.05. meaning that transactional leadership styles can affect employee performance positively and significantly.

CONCLUSION

The results of the assessment of multiple linear regression analysis with two independent variables namely organizational culture and transactional leadership style and one dependent variable of employee performance indicate that organizational culture and leadership style variables have a positive and significant influence on employee performance at PT. Pegadaian (Persero) Regional Office III Palembang.

SUGGESTION

Based on the results of the research, and the conclusions above, the researcher can propose a number of suggestions as follows:

1) For PT. Pegadaian (Persero) Regional Office III Palembang

Leadership style at PT. Pegadaian (Persero) Palembang Regional Office III that needs to be done by the company is to maintain the existing conditions and improve this condition towards a better one. Leaders must pay more attention to policies that are in accordance with procedures and give authority to their subordinates to make decisions together. In addition, leaders should pay more attention to the ongoing work process, where leaders can clarify goals and communicate the objectives and expected results. So that it can create participation and communication between superiors and subordinates.

2) For Further Researchers

For the next researcher can examine organizational commitment, training and so on and can expand the sample to strengthen and produce good research.

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Study on the Impact of Non -Financial Rewards on Turnover Intention: Mediating Role of Intrinsic Motivation (with Special Reference to the Hotel Industry of Sri Lanka)

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DOI: 10.29322/IJSRP.9.08.2019.p9237

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9237>

Abstract- Employee Turnover Intention is recognized as one of the strategic and critical issue in competition among organizations especially in the hotel industry in Sri Lanka. Therefore, organizations try to minimize their turnover ratio in order to save their cost, consists of hiring, recruiting and selecting the employees. Thus the study mainly focuses about two objectives as to identify the impact of the non-financial rewards on employee turnover intention as well as to identify the mediating effect of intrinsic motivation on the relationship between non-financial rewards and the turnover intention. The sample consisted of two hundred operational level employees working in Sri Lanka Tourism Development Authority (SLTDA) resisted five star hotels. The data were gathered by self-administrated questionnaire and the data were analyzed by using simple regression analysis as well as Baron and Kenny mediation analysis method. The analysis exposes that there is a strong negative relationship between the employee non-financial rewards and turnover intention. Mediating analysis results goes to show that intrinsic motivation partially mediate the relationship between non-financial rewards and employee turnover intension. The results help top managers to formulate effective strategies to retain their employees in the long run.

Index Terms- Non-Financial Incentives, Intrinsic Motivation, Turnover Intention, Hotel Industry, Sri Lanka Tourism Development Authority

I. INTRODUCTION

Human Resource is one of the most important and a valuable resource in any organization. They are the source of achieving organizational major goals and competitive advantage because of it has the capability to convert the organizational input into output. The terms of human resources refer to the tangible assets, but they are capabilities take intangible (knowledge, skills, creative abilities, talents, values and beliefs) of an organization's work force environment. The competitors can create other resources like physical materials, technological methods, practices and strategies while the human resources are unique to each and every organization.

Hospitality is a rapidly expanding industry world-wide. It is expected to remain a leading contributor to the global economy by generating desired foreign exchange reserves to the country and same time creating employment opportunities. Development of human resources (HR) remains the most important and significant factor for the success of the hospitality industry of the country. According to the Nankervis & Deborah (1995) Human resources in the hospitality sector require not just a human touch and "service with a smile" but also yearn for individuals who are multi skilled, cross-trained, forward looking in terms of perspective and mindset, and embody strategic creative and systematic thinking. Employees often resist change and prefer to adhere to the traditional values and practices. Many organizations have come forward, and are doing remarkably well in the development of human resources to meet international standards in the hospitality field Tourism Industry.

According to Whetten and Cameron (2007) highlighted that non-financial rewards effectively engage in motivating employees .In 2004 Brown et al. suggested that labour turnover affects both workers and firms. Most researchers proved that employee turnover is one of the major issue related to the hospitality industry. Therefore According to the Khan et al in 2013 suggested that Organization tries to reduce turnover intention through reward climate in the workplace. Simultaneously non-financial rewards establish the linkage with intrinsically motivated behaviour.

Tourism income is one of the important segments that contribute to the Sri Lankan economy. Recent trends of Sri Lankan Gross Domestic Production (GDP) shows a significant role which played by the service sector indicating over 60 percent contribution. According to annual research statistics of 2017, tourism' total contribution to GDP was recorded as 13.5percent. And also tourism' total contribution to employment was increased by 2.8percent with comparing 2016. It is proved that high number of

employment opportunities can be seen in the context of hotel industry. Under the research area researcher selected 5 star categorical hotels in Sri Lanka. According to the Sri Lanka tourism development authority (SLTDA) annual report in 2019, there are 23 registered 5 star hotels can be identified. his article guides a stepwise walkthrough by Experts for writing a successful journal or a research paper starting from inception of ideas till their publications. Research papers are highly recognized in scholar fraternity and form a core part of PhD curriculum. Research scholars publish their research work in leading journals to complete their grades. In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

Problem Statement

According to the Ranasinghe & Sugandhika (2018) Tourism income is one of the important segments that contribute to the Sri Lankan economy. Recent trends of Sri Lankan Gross Domestic Production (GDP) shows a significant role which played by the service sector indicating over 60 percent contribution. But Hotel industry faces the problems in developing and maintaining the required manpower. Number of researchers highlighted that, comparing with others hotel industry have considerable employee turnover ratio. Since because of that firm growth and productivity can be reduced.

Barney & Wright (1997) stated that the firm's people are its most important asset. The large number of human contributions can identify in the Hotels, but Labour turnover is the major human side problem. Employee turnover, as defined by Him and Griffith (1994), is 'voluntary terminations of members from organizations'. According to Khatri et al. (1999), turnover intention is occurring when an employee willing to switch their existing job to another, based on their individual desire. One of the major issues which have been part of tourism industry in past is to row out itself from the problem of employee turnover rate. It is said that employee turnover is one silent part of human resource management which can have a negative impact for the organization if managed inadequately.

According to Whetten and Cameron (2007) suggested in the literature of human resource management and organizational behavior that non-financial incentives act effectively in motivating employees .In 2004 Brown et al. suggested that labour turnover affects both workers and firms. Similarly, Khatri et al., (1999) mentioned and Barnett (1995), Chang (1996) Syrett (1994) suggest that employee turnover is a major problem for companies in many Asian countries include Sri Lanka. Every organization tries to reduce turnover intention regarding the reward climate in the workplace (Khan et al., 2013).

In the Sri Lankan context, considerable number of researchers explains the only turnover intention. There is no combination turnover intention, non-financial rewards and also intrinsically motivated behaviour. There is a deficiency of researches related to a particular research area and could find contradictory ideas between variables. It provides knowledge and empirical gap for relevant research problem.

Research Problem

- What is the impact of non -financial rewards on turnover intention of Operational levels employees in Hotel industry?
- What is the impact of non -financial rewards on turnover intention through intrinsic motivation of Operational levels employees in Hotel industry?

Research Objectives

- To identify the impact of non -financial rewards on turnover intention of Operational levels employees in Hotel industry?
- To identify the impact of non -financial rewards on turnover intention through intrinsic motivation of Operational levels employees in Hotel industry?

II. LITERATURE REVIEW

This is important especially when countering the other factor of turnover intentions in the long run. It is a known fact that employees desire a compensation system that they perceived as being fair and commensurate with their skills, experiences and knowledge. Therefore HRM must take note that pay is the main consideration because it provides the tangible rewards for the employees for their services as well as a source for recognition and livelihood. Employee compensation and benefits includes all form of pay, rewards, bonuses, commissions, leaves, recognition programs, flexi work hours and medical insurance (Sherman et al., 1998).

Human resources in the hospitality sector require not just a human touch. Because it encompasses with the “service with a smile”. But also desire for individuals who are multi skilled, cross-trained, forward looking in terms of perspective and mindset, and embody strategic creative and systematic thinking. According to the Nankervis & Deborah (1995) identified that to encourage tourists to choose a specific hotel, the hoteliers must meet or exceed the guests’ expectations of service quality

Turnover intention

Turnover intention is a high degree of problem for each and every organization. Most of the organizations always concerns about their turnover intention deeply. It is a serious human side problem for the organization. A huge number of employee turnover may be harmful to both the organization performs as well as the employees work life. If the organization turnover intention is high, they want to spend extra expenses for recruiting and training new workers. It will be negatively impacted to the organizational cost function and work environment. According to Abassi & Hollman (2000) identified Employee turnover is the rotation of workers around the labor market, between firms, jobs and occupations, and between the states of employment and unemployment. Simultaneously Turnover Intention is defined by Lee (2008) as the subjective perception of an organizational member to quit the current job for other opportunities.

In 2006 Carmeli and Weisberg used the term turnover intentions to refer to three particular elements in the withdrawal cognition process (i.e., thoughts of quitting the job, the intention to search for a different job, and then intention to quit. Sousa-Poza & Henneberger (2002) defined turnover intent as the reflection of the probability that an individual will change his or her job within a certain time period. Although, there is no standard framework for understanding the employee’s turnover process as whole, a wide range of factors has been found useful in interpreting employee turnover Kevin et al. (2004).

Non-Financial Rewards

Rewards are imperative factors that illuminate certain job aspects that contribute significantly to the organization such as job satisfaction (Maqsood Haider, 2015). Rewards are basically categorized into two parts as financial rewards and non-financial rewards. In classifying the non-monetary incentives, the breakdown of on-the-job rewards proposed by Meacham and Wiesen (1969). Non-monetary incentives are the tangible rewards, social practices or job related factors that are used in an organization to motivate employees without direct payment of cash. According to the Depedri (2010) suggested rewards, therefore, involve all economic benefits that are being supplied by the organization-pay, promotion, verbal recognition and responsibilities whether they are financial or not. Non-monetary incentives are rewards that an individual experiences and it is highly and directly effect on the organization itself. (Falola, et al, 2014; Kinicki and Williams, 2003). According to Whetten and Cameron (2007) mentioned about the essence of incentives is to establish linkage with desired behavior and the outcome that makes the employee feel appreciated.

Non-Financial Rewards & Employee turnover

According to Henry Ongori (2007) mntioned about the organization should pay employees based on their performance and in addition they should give employees Rewards like individual bonus, lump sum bonus, sharing of profits and other benefits. Hence, if these are put in place they would minimize employee turnover. Employee turnover can often be conceptualized in terms of different factors. A number of scholars given their own idea about the turnover intention according to their different point of view. Therefore many researchers suggested that there is a link between non-financial rewards & employee turnover.

Non-Financial rewards & Intrinsic Motivation

According to the previous researchers, relationship between non-Financial rewards & Intrinsic Motivation can be identified. In 2013 Khan et al. suggested non-financial rewards play a significant role in the perception of the employee regarding the reward climate in the workplace. Bob Nelson (2001) also supports the view that there is a strong link between non-financial rewards and improved job motivation. Scott Jeffrey’s paper (2002) implies that the use of tangible non-financial rewards might accomplish the objective of motivating employees in a lowest cost better than the market value of that incentive in cash. Brain processes information affects tangible non-financial incentives having a greater impact on people than cash rewards (Alonzo, 2004). Bob Nelson (2001) also

highlighted the view that there is a strong relationship between non-cash incentives and improved job motivation. Stark (2007) regards non-financial rewards as crucial in helping an organization stand out as a top employer, and also have the dual impact of increasing engagement among employees. The essence of incentives is to establish linkage with desired behavior and the outcome that makes the employee feel appreciated in the psychology literature, intrinsically motivated behavior is stated to arise from innate psychological needs, such as needs for competence and autonomy (Deci & Ryan, 1985; Kasser & Ryan, 1996).

III. RESEARCH METHODOLOGY

The research study depended on the survey technique because, according to the nature of the research, the investigator presumed it to be the most suitable technique. The research sample is consisting with 200 operational level employees who are employed in five star category hotels in Sri Lanka registered with the Sri Lanka Tourism Development Authority. The data were collected by using self-administrated questionnaire with five-point Likert scale statements by using convenience sampling method. To assess the reliability engaged in the study constructs, reliability testing was conducted to guarantee measurement reliability. Hence, the reliability of the research constructs in the acceptable level as 0.743 in all the dimensions of the questionnaire.

In order to assess the impact of the non- financial rewards on employee turnover intention of the employees Karl Pearson Correlation coefficient as well as the simple regression analysis was utilized. Moreover, to identify the mediating effect of the intrinsic motivation between the dependent and the independent variable Baron and Kenny four step mediator analysis model was employed. To identify the indirect effect of the mediator researcher used Sobel test analysis.

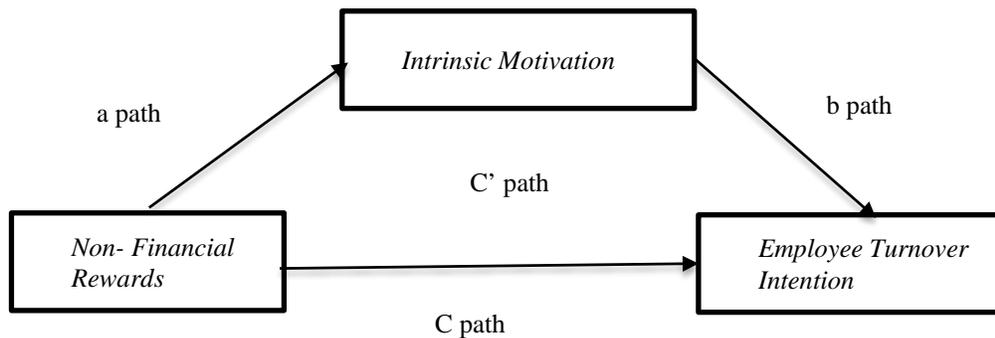


Figure 1-Conceptual Model of the Study
Source: Based on the Review of the Literature

- Hypothesis One: There is a relationship between Non-Financial Rewards and employee Turnover Intention.
- Hypothesis Two: There is a relationship between Non-Financial Rewards and Intrinsic Motivation.
- Hypothesis Three: There is a relationship between Intrinsic Motivation and employee Turnover Intention.
- Hypothesis Four: Non-Financial Rewards influence employee Turnover Intention through Intrinsic Motivation.

IV. DADA ANALYSIS AND INTERPRETATION

Descriptive statistical Analysis used in order to analyze the existing situation of the non-financial rewards, intrinsic motivation and turnover intention dimensions. Descriptive analysis provides a clear summary regarding the sample of the study. The majority of the executive level employees in this research sample were male employees (86%) and the age group 25 to 35 was the most frequent age category who is working in the five star category hotels in Sri Lanka (77.3%). Significant numbers of employees who are employed in this industry have 5-10 years of service experience and it is identified as 76.7% of the sample.

Mean value with non-financial rewards of employees was 3.74 and it implied that employees were moderately agreed with non-financial incentives. The standard deviation and coefficient of variance was 0.66 and 45.62% respectively. Furthermore, the mean value of the intrinsic motivation variable was 3.79 and therefore the employees were moderately agreed with intrinsic motivation. The standard deviation and coefficient of variance is 0.76 and 57.7% respectively. The mean value of the employee turnover intention was 1.73. It implied that employees were disagreed with turnover intention. The standard deviation and coefficient of variance is 0.79 and 70% respectively. When considering the overall mean values, it can be clearly recognized that there was not higher variation between those values.

Based on the analyzed data the correlation value between independent and dependent variable was negative 0.62 which implied that there was a strong negative relationship. Furthermore, p-value of the results was 0.02 which emphasizes that there was a significant

negative relationship between independent and dependent variables at 0.05 significant level. This illustrate when non-financial rewards increase, turnover intention would be decrease.

In order to identify the impact of the non- financial rewards on employee turnover intention simple regression analysis was conducted and the results are summarized as follows.

Table 1-Regression Output

Model	B	Standard error	t value	P value
Constant	3.166	0.392	9.266	0.000
Non- Financial Rewards	-0.569	0.167	-6.549	0.000

Dependent variable: Turnover Intention

Source: Based on analyzed data

Based on the analyzed data the constant value is +3.166. It implies that the value of turnover intention, when the non-financial reward is equals to the zero level. Moreover, the coefficient of non-financial incentives is -0.569. It is the average change in turnover intention due to the one unit change in non-financial rewards. It explained about that when non-financial rewards were increase by one unit, turnover intention decrease by the 0.586 times. In addition to that it's also implies that the negative relationship between non-financial incentives and turnover intention at 0.05 significance level ($p < 0.05$).

In accordance with the significance of the model the p value is 0.000, therefore, the regression model is significant at 0.05 significant level. When consider about the linear regression model summery the R2 value was 0.27. In accordance with that it can be concluded 27% of total variation of Employee Turnover Intention is explained by the Non- Financial Rewards. On the other hand, 73% of total variance in the dependent variable is unexplained by the linear regression model. Therefore, it appears that the model was fitted in unfair manner. Because of, the unexplained variation is higher than the explained variation.

Mediator analysis

In order to identify the mediating role of the Intrinsic Motivation with the relationship with independent and the dependent variable, Baron and Kenny mediator analysis was conducted. The result of the mediating analysis is summarized as follows;

Table 2- SPSS Output of mediator analysis

Path	B (unstandardized coefficient)	Standard error	B (standardized coefficient)	P value
C path	-0.569	0.054	0.565	0.000
A path	0.564	0.072	0.563	0.000
B path	-0.516	0.053	-0.513	0.000
C' path	-0.373	0.060	-0.365	0.000

Source; Based on analyzed data

The above table revealed that the all four paths are significant with the coefficients of 0.569,0.564,-0.516,-0.373 at the 0.05 significant levels. In accordance with the coefficient between Non- financial rewards and Employee Turnover Intention it can be clearly identified that there is a strong negative relationship between both variables. Because of it implied value as -0.569. In addition to that p value denotes 0.000. Therefore, it is significance at 0.05 level. Hence it can be concluded that there is a strong negative relationship between independent and dependent variable without having any mediator. Additionally, according to the Baron and Kenny mediation model c path is significant.

Moreover, the coefficient between Non-Financial Rewards and Intrinsic motivation was 0.564. It suggested that strong positive relationship between independent and the mediating variable. With reference to the Baron and Kenny a path also significant at 0.05 level because the p value is 0.000.

Similarly, the coefficient between intrinsic motivation and Employee Turnover Intention was negative 0.516. It illustrates that there is a strong negative relationship between the mediating variable and the dependent variable. With reference to the Baron and Kenny mediator Analysis, b path also significant at 0.05 level because the p value is 0.000.

As per the table, the data support for a statistically significant relationship ($P < 0.05$) between the variables when analyze the independent variable and Mediating variable in predicting dependent variable. It implied coefficient value as negative 0.373. Hence there is weak negative relationship between variables when mediator is in the model. Therefore, the c' path also significant and When compare the c path and c' path there is a significant difference between the coefficients of the two paths.

$$C \text{ path} - c' \text{ path} = -0.569 - (-0.373) = -0.196$$

Based on the above difference, when mediator is in the model, the effect of independent variable on dependent variable is reduced. Coefficient difference is negative 0.196 and it implied that intrinsic motivation partially mediates the relationship between Non-Financial Rewards and Employee Turnover Intention at 0.05 significant level.

Moreover, Sobel calculation illustrates the portion of Non-Financial Rewards on Employee Turnover Intention due to the mediating effect of Intrinsic Motivation and it is 41.33% at the 0.05 significant level. Thus, the Mediator analysis and Sobel test identified that intrinsic motivation partially mediates the relationship between the Non-Financial Rewards and Employee Turnover Intention.

V. CONCLUSION

Overall summary of the research study mentions about the most important idea about the influence of non-financial rewards on turnover intention for operational level employees in the hotel industry. Based on the results of the regression analysis there is a strong negative relationship between Non-Financial Rewards and Employee Turnover Intention. These findings are agreed with results of the study previous literature and Stark (2007) regards nonfinancial rewards as crucial in helping an organization stand out as a top employer, and also have the dual impact of increasing engagement among employees. Moreover, the study identified Intrinsic Motivation as a mediator in between Non-Financial Rewards and employee Turnover Intention. Intrinsic Motivation partially mediates the relationship between Non-Financial rewards and Turnover Intention of the employee. This research discovered that non-financial rewards for staff are the most significant driver of reducing the intention of operational level employee turnover in the hotel industry, it is stated that businesses should give high priority to improving their non-financial incentive package. Despite the fact that hotel industry employees work under tight schedules, additional non-financial incentives are not given. Thus, Organizational management can properly improve employee enrichment and it will help to improve the quality of work life for the worker. It can produce a better working atmosphere. In addition top management should allocate adequate funds to employ employees to carry out their jobs in effective manner as well as they can design appropriate rewarding system based on their performance. Finally, based on the findings of the study top management of the hotel industry in Sri Lanka can formulate effective strategies to identify the factors to reduce the turnover intention of their organizations.

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Rationale of Antibiotic Usage in Simple Exodontia – a Prospective Study

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DOI: 10.29322/IJSRP.9.08.2019.p9238

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9238>

Abstract- Antibiotic prescription after simple extraction of tooth has remained a controversial topic amongst dental fraternity owing to the fact that antibiotic resistance is becoming a serious public health and patient safety issue. A prospective clinical trial was undertaken to assess the rationale behind antibiotic use after simple extractions in minimizing post extraction pain and discomfort. *Materials and methods:* All the patients undergoing simple extractions were categorized into two groups: Group 1: patients receiving antibiotics postoperatively, Group 2: patients not receiving antibiotics postextraction. The patients were evaluated upto 6 postextraction days for signs of infection and dry socket. *Results:* 4 patients (1.2%) reported with infection of the extraction socket in nonantibiotic group, whereas 1 (0.3%) case of infection was found in the antibiotic group. Dry socket was seen in 29 (8.8%) patients, 16 (4.8%) in the antibiotic group and 13 (3.9%) in the nonantibiotic group. *Conclusion:* The results of the present study do not significantly justify the use of antibiotics following extractions.

Index Terms- antibiotic resistance, dry socket, infection.

Declarations of Interest: None.

I. INTRODUCTION

A major turning point in medicine, as well as in human history was the discovery of antibiotics in the early 20th century. Unfortunately, development of resistance turned out to be a serious consequence of the use of these lifesaving and wondrous medicines. Bacterial resistance to antibiotics is multifactorial. In medicine, long-term and repetitive use of broad-spectrum antibiotics has resulted in antibiotic resistance. Some resistance occurs intrinsically, but much of the blame is attributable to decades of use by medical practitioners, nontherapeutic use in agriculture, and careless disposal of waste by the pharmaceutical industry as a whole ¹.

Antibiotics used in dentistry are frequently broad-spectrum agents, which can predispose for the selection of resistant strains. Furthermore, there is evidence that antibiotic-resistant bacteria, such as the *Prevotella* species, are being isolated from odontogenic infections with increasing frequency². Antibiotic

resistance is a serious public health and patient safety issue. Antibiotic resistant infections are extremely difficult to treat and frequently recur¹. The indiscriminate use of antibiotics may promote the emergence of antibiotic resistant bacterial strains, increases the likelihood of preventable adverse reactions, and represents a waste of healthcare resources². This problem has proved to be unrelenting and a constant source of frustration for researchers, health care providers as well as patients¹.

Of the total antibacterial prescriptions, dental prescriptions contribute upto 7–9% in primary care ^{1,3}. This doubly emphasizes the responsibility of dental surgeons on curbing the practice of routine antibiotic prophylaxis and practicing selective antibiotic use. Varied schools of thought exist among dental academia regarding prescription of antibiotics after simple tooth extraction. Although bacteremia occurs during simple exodontia^{1,4}, this does not justify antibiotic use in a healthy individual, as the effective host response can sufficiently counteract it. The current trend in dentistry in the developed world is shifting to the notion that antibiotics are not justified following simple exodontia. Unfortunately not much focus is laid on this aspect in the developing world where standards of oral care are far below those in the developed world^{1,5}.

The aim of the present study is to determine the rationality for postoperative antibiotic use following simple exodontia and assessing its efficacy in minimizing postoperative patient discomfort and complications

II. MATERIALS AND METHODS

A prospective randomized double-blind placebo-controlled clinical trial study was designed wherein all healthy males and females who reported to the Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Hyderabad, India and undergoing simple tooth extractions from January 2019 till March 2019 were included in the study.

Inclusion criteria were as follows: (1) both male and female patients; (2) patients aged between 15 and 80 years; (3) patients with a good systemic health; (4) patients undergoing simple extractions of permanent mandibular and/or maxillary teeth ; (6) patients undergoing single tooth extractions; (7) extractions requiring minimal instrumentation.

Exclusion criteria were as follows: (1) patients undergoing surgical extractions; (2) patients with deciduous teeth or teeth associated with local pathology; (3) patients with impacted mandibular third molars; (4) patients with a debilitating systemic disease; (5) patients undergoing extractions of endodontically treated teeth; (6) patients currently taking antibiotics at the time of extraction or have had antibiotics less than 3 days prior to extraction; (7) patients with habits which are known to be detrimental to oral health such as smoking, pan, betel nut, and/or tobacco chewing; (8) patients presenting with acute infections; (9) pregnant patients (10) inability to appear for follow-up.

All patients who fulfilled the inclusion criteria, after approval by the Institutional Ethical Review Committee were included in this study. All extractions were performed in the oral surgery department at Government Dental College and hospital, Hyderabad by senior dental surgeons (residents) under strict aseptic conditions using the following surgical protocol: regular surgical gloves and masks were worn for every extraction; 2% lignocaine containing 1 : 80,000 adrenaline were administered using 25/27 gauge needle prior to extraction; inferior alveolar nerve block was used for mandibular molars and premolars and local infiltration was used for mandibular anterior teeth and all maxillary teeth.

All the patients undergoing simple extractions were randomly categorized into two groups:

Group 1: patients receiving postextraction antibiotics.

Group 2: patients not receiving postextraction antibiotics.

Group 1: Patients Receiving Postextraction Antibiotics. All patients in this group were prescribed amoxicillin 500mg 8 hourly for 5 days along with Diclofenac sodium 75mg 8 hourly for 3 days starting 30 minutes after the extraction.

Group 2: Patients Not Receiving Postextraction Antibiotics. All patients in this group were not prescribed antibiotic and were given Diclofenac sodium 75mg 8 hourly for 3 days starting 30 minutes after the extraction.

Randomization was achieved using the closed envelope technique. In this randomization technique, dental surgeons were given randomly generated prescription regimen within sealed opaque envelopes. After establishing consent, the envelope was opened and the patient was then offered the allocated prescription regimen.

Extractions were performed with minimal invasion using a mucoperiosteal elevator, straight elevator (if required), and

forceps. After achieving hemostasis using a cotton pressure pack, postoperative instructions were given to every patient. Patients were recalled after five days to assess postoperative complications including inflammation, wound infection, and dry socket. Intensity of pain (Fig. 1) was evaluated in preoperative and postoperative session using Visual Analogue Scale (VAS) of 10 cm horizontal line where the end points were marked as no pain and unbearable pain. Patients were asked to indicate on the line at a point which corresponds to the level of pain intensity he/she feels.

On recall, patients were evaluated for signs of persistent inflammation (i.e., degree of pain, swelling, and redness) and signs of dry socket (i.e., severe pain accompanied with presence of denuded bone at the base of the socket). Presence of persistent inflammation and/or suppuration on the 6th day was considered as wound infection.

Photographs were also taken preoperatively and during each follow-up session to document the outcome.

The data were entered into the computer for analysis with the help of software program SPSS version 16 for windows. The data were expressed as number, percentage and mean + SD over the table. The evaluation was done by unpaired 't' test and Chi square (χ^2) test. The result was considered significant if p value was <0.05. Tables were used to show the results and bar diagram were performed as necessary

Data Analysis. Data was analyzed using SPSS version 21. Chi square test was used to test the p value.

Null Hypothesis. Antibiotics do not significantly reduce postoperative complications in young healthy patients following simple tooth extraction.

III. RESULTS

Out of the initial sample of 400 (200 in each group), 328 patients turned up for follow-up visit, out of which 141 (42.9%) were males and 187 (57.1%) were females. Antibiotic group comprised 152 patients (70 males and 82 females) and nonantibiotic group included 176 patients (79 males and 97 females). (Figure 1). Out of the total sample, 179 were maxillary teeth and 149 mandibular teeth (Table 1).

The mean age of the patients was 34.35 years \pm 9.16. The most common reason for extraction was grossly carious teeth 32%, followed by periodontitis 27.7% and root pieces 11.5% (Figure 2,3).



Figure 1. Gender distribution (diagram)

Table 1. Extracted teeth

Tooth extracted	11	12	13	14	15	16	17	18	21	22	23	24	25	26	27	28
Gp I	1	0	1	4	3	14	6	4	0	0	2	2	3	17	8	9
Gp II	1	1	1	4	4	26	9	8	0	2	2	3	9	15	11	9

Tooth extracted	31	32	33	34	35	36	37	38	41	42	43	44	45	46	47	48
Gp I	0	0	2	2	9	10	8	10	1	2	1	5	7	10	7	4
Gp II	1	2	2	3	8	9	8	5	0	2	1	2	3	16	6	3

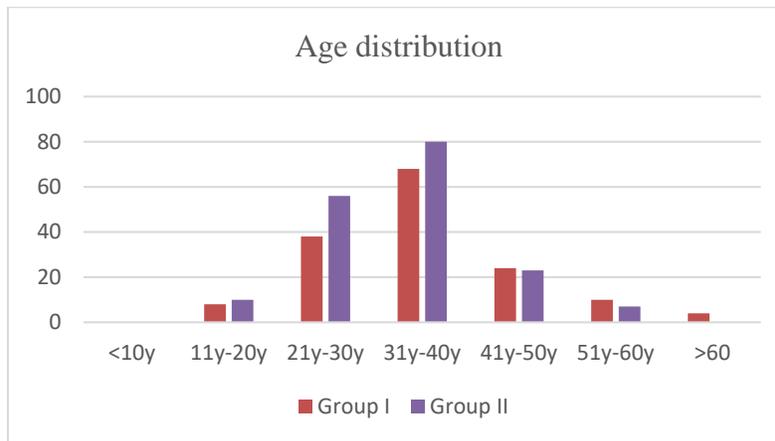


Figure 2. Age distribution(diagram)

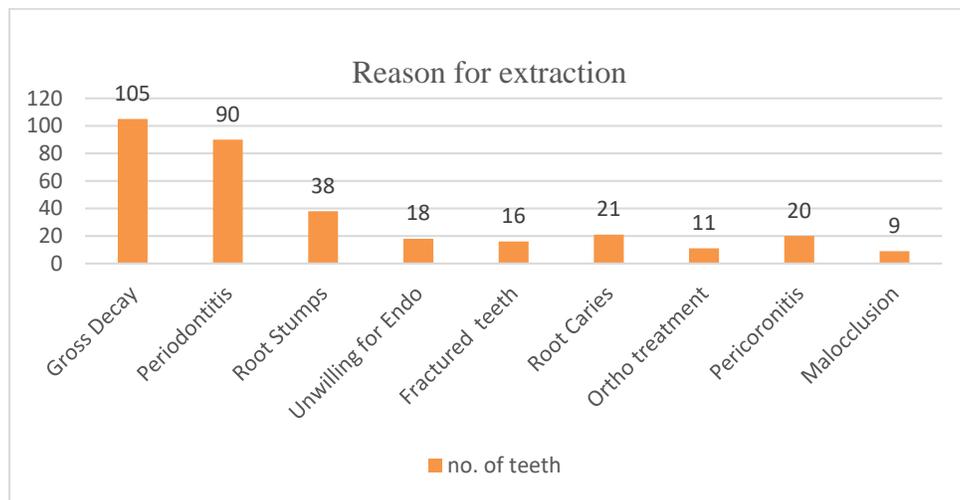


Figure 3. Reason for Extraction

The mean time taken for extraction was 8.52 minutes \pm 3.46. Out of the total sample, 294 (89.6%) presented with no postoperative complications and 34 (10.4%) had postoperative complications, which included dry socket (alveolar osteitis) in 29 (8.8%) patients, 16 (4.8%) in the antibiotic group and 13 (3.9%) in the nonantibiotic group. 4 patients (1.2%) reported with infection of the extraction socket in nonantibiotic group, whereas 1 (0.3%) case of infection was found in the antibiotic group. Out of the 29 cases of dry socket, interestingly, 18 (62%) cases belonged to females, whereas 11(38%) was found in males. Although there was no relationship between antibiotic use and dry socket (Table 2), the overall female predisposition was also found statistically insignificant ($p = 0.43$). Of the patients presenting with dry socket, 24 patients had preoperative pain (12.5% of total cases with preoperative pain). Out of the 29 patients who presented with postoperative dry socket, 24 (82.7%) were patients with dry socket

who reported preoperative pain (12.5% of all cases with preoperative pain). Five cases of dry socket occurred in patients who reported no preoperative pain (4.5% of all cases who presented without any preoperative pain). However, this relationship was found to be statistically insignificant ($p = 0.06$) (Table 3).

Of the total sample, 23 (7%) patients showed adverse effect to the drugs prescribed. Diarrhea was reported in 7 (2.1%) patients, abdominal discomfort in 11 (3.3%) patients, and vomiting in 5 (1.5%) patients. About 86% (20) of patients who presented with adverse effects belonged to the antibiotic group. Only 3 patients from the nonantibiotic group reported adverse effects (2 vomiting and 1 abdominal discomfort) (Table 4). The relationship between adverse effects and antibiotics was proved to be statistically significant ($p = 0.0001$).

Table 2. Distribution of dry socket amongst male and females in both the groups

Gender	Group	Dry socket	X^2	p value
Male	Group I	6 (8.6%)	0.23	0.62
	Group II	5 (6.3%)		
Female	Group I	10 (12.2%)	0.62	0.42
	Group II	8 (8.2%)		

Table 3. Association of preop. pain with dry socket

Preop pain	Dry socket yes	Dry socket No	X^2	p value
Yes(216)	24 (11.1%)	192	3.45	0.06
No (112)	5 (4.46%)	107		

Table 4. Drug Adverse effects

Adverse effects	Group I	Group II	X ² 0.605 p value = 0.0001
None	132	173	
Diarrhoea	7	-	
Abdominal discomfort	10	1	
Vomitting	3	2	

Pain scale indicated gradual increase in pain in the first 24 hours and a gradual decline over the next 5 days.

The overall trend showed the decrease in preoperative pain after the first hour followed by a slight increase after 6 hours and then a gradual decline over the next 5 days. This trend was equally represented in both groups although to varying degrees. (Table 5). The mean pain score between assessment stages (6 hrs, 12 hrs, 24 hrs, 48 hrs, and 72 hrs) shows a greater drop in the antibiotic group over 72 hours (p = 0.9 NS). Out of the total sample, 328 (152 in

the antibiotic and 176 in the nonantibiotic group) patients presented with a complaint of preoperative pain ranging from very mild to very severe pain. Out of 328 patients, 29 (12 in the antibiotic and 17 in the nonantibiotic group) patients reported postoperative pain ranging from very mild to very severe even after 6 days. The average preoperative pain was 1.82 ± 1.73 in the antibiotic group and 2.07 ± 1.68 in the nonantibiotic group. Only 4 patients reported swelling after 6 days of extraction (2 each in both the groups).

Table 5. Mean distribution of pre-op and post-op. pain

Study group	Assessment stages	Mean	S.D	n
Group I (with antibiotics)	Preop	1.82	1.73	152
	6 hrs	1.56	0.83	152
	12 hrs	2.03	0.81	152
	24 hrs	1.25	0.78	152
	48hrs	1.21	1.8	152
	72 hrs	0.66	1.24	152
Group II (without antibiotics)	Preop	2.07	1.68	176
	6 hrs	1.42	0.52	176
	12 hrs	1.69	0.79	176
	24 hrs	1.31	0.88	176
	48 hrs	1.14	1.46	176
	72 hrs	0.76	1.22	176

IV. DISCUSSION

The results of the present study indicate no significant role of antibiotics in simple extractions in terms of improving postoperative quality of life. The ideal agent to be used after tooth extraction should alleviate pain, reduce swelling and trismus to a minimum, promote healing and have no unwanted effects. Since such an agent does not exist, analgesics are the obvious choice for relief of pain, an analgesic with additional anti-inflammatory properties should be used wherever indicated⁶.

The prophylactic use of antibiotics refers to the administration of these agents preoperatively to prevent a postoperative infection. Unless a significant risk of postoperative

infection is present, generally, antibiotics should not be required before the removal of erupted carious or periodontally involved teeth. Although extraction sockets are considered contaminated wounds, the organisms involved are part of the normal oral flora, and therefore are not a usual source of postextraction infection. However, the decision of prophylactic antibiotics prescription in noninfected cases should also be based on whether patients have any significant medical risk factors that could adversely affect their humoral and cellular defense mechanisms, and whether any systemic risks are associated with the bacteremia that accompanies tooth extraction⁷.

The data and literature to support prophylactic administration of oral antibiotics are inconsistent and have

demonstrated that neither preoperative nor postoperative prophylactic administration of antibiotics have shown any statistically significant benefit with regard to surgical site infection or alveolar osteitis over patients who did not receive antibiotic prophylaxis¹. Pain experienced from pulpitis, periodontitis, alveolar osteitis, or peri-implantitis is not an indication for antibiotics. The antibiotics may serve to decrease local inflammation caused by surface biofilm bacteria and, therefore, reduce the patient's symptoms. These patients require mechanical or surgical intervention in the form of caries control, extractions, root canal therapy, scaling, and root planing, for example, rather than systemic antibiotics. However, patients presenting with cellulitis or abscess involving fascial planes may benefit from systemic antibiotics, where they serve as an adjunctive measure to surgical or mechanical removal of the infective source to prevent the hematogenous or local spread of the infective bacteria¹.

The results of the present study do not significantly justify the use of antibiotics following extractions. This was proved by the fact that there were only 5 cases (1.5%) of infection amongst the entire sample. These findings are similar to numerous other studies such as those by Agrawal et al⁶, Yousuf et al⁸ and van Eeden and B'utow⁹. Conversely, a study done by Arteagoitia et al¹⁰ reported a significant rise in the rate of infection related complications in individuals who were not prescribed antibiotics (up to 12.9%).

However, the aforementioned study was performed exclusively on impacted molars and therefore may have limited bearing on the present study. There were some postoperative complications in the present study too. A few patients presented with dry socket and postoperative pain even upon evaluation on the 6th day (see Table 5). The number of diagnosed dry socket cases was nearly similarly distributed in both groups. Dry socket is a phenomenon which relates to lack of clot retention/formation within the socket and is not considered an infectious process. These findings correlate with other studies conducted by Arteagoitia et al¹⁰ and L'opez-Cedr'un et al¹¹ which noted no difference in prevalence of dry socket when postoperative antibiotics were given. However, it should be noted that in a study conducted by van Eeden and B'utow⁹, there were no cases of dry socket in individuals who were given antibiotics, whereas 15.8% of those who were not given antibiotics presented with dry socket.

Although all drugs are known to have adverse effects, unsurprisingly, patients belonging to antibiotics group reported more adverse effects when compared with their counterparts in the nonantibiotic group (see Table 4). Diarrhea, abdominal pain, and vomiting were the predominant gastrointestinal tract related effects. Although these cases presented in only a small minority of patients who consumed antibiotics, they still question the rationale behind antibiotic use unnecessarily without producing any tangible benefits. In fact this increases the physical as well as financial burden on the patient. This is especially a problem in developing countries where financial constraints make it difficult for patients to afford an antibiotic regimen in addition to treatment. Adverse effects of antibiotics can result in reduced quality of life and can significantly disrupt their daily work and probable source of livelihood. On a community level the antibiotic overuse has many consequences such as promoting the development of resistant organisms and unfavorable drug interactions⁸. Dental surgeons must take it as an ethical responsibility and play a pivotal

role in preventing the propagation of such microbes by limiting the use of antibiotics and being selective in their prescription.

The antibiotic group showed a better pain profile than the nonantibiotic group, showing a steeper decline in pain over 72 hrs. (see Table 4). However, it should be noted that reduction in pain profile was not statistically significant ($p = 0.99$) in the present study and therefore does not justify the use of antibiotics. Studies conducted by van Eeden and B'utow⁹ and Agrawal et al¹⁰, also reported no significant relationship between the use of antibiotics and postoperative pain. As studies have proved that this is unacceptable and a disservice to not only the patient but also the community at large, the practice of prescribing antibiotics routinely as a preventive measure to avoid postoperative complications, like pain and infection, must be discarded. The use of a stronger analgesic instead is a much better option after simple extractions to reduce pain in lieu of antibiotics⁸.

V. CONCLUSION

Although circumstances exist when systemic antibiotics are indicated, proactive local measures are usually sufficient in treating bacterial infections of the oral cavity before antibiotics are truly indicated. Strict adherence to universal precautions and sterilization protocols wherever applicable may help prevent disease transmission as well. As dentists, we can do little to limit the use of antibiotics in other arenas like agriculture or regulate dumping of antibiotic manufacturing by-products into the environment. But we can strive to practice responsible, evidence-based medicine and dentistry. Prudent use of antibiotics plays an important role in minimising the impact of antimicrobial resistance on public health.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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The Effect of Logistics Process Quality And Logistics Outcome Quality in Logistic Letter and Package Services to Customer Satisfaction

(Case study at PT. Pos Indonesia (Persero) Palembang Post Office 30000)

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DOI: 10.29322/IJSRP.9.08.2019.p9239

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9239>

Abstract- This research aimed to find out the effect of logistics outcome quality and logistics process quality to customer satisfaction in Palembang post office. The dimensions used for the logistics process quality variable are (procedure, contact quality personnel, information quality, and order discrepancy handling) while the dimensions used for logistics outcome quality variables are product availability, accuracy & condition order, and timeliness. The sample in this study is 100 respondents with the sampling technique using the census method. The data analysis used in this study is multiple linear regression analysis using the SPSS 15.0 program. The results of this study indicate that logistics outcome quality and logistics process quality have a positive and significant influence to customer satisfaction.

Index Terms- Customer Satisfaction, Logistics Outcome Quality, Logistics Process Quality, Post Office.

I. INTRODUCTION

The Indonesian Logistics Association (ALI) in 2018 estimates the growth of the logistics market in Indonesia in 2019 to be in the range of 10-12 percent, as well as from Data Fost & Sullivan in 2018 estimated that the Indonesian logistics industry will grow 15.4 percent with a value of Rp. 4396 trillion in 2020. This significant growth is driven by consumption of the population, improvement in infrastructure and foreign investment.

Consumer satisfaction is a basic concept in marketing and business strategies [9]. Consumer satisfaction consists of feelings of pleasure or disappointment resulting from comparisons between buyer expectations and perceptions of performance (or results) of a product [28]. Consumer satisfaction arises when companies manage to provide logistics services that meet or exceed consumer expectations [40]. Quality of logistics services (Logistics Services Quality) can affect customer satisfaction [33].

Logistics Service Quality has two concepts, Logistics Outcome Quality (LOQ), which refers to the determination of the extent to which the promised core benefits or results are

delivered, and Logistics Process Quality (LPQ) that addresses the service delivery process [33]. the separation of dimensions of LOQ and LPQ service quality in a comprehensive model is an important step in our understanding of how Consumer Perceptions of quality services are formed. The dimensions of Logistics Process Quality (LPQ) are Ordering Procedures, Contact Quality Personnel, Information Quality, and Order Discrepancy Handling. The dimensions of Logistics Outcome Quality (LOQ) are Product Availability, Accuracy, Condition Order, and Timeliness.

Research Problem

- Does Logistics Process Quality and Logistics Outcome Quality effect Customer Satisfaction In Palembang Post Office? admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

II. LITERATURE REVIEW

A. Consumer Satisfaction

Consumer satisfaction is an emotional response to experience related to the product or service purchased. As for the factors that influence consumer perceptions and expectations, among others, needs and desires related to the things that consumers feel when trying to make transactions with product manufacturers, and past experience when consuming products from companies and competitors, and experience from friends [47].

B. Logistics Service Quality

Research by Millen et al. (1999) identified a significant increase in customer satisfaction as a key benefit of Logistics Service Quality (LSQ). Logistics Service Quality is a scale used to measure logistics service quality [47]. Logistics Service Quality has two concepts, Logistics Outcome Quality (LOQ), which refers to the determination of the extent to which the promised core benefits or results are delivered and the Logistics Process Quality (LPQ) that addresses the service delivery process. The separation of dimensions of LOQ and LPQ service quality in a comprehensive model is an important step in our

understanding of how consumer perceptions of quality services are formed. The dimensions of Logistics Process Quality (LPQ) are Ordering Procedures, Contact Quality Personnel, Information Quality, and Order Discrepancy Handling. The dimensions of Logistics Outcome Quality (LOQ) are Product Availability, Order Accuracy, Timeliness, and Order Condition.

C. Logistics Process Quality

The dimensions of Logistics Process Quality (LPQ) are four sub-dimensions, namely Ordering Procedure, Contact Quality Personnel, Information Quality, and Order Discrepancy Handling [5]. Ordering procedures discuss the efficiency and effectiveness of the procedures made by the company. It is important for companies to make order placement procedures to be effective and easy to use by consumers [43]. Personnel Contact Quality, refers to the consumer orientation of contact people from the company's logistics department. Specifically, consumers see about whether customer service staff are knowledgeable, empathize with the consumer situation, and help consumers solve their problems [43]. Information Quality, The ability of courier providers to enter relevant product and service information. It is important to attract consumers to pay attention to the special services and promotions provided to meet their needs [43]. Order Discrepancy Handling, refers to how well the company handles mismatches in orders that occur after orders arrive at consumers [43].

D. Logistics Outcome Quality

The dimensions of Logistics Outcome Quality (LOQ) are Product Availability, Order Accuracy, and Timeliness [5]. Product Availability, Refers to customer ability to choose products that are with the conditions of the package [39]. Order Accuracy, refers to the truth of service information and the accuracy of delivery to consumers [46]. Timeliness, refers to arrived time package to receiver location by the promised time. Timeliness also refers to the time needed between order placement and acceptance by consumers [43]. Order Condition, refers to damage condition that can occur while deliver to receiver. If the goods are damaged, consumers cannot use them and must wait for compensation from the company or they could use other service [43].

III. RESEARCH FRAMEWORK

Based on the above explanation, the theoretical framework is as follows:

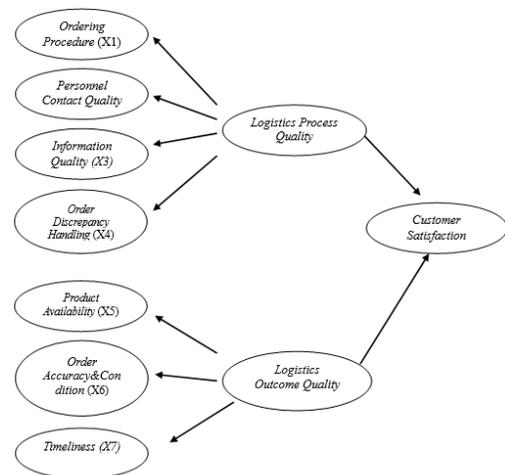


Fig-1: Path Diagram Model of This Research Framework

IV. METHODOLOGY

This study intends to measure the relationship between research variables. This study is useful for modeling and measuring the relationships between research variables or useful for analyzing and seeing the effect of independent variables (X) on the dependent variable (Y).

The design of this study is as follows:

1. Variable X (Free Variable), namely Logistics Process Quality and Logistics Outcome Quality
2. Variable Y (Bound Variables), namely Customer Satisfaction

In this study, respondents in this study were all customers Palembang post office 30000 with 100 samples customers. the research use Multiple Linear Regression as a research hypothesis testing technique to look for the model regression. On this research, the calculations were assisted by SPSS for Windows Version 15 software [8].

V. RESULT AND DISCUSSION

A. Validity Test Results

Instrumnt (Questionnaire Question) are called valid if there is significant correlation with the total score. In this research validity is tested using the Pearson Correlation method. The value of r table by significance level 0.01, two-way test, by N = 30 is 0.30. If the value of $r \geq 0.30$ then the statement items in questionnaire are valid. If the value of $r \leq 0.30$ then the statement items in questionnaire are invalid. The test results show that all indicators used to measure the variables in this research have r value greater than the r table value. This means all indicators are valid as research instruments.

B. Reliability Test Result

The Cronbach Alpha method is used to test the reliability of the instrument. Instruments are considered to have a high level of reliability if the value obtained is ≥ 0.60 . The table below is the result of reliability testing:

Table-1: Reliability Test Result

No.	Variabel	Cronbach Alpha	Parameter	Result
1	Logistics Process Quality (X ₁)	0,899	0,6	Reliable
2	Logistics Outcome Quality (X ₂)	0,847	0,6	Reliable
3	Customer Satisfaction (Y)	0,911	0,6	Reliable

Source: SPSS version 15 output processed, 2019

Table-1 above shows the Cronbach Alpha values for each statement is greater than 0.6, which means each indicator variable is reliable.

Demographic Variables

Through table-2, the number of respondents who filled out the questionnaire in this research were 100 consumer, consist of 65 male customer (65%), and 35 female customer (35%).

Table-2: Identity Distribution of Respondents

No.	Karakteristik	Jumlah	Persentase
A. Gender			
	1. Laki-laki	65	65,00%
	2. Perempuan	35	35,00%
B. Customers Age			
	1. 17 – 20 Years	6	6,00%
	2. 21 – 30 Years	24	24,00%
	3. 31 – 40 Years	33	33,00%
	4. 41 – 50 Years	27	27,00%
	5. ≥ 51 Years	10	10,00%
C. Last Education			
	1.Elementary School	9	9,00%
	2.Junior High School	25	25,00%
	3.Senior High School	32	32,00%
	4.Diploma	20	20,00%
	5.Bachelor	14	14,00%
D. Customer Jobs			
	1. Student / College Student	11	11,00%
	2. Government employees	24	24,00%
	3. Private Employees	31	31,00%
	4. Entrepreneur	24	24,00%
	5. House wife	10	10,00%
E. Products Used			
	1. Pos Internasional	26	26,00%
	2. Pos Express	25	25,00%
	3. Paket Kilat Khusus	35	35,00%
	4. Paket Pos Biasa	14	14,00%

F.	Logistics Service / month		
	1. 2 times	30	30,00%
	2. 3 times	51	51,00%
	3. > 3 times	19	19,00%

Source: SPSS version 15 output processed, 2019

Based on age, the customers is dominated by customer aged 31-40 years with 33 people (33%). Based on education level, respondents is dominated high schooler graduated with 32 people (32%), followed by junior high schooler graduated with 25 people (25%). Then, the previous work was dominated by private companies with 31 people (31%). Logistics Product dominated by Paket Kilat Khusus product with 35 people (35%) the highest than other product. Based on how often customers use post office service per month, 51 people (51%) used this service 3 times per month.

C. Multiple Regressions Analysis

Before the test was carried out, the researchers conducted normality, multicollinearity, and heteroscedasticity tests to ensure that the regression equation had accuracy in estimation, unbiased and consistent. The test results show that the regression model was feasible because it met the assumptions of normality, there was no multicollinearity, and there was no problem of heteroscedasticity in the regression model. Following tables are the results of multiple regression analysis by SPSS version 15 for Windows:

The Proposed Hypothesis

1. Logistics Process Quality (LPQ) has a significant positive effect on Customer Satisfaction at the Palembang Post Office.
2. Logistics Outcome Quality (LOQ) has a significant positive effect on Customer Satisfaction at the Palembang Post Office.
3. Logistics Process Quality (LPQ) and Logistics Outcome Quality (LOQ) simultaneously have a significant positive effect on Customer Satisfaction at the Palembang Post Office.

Table-3: The Results of Multiple Linear Regression Analysis

Variabel	(B)	Std Error	Beta	Sig.
Constant	8,617	5,793		0,140
Logistics Process Quality	0,123	0,047	0,196	0,011
Logistics Outcome Quality	0,518	0,055	0,703	0,000

Source: SPSS version 15 output processed, 2019

Based on the data analysis, the regression equation is obtained:

$$Y = 8,617 + 0,123 (X_1) + 0,518 (X_2)$$

The above equation can be explained by below:

1. Logistics Process Quality variables have a positive effect on the Consumer Satisfaction variable.
2. Logistics Outcome Quality variable has a positive effect on the Consumer Satisfaction variable.

Table-3 also contains the value of t which can be a reference to whether the . Logistics Process Quality and . Logistics Outcome effect the Consumer Satisfaction.

D. Determination Test (R²)

Determination test in multiple linear regression is used to determine the percentage contribution of the influence of independent variables simultaneously on the dependent variable. This coefficient shows how much the percentage variation of the independent variables used in the model is able to explain the variation of the dependent variable. Based on the results of calculations with SPSS for Windows version 15.00, the results of the determination test are obtained as follows:

Table-4: The Results of Determination Test (R²)

Model	r	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,689 ^a	0,475	0,464	2,9171	2,473

Source: SPSS version 15 output processed, 2019

Based on Table-4 above, the coefficient of determination has a value of 0.475 (47.5%). This can state that the Logistics Process Quality and Logistics Outcome variables can explain the Consumer Satisfaction variable by 47.5%, while the remaining 52.5% is influenced by other independent variables other than the variables in this study.

E. Model Test (F Test)

The results of this test are to find out whether the regression model can be used to predict the dependent variable or not, in addition to knowing whether the independent variables together have a significant effect on the dependent variable. Significant means that the relationship that occurs can apply to the population (can be generalized).

Table-5: The Results of F Test

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	747,232	2	373,616	43,906	0,000 ^a
Residual	825,424	97	8,510		
Total	1572,656	99			

Source: SPSS version 15 output processed, 2019

Regression Parameter Coefficient Test

This test is to test whether the parameters (regression coefficients and constants) to estimate the equation / multiple

linear regression models are already the right parameters or not. The right intention here is that these parameters are able to explain free behavior in influencing the dependent variable. In this section, the t test is focused on the regression coefficient. The t test is known as a partial test, which is to test how the influence of each independent variable individually on the dependent variable. This test can be done by comparing t count with t table or by looking at the column of significance in each t count

This study was conducted with a significance of 0.05 ($\alpha = 5\%$) as shown in Table-6 below.

Table-6: The Results of tTest

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8, 617	5,793		1,488	0,140
	Logistics Process Quality	0,123	0,047	0,196	2,603	0,011
	Logistics Outcome Quality	0,518	0,055	0,703	9,346	0,000

Source: SPSS version 15 output processed, 2019

t count is greater than the error level of 0.05, it can be said that the independent variable does not have a significant effect on the dependent variable. Based on the data in table 4.17 above, it can be explained as follows:

1. Variable Logistics Process Quality have a positive and significant effect on the Customer Satisfaction variable at PT. Pos Indonesia (Persero) Palembang Post Office 30000.
2. Variable Logistics Outcome Quality has a positive and significant effect on the Customer Satisfaction variable at PT. Pos Indonesia (Persero) Palembang Post Office 30000.

VI. CONCLUSION AND RECOMMENDATION

Conclusion

Based on the research problem formulation proposed, then referring to the data analysis model that has been done, and various discussions that have been put forward in the previous chapter, we can draw some conclusion as follow:

1. Descriptively it is found that the indicator of shipping costs when the order process gets the value of satisfaction under other indicators.
2. Logistics Process Quality has a positive and significant effect on Consumer Satisfaction at PT. Pos Indonesia (Persero) Palembang Post office 30000.
3. Logistics Outcome Quality has a positive and significant effect on Customer Satisfaction PT. Pos Indonesia (Persero) Palembang Post office 30000.
4. Logistics Process Quality and Logistics Outcome Quality simultaneously have a positive and significant effect on Customer Satisfaction PT. Pos Indonesia (Persero) Palembang Post office 30000.

Recommendation

Based on the results of research, discussion and conclusions, the suggestions that can be given are as follows.

PT. Pos Indonesia (Persero) Palembang Post Office 30000

Logistics Process Quality and Logistics Outcome Quality is a quality that must always be applied and maintained in Companies. On the point of question the cost of order indicator gets quite good respond. Therefore, PT. Pos Indonesia (persero) Palembang Post Office 30000 is recommended to provide competitive prices with competitors by recalculating the prevailing prices with the highest frequency of delivery to the destination, so that for this purpose prices can be lowered by comparing freight rates compared to per kilogram.

Further research

For the next researcher, it is expected to add other research variables and indicators, so that they can answer in more detail in explaining the research on customer satisfaction.

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Analysis the Customers' Patience in Restaurant

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DOI: 10.29322/IJSRP.9.08.2019.p9240

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9240>

Abstract- Queues (waiting lines) are a part of everyday life. However, having to wait is not just a petty personal annoyance. A queuing model is constructed so that queue lengths and waiting time can be predicted. Queuing models represent the queuing systems. This model enables the performance measures and customers' patience in the restaurant. The common problem arises in almost every famous restaurant is that they lose the customers because of a long waiting line and poor quality service. This paper analyze the performance measures and the customers' patience in the system. The data sets are obtained from a Kentucky Fried Chicken shop in Yangon in order to derive the arrival rate, the service rate, utilization factor, waiting time and probability of potential balking customers. The collected data is analyzed by Little's formula and queuing model which is M/M/1 model.

Index Terms- Kendall's Notation, Little's Formula, Queuing Models, Queuing Theory

I. INTRODUCTION

To improve the customers' return, the managers in the restaurant must consider a long waiting line and poor quality services. Although the taste, cleanliness, the restaurant layout and view are the most important factors for the restaurant, other factors such as customers' patience, long waiting line must be considered by managers. These factors will reduce customers' demands and even profit. In mathematics, a random service theory is called the queuing theory to solve the problems and analyze the system. By using queuing theory, the average waiting time in queue, average waiting time in the system, the average queue length, the average number of customers in queue and average number of customers in the system, the busy period and idle time can be calculated. To model the restaurant operation, queuing theory have been previously used by many researchers. This study is to measure the performance in the system and analyze the customers' patience on the administrative issues.

II. METHODOLOGY

A. The Conceptual Framework: Queuing Theory

In queuing theory, a discipline within the mathematical theory of probability, an M/M/1 queue represents the queue length in a system having a single server, whose arrivals are determined by a Poisson process and job service times have an exponential distribution. The model name is written in Kendall's notation. An M/M/1 queue is a stochastic process whose state

space is the set $\{0, 1, 2, \dots, n\}$ where the values corresponds to the number of customers in the system, including any currently in service.[1] To make the business decisions providing a service, queuing theory is considered. Queuing theory is based on probability theory and random process. From the fundamental features of the queuing theory, the customer's arrival pattern, the service time of server may be one of the probability distributions. The M/M/1 system is made of a Poisson arrival, one exponential (Poisson) servers, FIFO (or not specified) queue of unlimited capacity and unlimited customer population. The M/M/1 model show clearly the basic ideas and methods of Queuing Theory.[2]

B. Basic Structure of Queuing Models

The basic process assumed by most queuing models is the following: Customers requiring service are generated over time by an input source. At certain times, a member of the queue is selected for service by some rule known as the queue discipline. The required service is then performed for the customer by service mechanism. This process is depicted in Figure 1.[3]

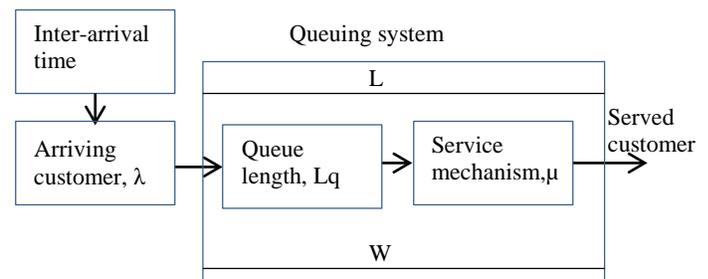


Figure 1. M/M/1 Queuing model

The input source is the total number of customers that might require service from time to time, i.e., the total number of distinct potential customers. The input source is said to be either unlimited or limited.

The queue is where customers wait before being served. The queue length is the maximum permissible number of customers that it can contain.

The queue discipline indicates the manner in which the units are taken for service. The usual queue discipline is first come first served, or FCFS through sometimes there are other service discipline, such as last come, first served or service in random order.[4]

The service mechanism consists of one or more service facilities, each of which contains one or more parallel service channels, called servers.

The time elapsed from the commencement of service to its completion for a customer at a service facility is the service time.

A model of a particular queuing system must specify the probability distribution of service times for each server. The service time distribution that is most frequently assumed in practice is the exponential distribution.

C. The Role of the Exponential Distribution

The operating characteristics of queuing systems are determined largely by two statistical properties, namely, the probability distribution of inter-arrival times and the probability distribution of service times. For real queuing systems, these distributions can take on almost any form. The most important probability distribution in queuing theory is the exponential distribution. The cumulative probabilities are

$$P\{T < t\} = 1 - e^{-\alpha t} \quad (1)$$

$$P\{T > t\} = e^{-\alpha t} \quad (2)$$

D. Little's Law

Little's law is a theorem that determines the average number of customers in a business system based on the average waiting time of a customer within a system and the average number of customers arriving at the system per unit time. [5] Mathematically, Little's law is expressed through the following equation:

$$L = \lambda W \quad (3)$$

Although it looks intuitively easy, it is quite a remarkable result as the relationship is not influenced by the arrival process distribution, the service distribution, the service order or practically anything else.

E. Queuing Models and Kendall's Notation

In queuing models, the following factors are characterized:[3]

Arrival time distribution: Inter -arrival times independently and identically distributed according to an exponential distributions (i.e. the input process is Poisson)

Service time distribution: The service time distribution can be exponential distribution. The service time is independent of the inter-arrival time.

Service mechanism: It consists of one or more service facilities, each of which contains one or more parallel service channels, called servers.

Queue lengths: There may be infinite or finite queue length .

Queuing discipline: The queue discipline refers to the order in which members of the queue are selected for service. It may be first-come-first-served, random, according to some priority procedure, or some other order. First-come-first-served usually is assumed by queuing models.

Capacity: The maximum number of customers in a system can be several.

Kendall's notation is a system of notation according to which the various characteristics of a queuing model are identified. Kendall (Kendall, 1951) has introduced a set of notations which have

become standard in the literature of queuing models. A general queuing system is denoted by (a/b/c):(d/e) [6] where
a= probability distribution of the inter-arrival time
b=probability distribution of the service time
c=number of servers in the system
d=maximum number of customers allowed in the system
e=queue discipline

III. PROCEDURAL OVERVIEW

From observation, this shop has several waiters but only one chef can serve all of the customers.

A. Procedure with Data

In M/M/1 queuing model, the following formulas will be used[3].

$$\rho = \frac{\lambda}{\mu} \quad (4)$$

$$P_0 = 1 - \rho \quad (5)$$

$$P_n = (1 - \rho)\rho^n \quad (6)$$

$$L = \frac{\lambda}{\mu - \lambda} \quad (7)$$

$$L_q = \frac{\rho^2}{1 - \rho} \quad (8)$$

$$W = \frac{1}{\mu - \lambda} \quad (9)$$

$$W_q = \frac{L_q}{\lambda} \quad (10)$$

λ = expected number of arrivals per unit time

μ =expected number of customers completing service per unit time

ρ =utilization factor

P_0 = probability of no customer in the system

P_n = probability of exactly n customers in queuing system

L = average number of customers in the system

L_q = average number of customers in queue

W = average waiting time spent in the system

W_q =average waiting time in queue

B. Calculation

From observations, the KFC shop provides 25 tables and 98 chairs in shop 1 and 17 tables and 72 chairs in shop 2. If necessary, the extra chairs are provided. There are several waiters to serve. In this shop, between 400 and 600 customers can be served during weekdays and between 500 and 1000 customers can be served during weekends in shop 1 and between 300 and 500 during weekdays and between 500 and 700 during weekends in shop 2. This paper seeks to analyze the performance

measures and customers' patience during weekdays and weekends respectively. The time window is 3 hours.

In shop 1, at the off-peak hours, there are an average 500 people coming to this shop in 3 hours. From this, the arrival rate can be derived as: $\lambda = \frac{500}{180} = 2.78$ customers per minute. From observations, each customer spends 30 minutes an average in it (W), the waiting time (W_q) is about 3 minutes in peak hours.

Next, the average customers in this shop is $L = \lambda W = 2.78 \times 30 = 83.34$ customers. It is Little's formula. There is no customer in queue because the system capacity is greater than the average number of customers. There is also no waiting time in queue in off-peak hours. The service rate can be derived as:

$$\mu = \frac{\lambda(1 + L)}{L} = \frac{2.78(1 + 83.34)}{83.34} = 2.81 \text{ customers per minute}$$

It means that nearly 3 customers can be served in one minute. The utilization factor or busy period can be calculated as:

$$\rho = \frac{2.78}{2.81} = 0.989$$

It means that the chef is very busy. And the probability that the system is idle can be calculated:

$$P_0 = 1 - 0.989 = 0.01$$

It means that the system may be free in 1%. The probability of exactly 'n' customer in the system:

$$P_n = (1 - \rho)\rho^n$$

In off-peak hours, there is no customer in queue to be served. So, there is no customer to balk in this situation.

In peak-hours, the measures of performance can be calculated as follows: there are on average 750 people coming to this shop in 3 hours. From this, the arrival rate is 4.167 customers per minute. As above, $W=30$ minutes and $W_q=3$ minutes, so, $L=125$ customers. In this situation, the capacity is just 98 but the number of customer is 125 people. So, the number of customer is greater than the capacity. So, there is also need to know the average number of customers in queue. $L_q= 12.5$ customers are in queue. The service rate for this situation is: $\mu=4.2$ customers per minute.

It means that 4.2 customers can be served in one minute. The utilization factor is 0.992 and the idle time is 0.008.

In peak-hours, potential customers will start to balk because of a long waiting line. When the customers see more than 10 people are already in queue and a potential can tolerate is 15 people, the probability of customers going away is:

$$P_{125-140} = \sum_{n=125}^{140} (0.008) (0.992)^n = 4.156 \%$$

In shop 2, at the off-peak hours, there are an average 400 people coming to this shop in 3 hours. From this, the arrival rate can be derived as: $\lambda = 2.22$ customers per minute. From observations, each customer spends 30 minutes an average in it (W), the waiting time (W_q) is about 3 minutes in peak hours.

Next, the average number of customers in this shop is 67 customers. There is no customer in queue because the capacity of this shop is greater than the average number of customers in it. There is also no waiting time in queue in off-peak hours. The service rate is 2.25 customers per minute. It means that nearly 3 customers can be served in one minute. The utilization factor or busy period is 0.987. And the probability that the system idle is 0.013. It means that the system may be free in 1.3%.

In peak-hours, the measures of performance can be calculated as follows: there are on average 600 people coming to this shop in 3 hours. From this, the arrival rate is 3.33 customers per minute. As above, $W=30$ minutes and $W_q=3$ minutes, so, there are 100 customers in the system. In this situation, the capacity is just 72 but the number of customer is 100 people. So, the number of customer is greater than the capacity. The average number of customers in queue is $L_q= 10$ customers is in queue. The service rate for this situation is 3.36 customers per minute. The utilization factor is 0.99 and the idle time is 0.01.

In peak-hours, the potential customers who will start to balk because of a long waiting line. When they see more than 10 people are already in queue and a potential can tolerate is 15 people, the probability of customers going away is:

$$P_{100-125} = \sum_{n=100}^{125} (0.01) (0.99)^n = 8.42 \%$$

IV. RESULTS

The utilization rate is very high at 0.989 and 0.987 at weekdays and 0.992 and 0.99 at weekends. But the service rate is at 2.81 and 2.25 customers per minute on weekdays and at 4.2 and 3.36 customers per minute on weekends each shop. But the quality of service is needed to consider. Because the more the customer, the less the service of quality. It is main point. The faster the service, the poorer the taste. But, when the service rate is higher, the utilization rate will be lower. It can decrease the probability of the customers going away.

This paper can help to increase the quality of service by anticipating if there are many customers in the queue. By analyzing the huge number of customers coming and going in a day, the manager can determine how to decide to get profit. The summarized result is shown in Table 1 and Table 2 respectively.

Table 1. The Summarized Results in Shop 1

Symbols	On Weekdays	On Weekends
λ	2.78	4.167
μ	2.81	4.2
ρ	0.989	0.992
P_0	0.01	0.008
L	83.34	125
L_q	0	12.5
W	30	30

W_q	0	3
$P_{125-140}$	0	4.156%

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Table 2. The Summarized Results in Shop 2

Symbols	On Weekdays	On Weekends
λ	2.22	3.33
μ	2.25	3.36
ρ	0.987	0.99
P_0	0.013	0.01
L	67	100
L_q	0	10
W	30	30
W_q	0	3
$P_{125-140}$	0	8.42%

V. CONCLUSIONS

The overall analysis of the results can be summarized as follows: On weekdays, there are nearly 83 customers and 67 customers in this system but no customer in queue. Nearly 3 customers and 2 customers can be served in one minute each shop. So, the server is very busy in this situation. On weekends, there are 125 customers and 100 customers each shop and nearly 13 customers and 10 customers in queue to be served in peak hours. 4 customers can be served in one minute at shop 1 and 3 customers can be served in one minute at shop 2. The service rates are greater than before. So, the quality of service may be poor. The chef is very busy too. In shop 1, 4% of customers will start to balk and nearly 8% of the customers will balk at shop 2. And the fact that the potential customers who will start to balk must be considered. This theory can also be applied for the restaurant if they want to calculate all the data daily. By analyzing the several number of customers in the system to serve and the busy period, this shop can set a target how to manage.

ACKNOWLEDGEMENT

This paper is supported by U Kyaw Myo Zaw, the manager of KFC shop in Yangon, Myanmar and by Daw Mi Cho Cho, Head of Faculty of Computing in University of Computer Studies (Sittway). I'd like to thank them for their constructive data and supporting.

The Influence of Cooperative Learning Model STAD Type-Assisted Technique Mind Map On Activity and Outcomes Of Learning Students Grade Iv Elementary School Penambangan Sidoarjo

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DOI: 10.29322/IJSRP.9.08.2019.p9241

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9241>

Abstract- Learning is a process to create a state of conducive and able to make individuals feel comfortable in learning situations. In order to have a good interaction in the teaching-learning process only acts as a facilitator and learners are required to be active in digging his knowledge. In the learning process, a lot of learning models and techniques that can improve creativity and learning activities of learners so as to achieve the objective of learning which one of them is the cooperative learning model of STAD type and mind map techniques.

This research aims to determine the influence of: (1) The influence of the model of cooperative learning of the type of a-kind technique of mind map on student learning activities in class IV Elementary School Penambangan Sidoarjo and (2) influence of study model cooperative type STAD assisted technique mind map towards student learning outcomes in class IV elementary School Penambangan Sidoarjo.

This research is an experimental study with one group pretest-posttest control group design. Data collection techniques are done through observation, documentation, and test results. Data analysis techniques to know the influence of the cooperative model of cooperatives type STAD assisted technique mind Map carried out using the test T-Test with the help of software SPSS 25 for Windows.

Data analysis results show significant differences between activity and study results before and after treatment. Both on activity and learning outcomes, the Posttest value gained higher than the pretest value. The T-test result results in a T-table > T-count value, with the significance of the 0.05 known Sig. 2 tailed value of $0,000 < 0.05$ so it is declared H_0 is rejected. This means there is a significant difference in experimental learning outcomes with the control class at the time of Posttest.

Based on the results of data analysis can be concluded that: (1) There are influences of the model of cooperative learning of type STAD with technical mind map techniques to study activity in class IV and (2) there is the influence of model cooperative learning type the STAD is assisted with mind map techniques towards student learning outcomes in class IV.

Index Terms- STAD Learning Model, Mind Map, Activity, Learning Outcomes

I. INTRODUCTION

Elementary school is the initial foundation of moral and character formation for learners. Teachers play a very important role. Teachers are tasked to print a qualified generation of the nation through effective learning. The teacher serves as a facilitator directing and guiding learners to develop their own knowledge. In learning, learners must be able to experience a change of mindset that initially did not know to know and understand. To embed knowledge to learners, learning and teaching excitement should be systematic, balanced, interconnected, and influence each other.

If the teacher is active and dominates the learning activities, the learners will not be able to develop their talents and abilities. According to Ahmad (2010:03), students will understand the knowledge when hearing directly and prove the truth. So, learning by doing and learning by experience. They will be easier to understand the knowledge gained by their own evidence than simply listening to the teacher who is speaking and telling the knowledge.

The implementation of the 2013 curriculum aims to remove the separation boundaries between subjects because it is considered to limit the scope of learners' knowledge. As such, teachers must follow the age of the ages by giving students the ability to face the 21st century including critical, creative, innovative, communicative and collaborative thinking. The task and role of the teacher should be in accordance with the father of national education KI Hajar Dewantara, the teacher in front as exemplary, in the middle of giving an idea, and behind to give encouragement to the participants. To achieve effective learning outcomes, students' ability should be used as a goal in designing learning activities. In delivering the material, the teacher must adapt to the students' condition. Includes a selection of appropriate models and learning techniques.

In this case, researchers offer a learning solution that is with the model of cooperative learning of type STAD with technique

mind map techniques in the learning process. With the help of the STAD-type cooperative learning model, learners will experience learning by being directly involved by emphasizing the activity and interaction between learners in the group. Thus, it will create an active learning atmosphere and not just one direction. Using the STAD-type cooperative learning model, learning will be more meaningful because of mutual cooperation in completing tasks. This is in accordance with the concepts of the Zone of Proximal Development and Scaffolding on constructivism learning theories where students are able to accomplish assignments with the help of teachers and their peers who are more of the matter through cooperation in Study Group. With the concept of Zone of Proximal Development and Scaffolding, it will increase the knowledge of learners to be more structured and fuller.

This type of cooperative learning Model is assisted by mind map techniques so that learning becomes more interesting and can help make it easier for students to understand and remember the material. According to Suryosubroto (2009:21), learning techniques are part of a learning method. The technique is used to implement learning methods that will be implemented by observing the students' conditions and the learning environment. Every teacher surely has different teaching techniques. In this case, researchers use mind maps to facilitate students' understanding. According to Beaulieu (2008:17), the image always has more power than a word. So, learners will more easily absorb knowledge delivered through images than words.

After observations on the average of middle semester scoring and daily assessment of class IV of the Elementary School of Sidoarjo, the students' study results of 35% are still under the Minimum eligibility Criteria (KKM) set at The 2018/2019 school year of 78. On the beautiful theme of diversity in my country requires learning models and techniques that can facilitate the delivery of the material to the learners. The basic competency of social sciences on the material relates to the economic activities that exist in the community. Researchers choose the model of cooperative learning STAD type with technique mind map because it is considered able to facilitate the delivery of materials

to students. Through the cooperative learning model of STAD type, students will discuss and instruct his knowledge with his group friends on the economic activities that exist around his residence and pour his idea in the form of a mind map. In the implementation of the STAD type Cooperative learning model, learners are grouped heterogeneously with differing academic abilities, gender, tribe, and performance levels.

Hopefully, when teachers apply to learn Model STAD assisted Technique Mind Map then the activity and student learning outcomes will increase. As such, researchers will conduct research titled **“The Influence Of Cooperative Learning Model Stad Type-Assisted Technique Mind Map On Activity And Outcomes Of Learning Students Grade IV Elementary School Penambangan Sidoarjo”**.

II. METHOD

The type of research used in this research is quantitative research. The type of quantitative research used is experimental research. The purpose of this research is to know the effect of a treatment on something controlled. In this study, researchers used Pre-Experimental design with the form of One group Pretest-Posttest Design. In this case, the treatment is a learning model of STAD assisted technique mind map. In this study are all students of class IV School of Penambangan Sidoarjo which amounted to as much as 48 learners. Sampling is done by purposive sampling technique. The time used for this study was in the even semester of the 2018-2019 school year.

III. RESULTS AND DISCUSSION

RESULTS

Research results related to the activity and outcomes of students' learning before and after the treatment model of learning STAD with the technique of mind map techniques. Can be seen in the table below:

Average student learning activities

Value	Student Learning Activities	
	Before Treatment	After Treatment
Average	64, 7	80,9
Highest value	83, 3	91, 6
Lowest value	50, 0	75, 0

Average learners Pretest and Posttest

Nilai	Student Learning Outcomes	
	Pretest	Posttest
Average	62,60	80,41
Highest value	80	90
Lowest value	25	65

From data on the average value of activity and student learning outcomes, there can be a significant improvement. In the hypothesis testing, researchers conducted the t-test test with the results in the table below.

Paired Samples Test Learning activities

Paired Differences	t	df	Sig. (2-tailed)
95% Confidence Interval of the Difference			
Upper			
-12,895	9,993	47	,000

Paired Samples Test Learning Outcomes

Paired Differences	t	df	Sig. (2-tailed)
95% Confidence Interval of the Difference			
Upper			
-13,863	8,073	47	,000

IV. DISCUSSION

Research results related to students' learning activities, indicating a significant difference in activity value. Before the treatment obtained the value of learning activities by 64,7 and the value of learning activities after giving a treatment of 80.9. Starting from the data that has been obtained, the researcher processed the data using SPSS for Windows and resulted in a signification (2-tailed) value of 0.000. So the significance value is smaller than 0.05. Thus, the learning model of the STAD-assisted technique mind map affects the learning activities of students in elementary School of Penambangan Sidoarjo.

Researchers using the learning model of STAD assisted technique mind map. During the learning process, active learners begin to look. All passive becomes active when discussing. The influence of these students' activity also occurred in the study conducted by Ernawita (2018) which was an increase of 12.65% and after the data was processed, the hypothesis test showed that the signification (2-tailed) level of < 0.05. The STAD learning model affects the activities of the students. In his research revealed, that the increase in the value of student learning activities is influenced by the exactness of the learning model, in this case, the student learning activities on the basic social sciences are influenced by the model Type Cooperative learning. Through this STAD model, they have the opportunity to become a peer tutor who will make them more active in learning.

The measurement of learners' learning results is done by giving study results test of pretests and Posttest. Before being taught with the STAD type Cooperative learning model, the results of the study were very much below average and after treatment, the learners' learning results increased. In the results of early observation, results can be obtained average pretests value of 62.60. After the treatment was given the average posttest value of the learners increased to 80.41. Starting from the data that has been obtained, the researcher processed the data using SPSS for Windows and resulted in a signification (2-tailed) value of 0.000. So the significance value is smaller than 0.05. Thus, the learning model of the STAD-assisted technique mind Map has an effect on

the outcomes of students' learning in elementary School of Penambangan Sidoarjo.

V. CONCLUSION

Based on the results of the research and data processing can be concluded that the model of cooperative learning STAD type with mind map technique affects the activity and learning outcomes of learners in grade IV Elementary School. It can be seen from the difference of results t-test pretest and Posttest both activity and learning outcomes of learners. For the calculation of learners' learning activities through observation obtained a significance value of 0.000. As for the calculation of student learning results through pretests and posttest administration and obtained significance value of 0.000.

Data analysis results show significant differences between activity and study results before and after treatment. Both on activity and learning outcomes, the Posttest value gained higher than the pretest value. The T-test result results in a T-table > T-count value, with the signification of the 0.05 known Sig. 2 tailed value of 0,000 < 0.05 so it is declared Ho is rejected. This means there is a significant difference in experimental learning outcomes with the control class at the time of Posttest. Based on the results of data analysis can be concluded that: (1) There are influences of the model of cooperative learning of type STAD with technical mind map techniques to study activity in class IV and (2) there is the influence of model cooperative learning type the STAD is assisted with mind map techniques towards student learning outcomes in class IV. So, it can be concluded that the learning Model of STAD with a technique mind map affect the activity and learning outcomes of students in class IV elementary School Penambangan Sidoarjo.

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Development Of Hadang Traditional Game Through Plyometric Exercise Method

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DOI: 10.29322/IJSRP.9.08.2019.p9242

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9242>

Abstract- *Hadang Game or Gobak Sodor* is a regional game from Indonesia that played by children. This game is a team game consist of two teams, each team consists of 5-7 people. The core of the game is to block your opponent from being able to get past the line specified in the rules of the game. To win, players must collect points by passing guards from the front row to the back row, and vice versa. This study aims to determine the results of the development of plyometric exercise method (Scissor Jump, Stride Jump Crossover, Lateral Bound) and for playing games. Plyometric is an exercise method that focuses on movement at high speed. The method used in this study is research-based development (R & D), aimed at developing plyometric exercise products. The research sample is the fifth grade students of SD Negeri 98 North Bengkulu amounting to 28 people. In the preliminary observation, the researchers have obtained pre-test data and the results of interviews from both teachers and students. Based on the results of the study using the plyometric method shows that the basic physical condition of the fifth grade students of SD Negeri 98 North Bengkulu in the good category. This is evidenced by the results of cognitive and psychomotor tests that have been conducted on small group trials with the acquisition of a percentage of 20% (2 people) with very good categories, 50% (5 people) with good categories, 10% (1 person) with enough categories and 20% (2 people) with less categories. Whereas in large group trials there was a percentage of 21% (6 people) with a very good category, 43% (12 people) with a good category, 25% (7 people) with enough categories, and 11% (3 people) with less category. Thus, it can be concluded that the plyometric method is feasible to be used for is the fifth grade students of SD Negeri 98 North Bengkulu. Suggestions for the teachers, that the use of the plyometric method is an alternative in the learning process, especially *Hadang* traditional game.

Index Terms- Hadang Traditional Game, Plyometric Method.

I. INTRODUCTION

The game is one form physical education activity in elementary school. Playing is an individual's need and there is a natural instinct from birth. Children will play with pleasure and burden. Natural instincts must be nurtured and channeled to positive and well-controlled things.

Traditional games are a means to introduce children to cultural values and social norms needed to establish relationships or social contacts and play a role in accordance with social positions in the community. Traditional games not only provide

recreational value or just have fun. More than that, traditional games also have the value of physical education (sports) and even social values. That is because in traditional games there are elements such as sportmanship, honesty, precision, agility, accuracy in determining steps, and working together in groups.

Hadang Game or Gobak Sodor is a kind of regional game from Indonesia that we can still find today played by children of elementary school. This game is a group game consisting of two groups, where each team consists of 5-7 people. The point of the game is to block the opponent from being able to get past the line to the last row back and forth, and to win the game, all group members must complete the process back and forth in the specified area.

Each region has a game that is almost the same implementation or much in common with games in other regions. The game names are the same or sometimes it is different from the other regions. For example, it can be stated in Central Java known as *the Gobak Sodor game*, in Jakarta it is called *Galasin*, while in North Sumatra it is called *Margalah*, but the game has the same rules. In order not to be confused, the Sports Director named the game as *Hadang* Game, it based on the observation that the task of the game is to block.

Based on observation and interview with physical education teachers at SD Negeri 98 North Bengkulu. In learning, physical education teachers only provide material in accordance with the existing curriculum without adjusting the existing environmental conditions at school. The teacher has never given a game to play through plyometric exercise, there is an opportunity to develop a face learning model because it has a field and physical education tools available at school.

The researchers wanted to develop traditional games through plyometric exercises so that students were more enthusiastic in physical education. Plyometric exercises show the characteristics of full strength of muscle contraction with very fast response, dynamic loading or very complicated muscle stretching (Radcliffe and Farentinos, 1985: 111). According to Chu (2000: 6) plyometric has the advantage, using force and speed achieved by accelerating body weight against gravity, this causes the force of velocity in practice.

The development of *Hadang* traditional game through plyometric exercise can be used in outdoor and indoor fields. The dominant physical elements that emerge in the game include reaction speed, sprint speed, and agility. In addition to these physical elements, there are also other elements, namely cooperative elements which include teamwork. The development

of game play in physical education through plyometric exercise is carried out with the aim of preparing students to move actively in learning. The learning model used is motion learning in the game of running techniques, deception and concentration. The learning method used is the PAIKEM approach-*Pembelajaran yang Aktif, Inovatif, Kreatif dan Menyenangkan* which is active, innovative, creative, and fun learning. Based on the description, the researchers are interested in conducting a research entitled: "Development of *Hadang* Traditional Game Through Plyometric Exercise Method".

II. LITERATURE REVIEW

Traditional games are physical activities that are carried out consciously and intentionally and use rules on the basis of habits that are inherited from one generation to another, Sumardiyanto (2010: 3). Traditional games are games played by children of ancient times. Most of these games are done in groups. The lives of people in the past who do not know the outside world have directed and guided them to high social and togetherness activities.

Moreover, Indonesian culture in general highly upholds the values of togetherness. This then led to the creation of traditional types of games. Unfortunately the development of the era, especially the rapid development of technology has made this type of game disappear slowly.

Traditional games are a form of game activity that develops from a particular community habit. In subsequent developments traditional games are often used as a type of game that has original regional characteristics and is adapted to local cultural traditions. In the implementation of traditional games can include elements of folk games and children's games into it. It is even possible to include activities that contain elements of art such as what is commonly referred to as traditional art (Agustin, 2013).

Traditional games here can be synonymous with traditional sports terms. In order for an activity to be categorized as a traditional game of course the elements of tradition must be identified which have a close connection with the habits or customs of a particular community group. In addition, the activity must also contain strong physical elements that obviously involve large muscle groups and also contain elements of spirit which underlie the intent and purpose of the activity. That is, an activity is said to be a traditional game if the activity is still recognized as having certain traditions. Involving large muscles and the presence of strategies and their fundamentals do not really look like what they display (Agustin, 2013).

Plyometric comes from the word "plyethyein" (Greek) which means to improve, or it can also be interpreted from the words "plio" and "metric" which means more and measure, respectively which means stretching (Radcliffe and Farentinos, 1985: 3). Plyometric is a method for developing explosive power, which is an important component in achieving plyometric exercise which results in isometric muscle movement and causes reflex strain in the muscles. Plyometric exercises are carried out a series of power exercises specifically designed to help muscles reach their maximum potential level in the shortest possible time.

Plyometric is the right practice for people who are conditioned and devoted to becoming athletes in increasing and developing maximum jump, speed, and strength. Chu (1992)

explained that plyometric is a training method that emphasizes movements at high speed, plyometric training to apply speed to strength.

III. METHODOLOGY

Research Methods

Research-based development is a type of research that use in solving practical problems, especially education and learning research. According to Borg & Gall as quoted by Wasis D (2004: 4) research and development is a process used to develop or validate the products used in learning education. Furthermore, it is stated that the research and development procedures basically consist of two main objectives, namely: (1) developing the product, and (2) testing the effectiveness of the product in achieving its objectives.

Samples are partially or representative of the population studied, Arikunto (2002: 109). According to Sugiyono (2007: 56) the sample is a portion of the number and characteristics possessed by the population. The sample in this study was the fifth grade students of SD Negeri 98 North Bengkulu, amounting to 28 people. The sampling technique is to include all individuals or members of the population into a sample. The sampling technique in this study is total sampling.

Based on the results of needs analysis, the next step is the development of *Hadang* game exercise model modified in the form of developing a plyometric exercise model (Drill Scissor Jump, Stride Jumps, Lateral Bound Drill). In developing the exercise model developed, the researcher made an exercise model based on the study which was then evaluated by a physical education teacher as a learning expert.

The design of the research by using the Plyometric Exercise Model (Drill Scissor Jump, Stride Jumps, Lateral Bound Drill) with the form of the development of game play to train physical conditions tailored to the needs of students in learning to solve so that learning can run more effective and efficient. This development of exercise model is designed s in learning variation and can optimize the movement of students by utilizing existing facilities and infrastructure. The learning in the form of this game is competitive to increase enthusiasm, fair play attitude and high fighting ability.

IV. RESULTS AND DISCUSSION

The Results Data of Small Scale Trials

After the drafting of the initial product, the traditional game development model was completed, the product was tested on the fifth grade students of SD Negeri 98 North Bengkulu 98 using a total sampling method.

This small-scale trial aims to find out and identify various problems such as weaknesses, shortcomings, or effectiveness of products when used by students. Data obtained from this trial was used as a basis for revising the product before being used in large scale trials.

Based on the results data of the questionnaire filled out by the students obtained the percentage of answers that correspond to the aspects assessed at 80%. Based on the criteria that have been determined, the traditional game development model with the

plyometric method has met the criteria very well, therefore it can be used for fifth grade students of SD Negeri 98 North Bengkulu.

The Data Analysis Results of Small Scale Trials

In the analysis of data from the results of small-scale trials carried out obtained through cognitive and psychomotor test results that have been done with the acquisition of a percentage of 20% (2 people) with a very good category, 50% (5 people) with good categories, 10% (1 people) with enough categories, and a percentage of 20% (2 people) with less categories. Based on the predetermined criteria, the development products of *Hadang* traditional game using Plyometric have fulfilled the **Good** criteria, therefore it can be used for the fifth grade students of SD Negeri 98 North Bengkulu. The factor that makes this model acceptable to fifth grade students of SD Negeri 98 North Bengkulu is the assessment of the quality of *Hadang* traditional game models with plyometric methods performed on psychomotor and cognitive aspects that have met the criteria of **Very Good**.

The Results Data of Large Scale Trials

Based on expert evaluation and small-scale trials the next step is a large-scale trial. Large-scale trials aim to determine the effectiveness of changes that have been made to evaluate cognitive and psychomotor tests and small-scale trials whether the development model of *Hadang* traditional game using a plyometric method can be used. Large-scale trial data was collected using questionnaires.

Based on large-scale trials, data obtained from students who have understood and are able to practice traditional sports correctly in a percentage of 89%. Based on the predetermined criteria, the development model of traditional game using the plyometric method meets the criteria very well, so that it can be used for fifth grade students of SD Negeri 98 North Bengkulu. The following data shows the percentage of student questionnaires. In a large group trial a percentage of 21% (6 people) with a very good category is obtained, 43% (12 people) with good categories, 25% (7 people) with sufficient categories, and a percentage of 11% (3 people) with less categories.

The Data Analysis Results of Large Scale Trials

The Data Analysis Results of Large Scale Trials obtained a percentage of answer choices that were 90% suitable. Based on criteria that had been determined, the development model of traditional game using the plyometric method had met the criteria **very well**, therefore from large-scale trials this model could be used for fifth grade students of SD Negeri 98 North Bengkulu. The factor that makes this model acceptable that is all aspects

tested, 90% of students can exercise well. Both from understanding the rules of the game, the application of attitudes in traditional game activities has to be carried out using a plyometric method that is in accordance with the level of growth and development.

V. CONCLUSIONS

The development model products of *Hadang* traditional game using the plyometric method can be practiced by the test subjects. It was based on the results of the analysis of cognitive tests and psychomotor tests of the results of small-scale trials of 80% and large-scale trials of 90% and meeting the criteria very well.

If there are no problems, the development of *Hadang* game using the plyometric method can be continued, but if there is a problem, the game development model can be adjusted and then a work evaluation can be done to obtain the conformity of the development model of *Hadang* traditional game to the conditions and situations in the field.

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Calculation of Energy Levels and B (E2) for $^{46-45}\text{Ca}$, $^{46-45}\text{Sc}$ and $^{46-45}\text{Ti}$ by Using Nuclear Shell Model Code OXBASH

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DOI: 10.29322/IJSRP.9.08.2019.p9243

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9243>

Abstract: In this paper, the energy levels for $^{46-45}\text{Ca}$, $^{46-45}\text{Ti}$ and $^{46-45}\text{Sc}$ isotopes have been calculated. Calculations were carried out in the f7-shell region by employing the effective interactions, f748pn and using the shell model code OXBASH for windows by applying spin-parity of valance nucleons. It is found that there is good convergence of energy levels values with the standard practical value.

Key words: Energy levels, OXBASH Code and gamma transitions.

1. Introduction

The aim of this paper is study of the energy levels of $^{46-45}\text{Ca}$, $^{46-45}\text{Ti}$ and $^{46-45}\text{Sc}$ isotopes by using OXBASH code for windows. This program is a set of codes carrying out shell-model calculations with dimensions up to about 50,000 in the J-T scheme and about 2,000,000 in the M-scheme. Oxbash comes with a library of model spaces and interactions [1, 2].

Applied the shell model and use a Modified Brown and Sherr (f748pn) interaction for neutron and proton orbits in $^{46-45}\text{Ca}$, $^{46-45}\text{Ti}$ and $^{46-45}\text{Sc}$ to calculate the energy levels values. Various observables can be predicted accurately and systematically in terms of the nuclear shell model. For light nuclei, there are several "standard" effective interactions such as the Cohen-Kurath [3] and the USD [4] interactions for the *p* and *sd* shells, respectively. On the other hand, in the next major shell, *i.e.*, in the f7-shell, there are also "standard" interaction such as f748pn [5]. The spectroscopy of nuclei, in the f7-shell region, has been well described within the shell model framework. The best example for using several model spaces and two-body interactions is that of Brown et al, which is the most remarkable work in this field [6,7]. The starting point in all such shell-model calculations is the derivation of an effective interaction owing to the fact that the f7-shell is the most important for a variety of problems in nuclear structure such as electron capture in supernova explosions. In this work, the shell model calculations are carried out in the f7-shell region for the isotopes $^{46-45}\text{Ca}$, $^{46-45}\text{Ti}$ and $^{46-45}\text{Sc}$, to test the ability of the present effective interactions in reproducing the experiment in this mass region.

2. Shell Model Calculations

The calculations have been carried out in the nuclear shell model f7 using the code OXBASH for windows [6]. The code uses an m-scheme Slater determinant basis. With a projection technique, there are been constructed wave functions with good angular momentum J and isospin T. The f7pn model space is comprised of (1f7/2) below the closed N = Z=20 shell [8]. One can find the calculated results of states of the odd A and even A nuclei, number of protons, *i.e.*, 20 to the $^{46-45}\text{Ca}$, with neutron numbers (25, 26), number of protons, 21 to the $^{46-45}\text{Sc}$, with neutron numbers (24, 25) and number of protons, 22 to the $^{46-45}\text{Ti}$, with neutron numbers (23, 24) energy levels value.

2.1. Energy Levels Calculations

The calculations have been carried out using the code OXBASH for windows [9]. In the f7 model space comprised of the 0f7/2 valence orbits outside the ⁴⁰Ca. Two effective interactions have been employed with f7 model space for the calculations of level spectra, these effective interaction is f748pn [5]. It is worth mentioning that ⁴⁵Ca and ⁴⁶Ca have Isospin part (*T* = 2.5 and 3) respectively, ⁴⁵Sc and ⁴⁶Sc have Isospin part (*T* = 1.5 and 2) respectively, while ⁴⁵Ti and ⁴⁶Ti have Isospin part (*T* = 0.5 and 1) respectively.

The energy levels values for ⁴⁵Ca nucleus, the energy levels values are shown in table 1. these values are agreement with the experimental values, and new energy levels have been reached.

Table 1 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁵Ca

Exp .Res[10]		F748pn	<i>J^π</i>
<i>J^π</i>	Energy elevels		
7/2 ⁻	0.000	0.000	7/2 ₁ ⁻
5/2 ⁻	0.174	0.151	5/2 ₁ ⁻
3/2 ⁻	1.434	1.221	3/2 ₁ ⁻
-----	1.584	1.616	11/2 ₁ ⁻
-----	1.94	1.927	9/2 ₁ ⁻
-----	2.953	2.936	15/2 ₁ ⁻

The energy levels values for ⁴⁶Ca nucleus from f748pn effective interaction is shown in table 2 and these effective interactions give good results in comparison with the experimental values.

Table 2 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁶Ca

Exp .Res[11]		F748pn	<i>J^π</i>
<i>J^π</i>	Energy elevels		
0 ⁺	0.000	0.000	0 ₁ ⁺
2 ⁺	1.346	1.346	2 ₁ ⁺
4 ⁺	2.574	2.575	4 ₁ ⁺
6 ⁺	2.973	2.974	6 ₁ ⁺

The energy levels values for ⁴⁵Sc nucleus from f748pn effective interaction is shown in table 3 and these effective interaction results reasonably consistent with experimental data. The total angular momentum and parity are (7/2₁⁻, 11/2₁⁻, 9/2₁⁻, 15/2₁⁻, 7/2₃⁺, 5/2₂⁻, 9/2₃⁻, 19/2₁⁻, 23/2₁⁻, 7/2₇⁻) respectively, confirmation of which is (7/2⁻, 15/2⁻, 21/2⁻, 5/2⁻) as well as confirmation of momentum only, which is (1/2, 3/2, 9/2, 5/2, 3/2) respectively, and new energy levels have been reached.

Table 3 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁵Sc

Exp .Res[10]		F748pn	<i>J^π</i>
<i>J^π</i>	Energy elevels		
7/2 ⁻	0.000	0.000	7/2 ₁ ⁻
11/2 ⁻	1.236	1.268	11/2 ₁ ⁻

$9/2^-$	1.662	1.436	$9/2_1^-$
-----	1.716	1.707	$3/2_1^-$
-----	1.900	1.883	$5/2_1^-$
$15/2^-$	2.090	1.969	$15/2_1^-$
$(1/2, 3/2, 5/2)$	2.151	2.298	$1/2_1^-$
-----	2.152	2.416	$13/2_1^-$
$(7/2^-)$	2.341	2.461	$7/2_2^-$
$(1/2^+, 3/2, 5/2)$	2.531	2.490	$3/2_2^-$
-----	2.700	2.730	$11/2_2^-$
$(9/2^+, 11/2^-)$	2.960	2.838	$9/2_2^-$
$5/2^-, 7/2^-$	2.747	2.920	$7/2_3^-$
$1/2^+, 3/2, 5/2$	3.092	2.958	$5/2_2^-$
$5/2^-, 7/2^-, 9/2^-$	3.136	3.171	$9/2_3^-$
-----	3.198	3.181	$17/2_1^-$
-----	3.224	3.280	$13/2_2^-$
$(15/2^-)$	3.363	3.307	$15/2_2^-$
+	3.443	3.424	$11/2_3^-$
$19/2^-$	3.692	3.556	$19/2_1^-$
-----	3.722	3.691	$15/2_3^-$
-----	4.129	4.131	$9/2_4^-$
-----	4.178	4.190	$7/2_4^-$
-----	4.244	4.220	$5/2_3^-$
-----	4.307	4.260	$11/2_4^-$
-----	4.424	4.343	$13/2_3^-$
-----	4.464	4.448	$5/2_4^-$
-----	4.546	4.526	$17/2_2^-$
$(1/2, 3/2)$	4.662	4.565	$3/2_3^-$
-----	4.713	4.631	$11/2_5^-$
-----	4.713	4.667	$7/2_5^-$
-----	4.774	4.759	$13/2_4^-$
-----	4.801	4.792	$1/2_2^-$
-----	5.219	5.206	$15/2_4^-$
-----	5.261	5.272	$3/2_4^-$
-----	5.374	5.313	$9/2_5^-$
-----	5.374	5.402	$5/2_5^-$
$23/2^-$	5.418	5.563	$23/2_1^-$
$(21/2^-)$	5.710	5.672	$21/2_1^-$
-----	5.774	5.674	$7/2_6^-$
-----	5.834	5.843	$19/2_2^-$
-----	6.244	6.239	$11/2_6^-$
-----	6.332	6.347	$9/2_6^-$
$5/2^-, 7/2^-, 9/2^-$	6.551	6.419	$7/2_7^-$
-----	6.609	6.510	$17/2_3^-$
$(5/2^-, 7/2^-, 9/2^-)$	6.667	6.653	$5/2_6^-$
-----	-----	6.757	$13/2_5^-$
-----	7.696	7.618	$3/2_5^-$

-----	8.118	7.973	11/2 ₇ ⁻
-----	8.305	8.250	9/2 ₇ ⁻
-----	9.164	9.085	15/2 ₅ ⁻

For ⁴⁶Sc nucleus the energy levels calculations from f748pn effective interaction is shown in table 4. The effective interactions give results reasonably consistent with experimental data. The total angular momentum and parity are (3₁⁺, 5₁⁺, 2₁⁺, 5₂⁺, 4₁⁺, 7₁⁺, 3₄⁺, 1₂⁺, 4₄⁺, 0₁⁺) respectively, confirmation of which is (2⁺, 4⁺) respectively, as well as confirmation of momentum only is (3, 3) respectively, and new energy levels have been reached.

Table 4 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁶Sc

Exp .Res[11]		F748pn	J ^π
J ^π	Energy elevels		
6+	0.520	0.000	6 ₁ ⁺
4+	0.000	0.122	4 ₁ ⁺
3+	0.227	0.214	3 ₁ ⁺
5+	0.280	0.238	5 ₁ ⁺
2+	0.444	0.497	2 ₁ ⁺
5+	0.774	0.814	5 ₂ ⁺
4+	0.835	0.909	4 ₂ ⁺
7+	0.978	0.979	7 ₁ ⁺
-----	1.298	1.473	1 ₁ ⁺
3+,4+,(2+)	1.427	1.556	2 ₂ ⁺
-----	1.676	1.671	8 ₁ ⁺
-----	1.825	1.894	6 ₂ ⁺
(3)+	2.070	2.045	3 ₂ ⁺
-----	2.084	2.109	5 ₃ ⁺
-----	2.395	2.406	7 ₂ ⁺
(4+,5+)	2.431	2.409	4 ₃ ⁺
-----	2.486	2.472	9 ₁ ⁺
-----	2.534	2.583	2 ₃ ⁺
3+,4+	2.568	2.596	3 ₃ ⁺
3+	2.705	2.748	3 ₄ ⁺
1+	2.815	2.770	1 ₂ ⁺
-----	2.890	2.888	5 ₄ ⁺
-----	3.081	3.082	8 ₂ ⁺
-----	3.081	3.102	6 ₃ ⁺
4+	3.176	3.169	4 ₄ ⁺
-----	3.338	3.351	7 ₃ ⁺
-----	3.381	3.355	1 ₃ ⁺
-----	3.813	3.813	9 ₂ ⁺
-----	3.868	3.823	6 ₄ ⁺
-----	3.937	3.915	10 ₁ ⁺
-----	3.945	3.934	2 ₄ ⁺
-----	3.961	3.967	8 ₃ ⁺
-----	4.039	4.050	5 ₅ ⁺
-----	4.200	4.197	11 ₁ ⁺
-----	4.447	4.459	3 ₅ ⁺

-----	4.846	4.840	7 ₄ ⁺
-----	4.972	4.995	4 ₅ ⁺
0+	5.022	5.004	0 ₁ ⁺
-----	5.327	5.331	5 ₆ ⁺
-----	6.362	6.354	2 ₅ ⁺
-----	-----	7.470	4 ₆ ⁺
-----	-----	7.808	6 ₅ ⁺

The energy levels values for ⁴⁵Ti nucleus from f748pn effective interaction is shown in table 5 and these effective interaction results reasonably consistent with experimental data. The total angular momentum and parity are (9/2₁⁻, 11/2₁⁻, 7/2₂⁻, 15/2₁⁻, 17/2₁⁺, 5/2₂⁻, 23/2₁⁻, 27/2₁⁻) respectively, confirmation of which is (3/2⁻) as well as confirmation of momentum only, which is (3/2, 11/2, 13/2, 7/2, 17/2) respectively, and new energy levels have been reached.

Table 5 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁵Ti

Exp .Res[10]		F748pn	J ^π
J ^π	Energy elevels		
5/2 ⁻	0.039	0.000	5/2 ₁ ⁻
7/2 ⁻	0.000	0.210	7/2 ₁ ⁻
9/2 ⁻	1.353	1.411	9/2 ₁ ⁻
11/2 ⁻	1.466	1.490	11/2 ₁ ⁻
(1/2 ⁻ TO 7/2 ⁻)	1.799	1.729	3/2 ₁ ⁻
3/2 TO 11/2	2.432	2.477	3/2 ₂ ⁻
5/2 ⁻ , 7/2 ⁻	2.500	2.544	7/2 ₂ ⁻
-----	-----	2.927	5/2 ₂ ⁻
15/2 ⁻	3.015	2.990	15/2 ₁ ⁻
-----	3.200	3.299	1/2 ₁ ⁻
-----	3.200	3.310	13/2 ₁ ⁻
-----	3.200	3.334	7/2 ₃ ⁻
-----	3.200	3.341	9/2 ₂ ⁻
17/2 ⁻	3.601	3.383	17/2 ₁ ⁻
-----	-----	3.765	9/2 ₃ ⁻
(11/2 TO 15/2)	3.937	3.856	11/2 ₂ ⁻
-----	-----	3.892	19/2 ₁ ⁻
-----	-----	3.911	5/2 ₃ ⁻
(11/2 TO 15/2)	3.937	4.000	13/2 ₂ ⁻
-----	-----	4.045	7/2 ₄ ⁻
(7/2)-	4.723	4.319	7/2 ₅ ⁻
-----	-----	4.351	11/2 ₃ ⁻
-----	-----	4.650	15/2 ₂ ⁻
-----	-----	4.818	9/2 ₄ ⁻
-----	-----	4.844	11/2 ₄ ⁻
(17/2+)	5.239	5.114	17/2 ₂ ⁻
-----	5.540	5.120	5/2 ₄ ⁻
-----	5.540	5.163	15/2 ₃ ⁻
-----	5.540	5.167	11/2 ₅ ⁻
-----	5.540	5.167	9/2 ₅ ⁻
-----	5.540	5.190	13/2 ₃ ⁻

-----	5.540	5.234	$3/2_3^-$
-----	5.540	5.365	$19/2_2^-$
-----	5.540	5.465	$7/2_6^-$
-----	5.540	5.494	$5/2_5^-$
-----	5.540	5.503	$13/2_4^-$
-----	5.540	5.580	$11/2_6^-$
-----	5.540	5.626	$9/2_6^-$
-----	5.540	5.708	$1/2_2^-$
-----	5.540	5.766	$21/2_1^-$
-----	5.540	5.770	$3/2_4^-$
-----	5.540	5.784	$7/2_7^-$
$23/2^-$	6.163	5.814	$23/2_1^-$
-----	-----	5.974	$5/2_6^-$
-----	-----	6.064	$1/2_3^-$
-----	-----	6.071	$15/2_4^-$
-----	-----	6.141	$3/2_5^-$
-----	-----	6.143	$13/2_5^-$
-----	-----	6.160	$17/2_3^-$
-----	-----	6.179	$9/2_7^-$
-----	-----	6.195	$11/2_7^-$
-----	-----	6.211	$15/2_5^-$
-----	-----	6.216	$7/2_8^-$
-----	-----	6.295	$17/2_4^-$
-----	-----	6.344	$13/2_6^-$
-----	-----	6.371	$9/2_8^-$
-----	-----	6.405	$5/2_7^-$
-----	-----	6.457	$3/2_6^-$
-----	-----	6.536	$13/2_7^-$
-----	-----	6.657	$11/2_8^-$
-----	-----	6.668	$15/2_6^-$
-----	-----	6.677	$7/2_9^-$
-----	-----	6.689	$13/2_8^-$
-----	-----	6.725	$9/2_8^-$
-----	-----	6.789	$19/2_3^-$
-----	-----	6.843	$7/2_{10}^-$
-----	-----	6.857	$15/2_7^-$
-----	-----	6.937	$11/2_9^-$
$27/2^-$	7.143	6.881	$27/2_1^-$
-----	-----	6.956	$5/2_8^-$
-----	-----	6.977	$21/2_2^-$
-----	-----	7.047	$11/2_{10}^-$
-----	-----	7.126	$17/2_5^-$
-----	-----	7.187	$9/2_9^-$
-----	-----	7.403	$17/2_6^-$
-----	-----	7.404	$19/2_4^-$
-----	-----	7.432	$15/2_8^-$
-----	-----	7.441	$13/2_9^-$

-----	-----	7.505	13/2 ₁₀ ⁻
-----	7.830	7.543	23/2 ₂ ⁻
-----	7.830	7.588	15/2 ₉ ⁻
-----	7.830	7.703	3/2 ₇ ⁻
-----	7.830	7.709	1/2 ₄ ⁻
-----	7.830	7.714	25/2 ₁ ⁻
-----	7.830	7.732	17/2 ₇ ⁻
-----	7.830	7.841	5/2 ₉ ⁻
-----	7.830	7.879	19/2 ₅ ⁻
-----	7.830	7.908	15/2 ₁₀ ⁻
-----	7.830	7.939	3/2 ₈ ⁻
-----	-----	8.354	5/2 ₁₀ ⁻
-----	-----	8.574	21/2 ₃ ⁻
-----	-----	8.840	17/2 ₈ ⁻
-----	-----	9.009	19/2 ₆ ⁻
-----	-----	9.013	1/2 ₅ ⁻
-----	-----	9.069	3/2 ₉ ⁻
-----	9.643	9.650	19/2 ₇ ⁻
-----	9.643	9.693	21/2 ₄ ⁻
-----	9.643	9.706	23/2 ₃ ⁻
-----	9.643	9.764	3/2 ₁₀ ⁻
-----	-----	10.657	17/2 ₉ ⁻

For ⁴⁶Ti nucleus the energy levels calculations from f748pn effective interaction is shown in table 6. The effective interactions give results reasonably consistent with experimental data. The total angular momentum and parity are (0₁⁺, 2₁⁺, 4₁⁺, 2₂⁺, 6₁⁺, 1₁⁺, 2₅⁺, 4₆⁺, 8₃⁺, 4₉⁺, 11₂⁺, 1₅⁺, 12₃⁺, 1₇⁺) respectively, confirmation of which is (4⁺)

Table 6 shows a comparison of the energy levels values with respect to the ground state were calculated from f748pn effective interactions with experimental excitation energies of ⁴⁶Ti

Exp .Res[11]		F748pn	J ^π
J ^π	Energy elevels		
0 ⁺	0.000	0.000	0 ₁ ⁺
2 ⁺	0.889	0.945	2 ₁ ⁺
4 ⁺	2.009	1.890	4 ₁ ⁺
2 ⁺	2.961	2.541	2 ₂ ⁺
-----	3.213	2.815	4 ₂ ⁺
6 ⁺	3.298	2.855	6 ₁ ⁺
-----	3.338	3.306	2 ₃ ⁺
-----	3.553	3.453	3 ₁ ⁺
-----	3.553	3.458	4 ₃ ⁺
-----	3.579	3.540	5 ₁ ⁺
1 ⁺	3.731	3.662	1 ₁ ⁺
+	3.771	3.703	6 ₂ ⁺
-----	4.322	4.249	6 ₃ ⁺
-----	4.322	4.276	8 ₁ ⁺

-----	4.617	4.642	5 ₂ ⁺
-----	4.617	4.695	4 ₄ ⁺
+	4.845	4.851	0 ₂ ⁺
-----	5.000	4.907	3 ₂ ⁺
(4 ⁺)	5.079	4.957	4 ₅ ⁺
+	5.094	4.961	3 ₃ ⁺
+	5.094	5.028	7 ₁ ⁺
+	5.094	5.068	2 ₄ ⁺
-----	5.154	5.161	7 ₂ ⁺
+	5.180	5.272	8 ₂ ⁺
2 ⁺	5.363	5.364	2 ₅ ⁺
-----	-----	5.420	5 ₃ ⁺
-----	-----	5.424	6 ₄ ⁺
-----	-----	5.504	10 ₁ ⁺
4 ⁺	5.794	5.513	4 ₆ ⁺
+	5.811	5.696	7 ₃ ⁺
+	5.840	5.839	6 ₅ ⁺
+	5.903	5.896	5 ₄ ⁺
-----	6.025	6.033	9 ₁ ⁺
-----	6.025	6.064	6 ₆ ⁺
-----	6.025	6.086	0 ₃ ⁺
-----	-----	6.097	1 ₂ ⁺
8 ⁺	6.200	6.109	8 ₃ ⁺
-----	6.251	6.225	3 ₄ ⁺
-----	6.305	6.302	2 ₆ ⁺
-----	6.305	6.354	10 ₂ ⁺
+	6.424	6.378	5 ₅ ⁺
-----	6.513	6.493	6 ₇ ⁺
-----	6.513	6.519	4 ₇ ⁺
+	6.550	6.562	8 ₄ ⁺
-----	6.574	6.648	4 ₈ ⁺
+	6.616	6.653	11 ₁ ⁺
4 ⁺	6.685	6.696	4 ₉ ⁺
-----	-----	6.700	3 ₅ ⁺
-----	-----	6.716	7 ₄ ⁺
-----	6.794	6.761	9 ₂ ⁺
-----	6.794	6.795	2 ₇ ⁺
+	6.851	6.805	8 ₅ ⁺
+	6.851	6.850	6 ₈ ⁺
+	6.974	6.890	9 ₃ ⁺
+	6.974	6.893	5 ₆ ⁺
+	7.041	7.035	3 ₆ ⁺
+	7.041	7.048	12 ₁ ⁺
+	7.101	7.097	7 ₅ ⁺
+	7.147	7.156	6 ₉ ⁺
-----	7.172	7.191	10 ₃ ⁺
-----	7.238	7.259	5 ₇ ⁺

	+	7.288	7.268	4 ₁₀ ⁺
	+	7.288	7.299	2 ₈ ⁺
	+	7.350	7.377	3 ₇ ⁺
	+	7.350	7.379	8 ₆ ⁺
	+	7.558	7.561	5 ₈ ⁺
	+	7.558	7.562	8 ₇ ⁺
	-----	7.660	7.688	6 ₁₀ ⁺
	+	7.710	7.708	7 ₆ ⁺
	+	7.788	7.798	2 ₉ ⁺
	+	7.849	7.801	10 ₄ ⁺
	+	7.849	7.839	5 ₉ ⁺
	-----	7.874	7.884	3 ₈ ⁺
	-----	7.937	7.953	5 ₁₀ ⁺
	-----	8.013	8.007	8 ₈ ⁺
	-----	8.013	8.011	9 ₃ ⁺
	-----	8.134	8.118	7 ₇ ⁺
	+	8.182	8.191	3 ₉ ⁺
	+	8.182	8.204	0 ₄ ⁺
	+	8.230	8.213	1 ₃ ⁺
	+	8.230	8.245	2 ₁₀ ⁺
	10,11,12+	8.283	8.383	11 ₂ ⁺
	+	8.384	8.400	9 ₄ ⁺
	+	8.467	8.467	8 ₉ ⁺
	+	8.574	8.557	7 ₈ ⁺
	+	8.621	8.609	3 ₁₀ ⁺
	+	8.701	8.744	1 ₄ ⁺
	+	8.761	8.759	7 ₉ ⁺
	+	8.808	8.776	10 ₄ ⁺
	+	8.860	8.865	7 ₁₀ ⁺
	+	8.860	8.879	8 ₁₀ ⁺
	+	8.984	8.984	10 ₅ ⁺
	+	9.070	9.085	12 ₂ ⁺
	+	9.253	9.202	14 ₁ ⁺
	+	9.253	9.246	9 ₅ ⁺
	+	9.345	9.332	13 ₁ ⁺
	1 ⁺	9.420	9.441	1 ₅ ⁺
	+	9.474	9.467	0 ₅ ⁺
	+	9.572	9.536	11 ₂ ⁺
	12 ⁺ , 14 ⁺	10.041	9.927	12 ₃ ⁺
	-----	10.212	10.141	9 ₆ ⁺
	-----	10.256	10.271	1 ₆ ⁺
	-----	10.321	10.300	10 ₆ ⁺
	+	10.523	10.525	9 ₇ ⁺
	-----	11.426	11.456	9 ₈ ⁺
	1 ⁺	11.450	11.484	1 ₇ ⁺
	-----	-----	11.577	10 ₇ ⁺
	-----	-----	11.981	11 ₃ ⁺

12.974

12.835

0₆⁺

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Classroom Management of a Cape Verdean Higher Education Teacher

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Assignment Presented to the Academic Department
Of the School of Social and Human studies
In Partial Fulfillment of the Requirements
For the Doctorate Degree in Education

DOI: 10.29322/IJSRP.9.08.2019.p9244

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9244>

Abstract- The purpose of this research was to seek for classroom management strategies that a higher education professor uses in the context of a course of Literature taught to 2nd year undergraduate students from CVPU- Cape Verde Public University (Pseudonym) located in Cape Verde and to explore the role of the professor in using classroom management strategies to establish or maintain favorable conditions for learning and what classroom management practices do teachers implement in order to avoid behavioral problems. This research focused on qualitative data collection and the instrument that was used to collect the data of this study was semi structured interviews. The participant of this study was a professor from CVPU- Cape Verde Public University (Pseudonym) located in Cape Verde. The findings indicate that communication seems to be a fundamental component in classroom management, and it seems to be associated with the teacher's concept of how students learn and their intentions for teaching. In addition, it also suggests that learning is a gradual process, as students approach the fundamental concepts in period of studies, solve problems by relating these concepts in the group discussions and, finally, synthesize and register their understandings in the quiz.

Index Terms- Behavioral Problems, Classroom Management, Classroom Strategies, Higher Education, Teaching and Learning Process

I. INTRODUCTION

Assuming that the act of teaching should be understood in a contextualized way, in time and in space, it is understood that the privileged space for this is the classroom and the time available is that of the class. It is there and at that moment that teachers and students establish certain particular social relations that may favor or disempower the process of teaching and learning. Assuming that the primary purpose of the school is the transmission of historically constructed knowledge to the new generations to understand how, in fact, teachers manage the most diverse situations in search of effective professional duty that is essential to improve the quality of education. Doyle (1986) defines two main teacher tasks associated with classroom

management: class management (group organization, definition of rules, disciplinary procedures and sanctions, articulation and sequencing of activities, etc.); and teaching the content of the program (following the program, motivating students, selecting and organizing resources, evaluating learning, etc.).

The classroom management denotes a competence of the teacher associated with his or her pedagogical knowledge and the context of teaching and that develops through the experience during his or her teaching trajectory. From this perspective, investigations about classroom management should be carried out considering the real contexts of teaching, from which can emerge indications of the main aspects considered by the teacher in the process of organization and management of his or her activities before and during his or her teaching practice.

Statement of the Problem and Purpose of the study

The classroom management is a subject little addressed in educational research, but it configures a fundamental competence of the teacher for the referral of classes and for the maintenance of an environment conducive to learning. It is a capacity that encompasses content management, time, space and people, in order to guarantee the necessary conditions for teaching and learning. The researcher understands that teachers play an important role in classroom management and it is extremely relevant that teachers examine their classroom managements and techniques in order to create a safe environment conducive to learning for all learners. In addition, she believes that being an effective classroom manager is extremely important to successful teaching and learning process and effective classroom management plays an important role in student's classroom achievement.

Therefore, this research project has as its aim to seek for classroom management strategies that a higher education professor uses in the context of a course of Literature taught to 2nd year undergraduate students from CVPU- Cape Verde Public University (Pseudonym) located in Cape Verde. Furthermore, this paper will also address the role of the teacher in using classroom management strategies to establish or maintain

favorable conditions for learning and what classroom management practices do teachers implement in order to avoid behavioral problems.

II. LITERATURE REVIEW

According to the perspective of Amado and Freire (2009), the definition of classroom management includes the events that begin in the planning, with the organization and execution of each class held by the teacher “the orientation of questions and looks, reinforcements and incentives that he or she conveys to students” (Teixeira, 2011, p.115). Also it is included in this concept the evaluation that the teacher implements and the way how he or she manages and acts in relation to different conflicts and powers (Teixeira, 2012). Classroom management can also be described as the instructor responsibility to design and implement efficient classroom routines, policies, and procedures in order to ensure that students’ participate in class discussions, form cooperative learning groups, and accomplish class work, and several other classroom activities and interactions (Sterling, 2009). Classroom management can be also understood as the set of strategies adopted by the teacher, to maximize students’ cooperation and involvement and to reduce disruptive behavior (Arends, 1995; Wang, Haertel & Walberg, 1997, cited in Veiga 2013), maintaining an appropriate learning environment (Brophy, 1996; Djigic & Stojiljkovic, 2011). This concept involves the management of space, time and activities, as well as the management of student behavior, combining the characteristics of the teacher, his / her abilities and competences (Djigic & Stojiljkovic, 2011).

Classroom management is a fundamental step in ordering order, organizing teaching activities, and building an environment conducive to student learning. However, this theme receives little attention in teacher training courses and in educational research, particularly in the context of Higher Education, being a competence developed by the teacher during his teaching career. The first research on the organization and management of the classroom focused essentially on issues associated with order in the classroom, not establishing a direct relationship with the construction of a suitable environment for teaching and learning (Doyle, 1986).

However, since the 1980s, research has gone beyond the limits of order and has been associated with classroom management in teaching and learning processes (Gauthier et al., 1998). From this perspective, Doyle (1986) extends this concept, including the learning dimension, and conceives classroom management as a cognitive activity that allows teachers to anticipations that reduce the need for improvisations in order to promote learning. For the author, classroom management “consists of a set of rules and arrangements necessary to create and maintain an orderly environment conducive to both teaching and learning.”

Sterling (2009) emphasizes three fundamental dimensions of classroom management present in educational research: the management planning, the classroom management in a situation of interaction with students, and the evaluation and control of the classroom management activities. The first dimension refers to

the preparation and planning work that leads to a set of decisions related to the rules of coexistence and to the routines of class functioning, such as the sequencing of the activities and the implementation of a teaching plan. The second dimension refers to the application of disciplinary measures, the sanctions, the rules and procedures that govern the interaction between the agents of the classroom. It is, therefore, the supervision of the work of the students and the conduction of the dialogical interactions that are established in the classroom. The third dimension refers to the evaluation of the rules, procedures and disciplinary measures; therefore, it constitutes a reflexive activity of the teacher on the conduction of his or her classes.

The “management planning” is highlighted by the author as a fundamental stage of preparation for teaching, as stated:

The planning of class management begins not only with the preparation work, before the beginning of the school year, but also with the implementation and the communication of rules, procedures, relationships and expectations towards the students as soon as the year starts (Sterling 2009, p.29).

This planning begins before the beginning of a course and is established in the course of the classes, as a planning in action, particularly when the course starts, because this moment is fundamental so that the agents of the classroom know each other and the rules of Co-existence are shared (Sterling, 2009).

In the scope of Higher Education, Santos (2004), when dealing with the profile of the competent teacher, points out the ability to carry out pedagogical planning as a central capacity of this professional, who must “be clear about the objectives to be achieved in the development of the content with an adequate strategy and an evaluation that is consistent with what he or she has proposed. Plan your classes well and develop them competently (Santos, 2004, p.105).” Cunha (2009) evokes the concept of “participatory management” of the classroom as a characteristic of innovative experiences in Higher Education. In this process, the subjects involved participate in the classroom management from the conception of a planning for teaching to the analysis of the results, in which “there is a break with the vertical structure of power blaming the collective of the teaching and learning process through the proposals formulated” (p. 224). Effective classroom management not only permits the teachers to work with the pupils in a constructive and encouraging manner but also permits teachers to use preventative methods to avoid disruptions that are unnecessary (Schwartz & Pollishuke, 2013).

Thus, classroom management includes not only the physical appearance and the arrangement of the classroom, but also the classroom practices and rules, the responsibilities of the students required by the teacher, the student relationships, disciplinary actions, and the strategies the teachers use and the personalities displayed by the teachers.

Effective classroom management is extremely important because it helps students to be motivated, to exhibit appropriate behaviors, to boost confidence and enhance their learning. “Classroom management is a critical and complex component in the creation of effective learning environments” (Bennett & Smilanch, 1994, p.14). Richardson and Fallona (2001) state that the student learning and the classroom rules set by the teachers

are directly related, though, they consider that the most significant aspect is the classroom management set at the first week of the academic year. Also, Soodak (2003) argues in her research study, *Classroom Management in Inclusive Settings*, how the excellence of a classroom environment permits students to feel comfortable, safe and encouraged. When these aspects are present in a classroom the students' learning improves and misbehavior and disciplinary issues are reduced. Wentzel (2003) states in *Motivating Students to Behave in Socially Competent Ways* that when students have a strong sense of belonging it helps them to achieve good outcomes, encompassing educational motivation, a sense of effectiveness, and emotional well-being. "Also, a strong sense of belonging has been related with a desire to learn and an increase in understanding, while a lack of belonging has been related with undesirable educational outcomes such as absence and withdrawal from school" (Mansor et al., 2012, p.37). Therefore, effective classroom management is considered to be important not only for the classroom achievement, but also for the accomplishment of students' wellbeing and learning and for encouraging appropriate behavior. The use of classroom management skills may be a key component to help students to engage in the classroom. Usually one of the consequences of lack of engagement in the classroom is students' misbehavior. When students are not engaged in the classroom, they will get bored, resistant to teacher's instructions, which may cause conflict in the classroom if teachers do not possess classroom management skills to control this kind of situation.

Roache and Lewis (2011) discuss the relationship between students and teachers, and its effects on students' misbehavior in their study entitled *Teachers' Views on the Impact of Classroom Management on Student Responsibility*. In this study, they put together different views of different authors in relation to "student-teacher" relationship and how it is related to student behavior. One of the approaches they discussed is Canter's (2010), and it falls into a "teacher-oriented" model, which means that the teacher has clear expectations of students' behavior, and what is considered good behavior is enforced by rewards, while on the other hand what is not considered good behavior is addressed by "appropriate punishment". Another approach, supported by Gordon (1974) is the "student-oriented" one. The ones that defend this approach, for instance Gordon, believe that "obedience" is not the key for students to develop responsible behavior, but they should follow a "self-regulatory" process, where they are responsible for controlling their own behavior (Roache and Lewis, 2010). Furthermore, Roache and Lewis also discussed a "group-oriented" approach, which is supported by researchers like Dreikurs, Grunwald & Pepper. These researchers believe that students develop responsible behavior by forming decision groups, with the teacher as a guide to help them follow through the rules (Roache and Lewis, 2010). Dreikurs is a pioneer in the study of behavioral issues, but unfortunately I could not have access to any of his primary studies.

Roache and Lewis had the purpose to examine teachers' points of view on classroom management strategies and the perception they have of the relationship between students' responsibility and these strategies. This study was conducted in Australia, with 145

primary and 363 secondary school teachers. Questionnaires were applied, and after analyzing the data, the researchers found that when students misbehave in the classroom teachers become concerned, and they tend to adopt management strategies like punishments that instead of solving the problem may cause students to misbehave even more. One of the important issues that this primary research shows is that the use of punishment in the classroom may not necessarily be a good way of managing students' misbehavior.

The Classroom Management Idea Book created by Peace Corps (2008) also discusses strategies that teachers can use for a well-managed classroom:

1. Create a motivational environment by getting students involved in classroom activities. It is very important that teachers give students clear directions at the beginning of classes so they know what they are expected to do. It is also important that teachers demonstrate constantly that they believe every single student have the ability to learn.
2. Make every minute count by planning each lesson in advance, and by writing down every learning objective. Not every teacher may think of it, but it is important to be prepared with an emergency lesson or activity in case anything out of the ordinary happens.
3. Be prepared for students' misbehavior, which might be a challenge for teachers. One good strategy is to begin the school year by sharing with students the concept of misbehavior, and to establish a working system with rules and consequences. To make this more effective, allow students to participate in the creation of consequences for breaking the rules in the classroom.
4. Keep everyone engaged, because when students are challenged to think actively, they get involved in learning, which helps them develop critical skills. It is also important to always praise students for their willingness to try and answer questions.
5. Be creative, this is where teachers really put into action their ideas. They can use resources such as pictures, maps, activity ideas, arts and crafts instructions, magazines, and all materials they may find helpful to their classroom.
6. Give students choices, for instance, when found in situations where teachers have no choice unless to punish students misbehavior, it is a wise strategy to let students choose between two possible punishments, Peace Corps (2008).

Furthermore, the problem of students' misbehavior is one that goes beyond the classroom. Rusby (2011) related the school environment and school staff procedures to students' behavior. In her study entitled *Observations of the middle school environment: The context for student behavior beyond the classroom*, she discussed school environment and school staff procedures as very important in helping students develop appropriate behavior. Rusby believes that staff management procedures and environmental factors have the power to positively or negatively influence students' behavior. The use of clear rules and effective behavior management are important for a good "staff-student" relationship, and the lack of such environment can result in students' behavioral problems (Rusby, 2011). While conducting this study, students from 18 middle schools were used as participants, and the methodology was

based on observations. Observers/research assistants were trained and placed in the schools as to assess staff and students' behavior. As there were different environments in each school, there were obviously differences found in students and staff behavior. Most importantly, it was found that staff practices were deeply related to student behavior.

I do believe that school atmosphere, as well as home atmosphere, are important factors in controlling the problem of misbehavior. Most students have behavior problems because they have a difficult relationship at home, because they face violence, or because the family structure is not efficient in providing values that are important for someone to be able to develop positive behavior. Schools have to be equipped with staff members that are trained and able to deal with students that bring behavior problems from home. According to Stormont, Reinke & Herman (2011) "...schools currently lack systematic and coordinated efforts to meet the mental health and behavioral needs of students...". In their study entitled *Teachers' Knowledge of Evidence-Based Interventions and Available School Resources for Children with Emotional and Behavioral Problems*, Stormont, Reinke & Herman (2011) discussed a set of behavior interventions that can help teachers and schools deal with students with behavior problems. One of them is the establishment of "tiers of support with increasing levels of intensity" to reduce or prevent behavior problems. At a general level, all students receive the same instructions for correct behavior. Once teachers determine that these instructions are not efficient for certain students, they provide those students with additional intervention, which are generally conducted in small groups. In case these additional instructions do not prove to be efficient for certain students, teachers have to use specific strategies for students' individual needs. In that case they will have to develop a specific plan to address the behavior problem (Sugai et al. 2000, cited by Stormont, Reinke & Herman, 2011).

In this study, the researchers aimed to find out the knowledge of teachers about intervention programs to help students with behavioral problems, and the methodology used was the application of surveys. Participants included 239 teachers (early childhood and elementary education) from 5 school districts. This research comes to show that teachers have a very limited knowledge of the programs available; however, this cannot be generalized. The results apply only to the teachers that participated in the study; nevertheless, the same research can be conducted in different schools and districts. It is important to add that in addressing students behavior problems, I believe that teachers have to work together with parents for more efficient results because, as I mentioned above, behavior problems may be caused by family environment problems, and in that case teachers alone cannot achieve desired results while using strategies for behavior problems. The next chapter will provide detailed information on the methodologies used in conducting this research.

III. METHODOLOGY

Sample Population

One professor from the CVPU- Cape Verde Public University (Pseudonym) located in Cape Verde participated in this study. The professor investigated is a Master in African Literature and Languages and he acts as an English Professor in Higher Education for more than 20 years and he is recognized by his peers and students as a competent teacher. For more than 15 years he has been the coordinator and professor of a Literature course offered annually to 2nd year undergraduate students of the English Studies course. I chose this professor because he has stood out for years in the institutional evaluation carried out at the end of each semester, in which students evaluate their teachers through a questionnaire.

Having in mind the purpose of this study, this research focused on qualitative data collection. With the purpose to get the necessary information in order to answer my research questions the instrument that was used to collect the data of this study was semi structured interviews. According to McDonough & McDonough (2004) are those interviews "that have previously idealized questions, but giving the researcher flexibility to change the order and format of the questions" (p.183). With the purpose of obtaining the information necessary to answer the research questions it was chosen one data collection instrument as a way to avoid doubts arising during the data collection phase and to ensure the clarity of the data.

Plan for Data Analysis

The data was collected from the performance of the professor in his Literature course integrated by twenty four undergraduate students and whose objective is to provide a global vision of the general principles of Literature. The course was structured from two central teaching strategies, which are: the "periods of studies" and "discussion groups". In the "periods of studies" students meet in groups of six to answer a set of questions about key concepts and information related to a topic in class. These questions were available in the handbook of the course delivered at the beginning of the course and were answered with the support of the textbook delivered by the professor at the beginning of the course. A period of study is performed in an average period of two hours. The group discussions are held with all students, organized in turn. It discusses problems that articulate the information and concepts addressed in the periods of studies. Such questions are available in the handbook or removed from the textbook. Each group discussion is performed in an average period of two hours.

IV. DATA ANALYSIS

After the collection of the data through the methodology discussed in chapter II, the data was analyzed in a statistically valid, reliable, and coherent way. As the purpose of this chapter is to establish how the data was analyzed, below is an explanation of how the instrument described in Chapter II was analyzed.

The data collection was done with the accomplishment of a semi-structured interview that was recorded in audio and video and integrally transcribed. Also it was used as a data source the teaching planning developed by the professor for this course. The interview aimed to mobilize the professor's narratives about his knowledge and experiences about: the purposes and objectives for the teaching, the students and their understandings, the teaching strategies and the curriculum; considering the Literature course given to 2nd year undergraduate students of the English Studies in the first semester of 2016, more precisely during the month of November.

The professor points out the teaching planning as a fundamental step of his practice. This planning includes: the teaching staff, the summary of the course syllabus, A suggestion of bibliography for the course, the indication of websites with software for further studies, a description of the main teaching activities and evaluation criteria, a schedule with the content programming and activities that will be carried out in each class, a study guide for each subject, with questions and problems for the accomplishment of the period of studies and group discussions, and some appendices.

It is therefore a detailed and systematic planning that intends to anticipate the steps that the professor has chosen to guide his teaching. This planning is shared with the students on the first day of class, each of which receives a copy in the form of a handbook. On that day, the professor presents his teaching approach, clarifies doubts and initiates teaching activities. In this way, the students can have an overview of the course and the subjects and activities that are scheduled for each day of the class. At the beginning of the course the professor tends to be more attentive to the group, since it is a moment of adaptation and incorporation of the teaching strategies adopted in the discipline. However, as the students incorporate the dynamics of the classes and become more autonomous, the professor starts to interfere less and less in the learning process.

The class schedule is adjusted according to the progress of the course and if the students advance beyond the proposed one, the teacher proceeds to approach the following subjects. The following is a clipping of the calendar provided by the teacher in his teaching planning, in which he proposes an estimated period to approach a set of subjects.

Month	Day/period	Activity and Subject
November	14(morning)	PS - Non-Fiction - Objectives 1-5.
	16(morning)	GD - Non-Fiction - Exercises 1-5.
	21(morning)	PS - Fiction Part I - Objectives 1-10.
	23 (morning)	GD - Fiction Part I - Exercises 6, 7 and 9-12.
	28 (morning)	PS - Fiction Part II - Objectives 2-9.
	30 (morning)	GD - Fiction Part II – Exercises - 2, 3, 4. Quiz I.

Table 1 - Calendar clipping of the subjects and activities drawn from teaching planning.

In this section, it is presented a program for the teaching of two subjects: fiction and non-fiction. It can be observed that the time available for the approach of each subject is varied. To address the subject "Fiction" the professor suggests one period and to address "Non-Fiction" he also suggests one period. To set the time necessary for the approach of each subject requires the professor to know about the quantity of matters associated to each subject, the strategies used and the stage of students' development.

It is essential for him that the studies are carried out during the classes, as this will allow interaction among students, which for the teacher is an opportunity for them to develop "the skills and abilities", which are directly related to the two main teaching strategies proposed in the discipline, the period of studies and the group discussions. However, according to the professor the option of a group work requires more time for study in the classroom and this directly implies the selection of contents.

The choice of teaching strategies that favor interaction among classroom agents suggests that the teacher's approach does not prioritize the teaching of conceptual contents and corroborates with its purpose that students develop skills and abilities. Another aspect that stands out in the teacher's approach is the organization of teaching activities, which begin with the period of study, continue with the group discussion, and at the end of a cycle of subjects the students hold a "Quiz", which for the teacher "is a learning strategy, it is not an assessment of what they already know. It's a way for them to learn." This structure is maintained throughout the discipline, being interrupted only for the application of one of the three official evaluations proposed in the discipline. The group work also requires an adequate space and infrastructure, as the students need to organize themselves into groups and move through the classroom. Therefore, in order for the periods of studies and group discussions to be carried out, it is important that the chairs can be moved and that the class is not composed of a large number of students. The professor also emphasizes that it is "essential in this type of work, they have literature, they have what to read, this is necessary, and otherwise you cannot do the period of study".

The context in which learning will take place is an element considered by the teacher in the definition of his strategies, because in order for the activities to be carried out and achieve their purposes, it is fundamental that the necessary structural conditions and human resources exist. The professor also emphasizes that his approach requires the interaction between the professor and the students and, therefore, numerous classes make difficult its implementation. During the periods of study, students are free to leave the room and perform their activities at the pace that is convenient for them. The professor reveals that he deals with his target audience in a flexible way and he seeks to create a pleasant learning climate. The professor reveals to have knowledge about the characteristics of his target audience, who are young and adolescent, and so it does not require a rigid posture of his students. For him, a posture with more flexibility

does not imply lack of seriousness neither of the professor nor of the students and that the structure of the discipline allows the students to know the dynamics of the classes and to take responsibility for their learning. In the same way the professor deals with the control of the frequency in the classes. He proves to be quite flexible with the control of the students' frequency and even so, according to him, few are missing classes. For the professor, this is due to the fact that the students recognize the importance of participating in the classes and this can be an indication that the approach proposed in the discipline is approved by the students.

V. CONCLUSION

In this research it was possible to recognize that this professor conducts the classroom management considering: 1) his teaching strategies, 2) the elaboration of study plans for the students, 3) the strategic sequencing of his activities, 4) the organization of students in the classroom and (5) the human and material resources available for teaching. He emphasizes the importance of detailed teaching planning and presents a systematic organization of his activities based on the triad periods of study, group of discussion and quiz; which constitutes a central nucleus of activities that direct the teaching. Communication seems to be a fundamental component in classroom management, since the teacher provides his teaching planning to the students, in which he indicates his teaching objectives and strategies and reveals to be very flexible with the rules of coexistence in the classroom. His appreciation of teaching planning and the way he conducts his classes suggests that one of his goals is to create the conditions necessary for the students themselves to implement this planning and the role of the teacher is to oversee this process. In the case of this study, the classroom management seems to be associated with the teacher's concept of how students learn and their intentions for teaching. His emphasis on activities that provide interaction among classroom agents suggests that for him, learning is favored by interaction among the students.

It also suggests that learning is a gradual process, as students approach the fundamental concepts in period of studies, solve problems by relating these concepts in the group discussions and, finally, synthesize and register their understandings in the quiz. According to him, the choice of student-centered teaching strategies directly implies the selection of the contents for teaching and depends on some variables, such as: a small number

of students, an adequate space for teaching, support of monitors and didactic material for all students.

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Prevalence Of Traumatic Dental Injuries Among Residential School Children And Day Scholars Of 9-14 Years In South Bangalore.

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DOI: 10.29322/IJSRP.9.08.2019.p9245

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9245>

Abstract

Aim:- To assess and compare the prevalence of traumatic dental injuries among day scholars and residential school children and their association with predisposing factors, such as lip competence, molar relationship, overjet and variables such as age, gender and cause of trauma.

Methodology:- Cross sectional study was carried out among 250 residential and 250 day school children aged 9-14 years of South Bangalore. All the children were examined for traumatic dental injuries, its related cause, incisal overjet, molar relation and lip competence using mouth mirror and probe under day light.

Results:- Statistical analysis was done using SPSS version 22.0. Prevalence of dental injuries was 18.2% , commonly seen among boys of residential school aged 13-14 years. The increased prevalence of traumatic injuries was found with Class I molar relation and increased overjet in children with potentially competent lips.

Conclusion:- Increased prevalence of dental trauma among school children stresses the need for awareness towards prevention and treatment.

Index terms:- Cross sectional study, Prevalence, School children, Traumatic dental injury

INTRODUCTION:-

Several millions of people are injured by trauma every year that has multitude of consequences for not only the traumatized individual but also the family members and society. Oral region comprises as small as 1% of the total body area but accounts for 5% of all bodily injuries¹. Oral injuries are more common among the children and the adolescent. Studies have shown that 71-92% of all the TDI's sustained in a lifetime occur before 19 years of age and begin to decrease after 24-30 years². Since there is decline in the

prevalence and severity of dental caries among children, attention has been drawn to other aspects of oral health such as traumatic dental injuries³. These injuries range from simple enamel fractures to severe damage involving the displacement or avulsion of teeth⁴.

Prevalence of traumatic dental injuries has markedly increased in the past few decades. Existing data on prevalence of traumatic dental injuries carried out in different countries have shown that the prevalence of incisor trauma ranges from 6%-34%⁵. This difference may be attributed to age of the study participants, gender, sample from which participants were drawn and criteria used⁶⁻⁷.

Oral health is an integral part of general health. Oral cavity has a multitude of function. Decreased food intake due to oral pain and poor dental status can cause low growth in children. The position and appearance of anterior teeth have a psychological and a social impact on children and hence any injury to the anterior teeth will affect the child's quality of life. It also causes difficulty in speaking clearly and feeling embarrassed to smile or to show the teeth⁸⁻¹¹. Studies have shown that traumatic dental injuries of permanent anterior teeth affects the personality and self esteem of the young patient and its management requires experience, judgement and skill⁸.

The causes for traumatic dental injuries are usually related to the age of the patient . In preschool children the most common cause for traumatic injuries are falls. In school age children injuries are most often caused by bullying at school, sports etc. In adolescents and young adults assaults and traffic accident are the most common cause¹. Predisposing factors include inadequate lip closure and increased incisal overjet of teeth¹²⁻¹³.

Several residential schools are there in Bangalore. In these schools there can be increased prevalence of traumatic dental injuries as there is no parental supervision, increased sports activities, collision, bullying, violence etc. Very few studies in the literature have assessed the prevalence of traumatic dental injuries among residential school children.

Hence the aim of the study is to assess and compare the prevalence of traumatic dental injuries among the day scholars and residential school children in South Bangalore and to correlate the prevalence of injury to the cause of trauma with age of the child, incisal overjet, molar relationship and lip competence of the child.

MATERIALS AND METHODS:-

A cross sectional comparative study was conducted among 500, 9-14 years school going children of both genders from South Bangalore. Ethical clearance was obtained from the Institute's ethical committee. List of Day scholars school and Residential schools was obtained from the Department of Public Instructions. Permission was obtained from school authorities and study schedule was prepared. On the scheduled day the school was visited to collect the data.

Healthy children of the age group 9-14 years were included in the study. Children with permanent anterior teeth lost due to caries or causes other than trauma, children with partial or complete anodontia involving permanent anterior teeth and children undergoing orthodontic treatment were excluded from the study. Informed consent was obtained from both the parents and participants included in the study.

The study was undertaken in 2 parts :- Clinical examination and structured interview.

Clinical examination:- Information regarding age, gender and school was noted down. Clinical examination was done using mouth mirror and probe under day light to examine the number of teeth injured, type of injury, lip competence, molar relation and the overjet. The injured teeth were classified using the Andreasen's epidemiological classification of TDI's including codes of the World Health Organization International classification of diseases to dentistry and stomatology (1997). The Community Periodontal Index Probe for Treatment Needs was used to record the overjet. The molar relationship was recorded using Angle's classification (Angle's class I, class II and class III). Lip competency was recorded as competent lips, potentially competent and incompetent lips when the patient was seated upright and in relaxed state. Lips were noted as competent when the lips were in slight contact when the musculature is relaxed. Subjects with morphologically shorter lips not being able to form a lip seal in relaxed state and who required active contraction of perioral and mentalis muscle to form a lip seal were categorized to have incompetent lips. Subjects with normal lips that failed to form a lip seal due to proclined upper incisors were categorized to have potentially competent lips.

Structured interview:- Structured interview was conducted where the children were verbally asked to state the cause of injury that was documented as fall, collision, road traffic accident, violence, cannot recollect and miscellaneous. Miscellaneous category included biting on hard objects like pen, pencil etc, opening of bobby pins, soda bottles. Other information like duration since the injury occurred (<1 year, 1-2 years, > 2 years and cannot recollect) and if any treatment was taken for the injury was also noted down.

STATISTICAL ANALYSIS:-

The data was collected and tabulated and was analyzed using SPSS software V.22, IBM., Corp

Descriptive analysis of all the explanatory and outcome parameters was done using mean and Standard Deviation for quantitative variables, frequency and proportions for categorical variables.

Chi Square test was used to compare the difference in the distribution of responses for estimating the prevalence of dental injury between the Residential & Day Scholar school children.

Independent Student t test was used to compare the mean dental trauma Index scores between Residential & Day Scholar school children.

The level of significance was fixed at $P < 0.05$.

RESULTS:-

A total of 500 children, 250 from day scholars school and 250 from residential school were included in the study.

Difference in the prevalence of dental trauma between the males and females was stastically significant with higher prevalence of trauma seen among males of residential school (26.7%).

Difference in prevalence of dental trauma between day scholars school and residential school was statistically significant with p value less than 0.05 with a higher prevalence of trauma seen among Residential school children (23.6%).

A stastically significant difference in prevalence was observed between the age group 11-12 years of day scholars school and residential school. but difference in prevalence observed in 9-10 years and 13-14 years was not statistically significant.

In this study the most highly affected tooth was 11 (10.6%) followed by 21(10.4%]. Least affected being 22 (3.2%) followed by 31 and 12 (0.8%). Code 2 injuries (enamel fractures) were come common followed by Code 3 injuries (enamel and dentin fractures).

In the present study most of the subjects were not able to recollect the cause of injury.

Majority of the study participants had Angle's Class I molar relation followed by Class II and very few Class III.

Among these class I with bimaxillary protrusion has had highest prevalence of trauma followed by subjects with Class I (18.7%) and Class II (14.5%).

High prevalence of trauma was seen among subjects having potentially competent lips (42.9%) followed by subjects with incompetent lips (25%). The prevalence was low among subjects with competent lips (15.9%).

High prevalence of traumatic injuries was seen in subjects having overjet of 5.6-8.5mm in both day scholar school and residential school (42.9% and 31% respectively). Lower prevalence was observed among subjects having overjet of < 3.5 mm (7.6% in day scholar school and 20.9% in residential school).

DISCUSSION:-

Traumatic dental injuries are a challenging problem to the oral health professionals³. Unfortunately public is unaware of the risk and does not have enough information to avoid traumatic injuries to the teeth. Although prevention of TDI is the most desirable action, oral health promotion through well structured oral health education program can create positive change in awareness for special group such as school children.

In this cross sectional study the total prevalence was found to be 18.2%. This result is in accordance with the results obtained by Traebert et al (16.6%) and Cortes et al (16.1%) and in contrast to the results obtained by David et al (6%) and Rai and Munshi (5.29%) . This difference could be due to variation of age of the study subjects, gender, sample from which subjects were drawn, criteria used and geographical and behavioural differences between study locations.⁶⁻⁷

In this study TDI's were more common in children of residential school and more commonly found in boys. The reason for increased prevalence of TDI in residential school could be due to increased participation in sports, recreational and physical activity¹⁴⁻¹⁵. Apart from this there is also increased bullying and violence seen in residential school. The reason for boys being more prone to TDI's could be due to their participation and involvement in more aggressive sports and vigorous outdoor activities than girls. The relatively low prevalence of trauma in girls can be explained by the fact that girls are generally more mature in their behavior than boys¹⁵. This corroborates with the findings of studies conducted by Ravishankar et al, Ahlawat B et al, Patel et al, David et al and Cavalcanti et al. These results are in contrast to Garcia-Godoy, where gender distribution was not significantly different.³

In the present study the highest prevalence of trauma was among 13-14 years age group children. Children at this age are usually more active, have psychomotor underdevelopment and poor motor skills and hence cannot precisely evaluate velocity and danger.¹⁴ This result is in accordance to the study done by Hedge et al where the peak age to sustain TDI's was 13-14 and study done by Govindarajan et al and Prabhu et al where more injuries were found in 10-13 year old children.

In this study most commonly affected teeth were the maxillary central incisors. This could be due to the anatomical position of the maxillary incisors which are often associated with presence of overjet and inadequate lip closure.^{5,7,10} Also these teeth erupt early that put them at risk for a longer period of time¹⁴. This result is in agreement with the results obtained by Mona et al and Nik-Hussein et al. In this study fractures involving the enamel were more common followed by fractures involving enamel and dentin^{8,10,14,15} which is in accordance with the results obtained by Garcia-Godoy et al. TDI's usually affect single tooth but certain events may lead to multiple tooth injury as well.²

Conclusion could not be drawn for the cause of the injury in this study as majority of them (78%) failed to recall the cause of trauma. The most probable cause for this could be due to high prevalence of minor injuries, for which children and parents were not concerned by the traumatic event and forgot its circumstances in a short time¹⁶. Future study by interviewing the parents and teachers about the cause will throw light and provide some clue for the cause of TDI's among children. The 2nd most common cause of injury was fall. These results are in contrast with Govindrajana et al where the most common cause of TDI's was fall and the second most common cause was of unknown origin.

In the present study majority of subjects with TDI did not refer to dentist for professional assistance. Lack of adequate knowledge and proper motivation of both parent and dentist along with the limitations imposed due to socioeconomic constraints and high cost of treatment could explain the reason for untreated injuries⁶. This result is in accordance with the study conducted by Nik-Hussein and Gupta et al. Considering that TDI's can have a psychological and social impact on children, the required treatment should be promptly provided. Studies have shown that prompt treatment provided within 24 hours of injury reduced the chances of pulpal death and further complications¹⁷.

In the present study majority of the subjects had Class I molar relation and subjects with Class I bimaxillary protrusion had high prevalence of TDI followed by class I malocclusion which is in accordance with the results obtained by Govindarajana et al. This is in contrast to the study conducted by Dua et al where high prevalence of TDI was found in patients with Class II div I malocclusion.

High prevalence of TDI was found in patients with potentially competent lips. Lips provide protection to anterior teeth by avoiding excessive exposure of these teeth and thus a lack of lip coverage infers greater risk of TDI^{5,9,16,18}. These results are in agreement with the study conducted by Prabhu et al, Govindarajana et al and Mona H et al.

Significant association was found between the occurrence of anterior tooth injury and increasing overjet. The most probable cause for this could be that the increased overjet would result in more forwardly placed anterior teeth and this more prominent position in turn would make these teeth more vulnerable for trauma^{5,9,16,18}. These results are in accordance with El-Kalla et al, Cortes et al, Borzabadi-Farahani et al and Artunet et al.

CONCLUSION:-

High prevalence of TDI is seen which can be minimized by routinely conducting screening camps in schools to identify children who are at risk for TDI. School teachers should be educated regarding the emergency management of TDI. TDI's have both physical and

psychological impact on the child hence educational programs emphasizing the ways to prevent dental trauma and the benefits of seeking immediate treatment for the conservation of fractured teeth should be instituted.^{14,16}

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Table I:- Comparison of prevalence of dental trauma among different age groups.

Comparison of prevalence of Dental Trauma among different age groups in Day & Residential Schools using Chi square Test									
Age Groups	Dental Trauma	Day School		Res. School		Total		χ^2 Value	P-Value
		n	%	n	%	n	%		
9-10 yrs	Absent	55	96.5%	64	87.7%	119	91.5%	3.215	0.07
	Present	2	3.5%	9	12.3%	11	8.5%		
11-12 yrs	Absent	81	88.0%	46	69.7%	127	80.4%	8.202	0.004*
	Present	11	12.0%	20	30.3%	31	19.6%		
13-14 yrs	Absent	82	81.2%	81	73.0%	163	76.9%	2.008	0.16
	Present	19	18.8%	30	27.0%	49	23.1%		

Table II:- Comparison of cause of injury and treatment undertaken

Comparison of cause of Injury for dental trauma and treatment undertaken in Day & Residential Schools using Chi Square Test							
Variables	Category	Day School [n=32]		Res. School [n=59]		c2 Value	P-Value
		n	%	n	%		
Cause of Injury	Accident	4	12.9%	0	0.0%	24.299	<0.001*
	Collision	1	3.2%	0	0.0%		
	Fall	11	35.5%	13	22.0%		
	Sports	2	6.5%	0	0.0%		
	Violence	2	6.5%	0	0.0%		
	Cannot Recall	11	35.5%	46	78.0%		
Treatment Undertaken	Yes	2	6.3%	0	0.0%	3.770	0.05#
	No	30	93.8%	59	100.0%		

* - Statistically Significant
- Borderline Significance

Table III:- Comparison of dental trauma with prevalence of dental trauma among study participants.

Comparison of Dental Trauma with prevalence of Dental Trauma among study participants in Day & Residential Schools using Chi square Test									
Over/Jet	Dental Trauma	Day School		Res. School		Total		χ^2 Value	P-Value
		n	%	n	%	n	%		
≤ 3.5mm	Absent	170	92.4%	136	79.1%	306	86.0%	13.068	<0.001*
	Present	14	7.6%	36	20.9%	50	14.0%		
3.6-5.5mm	Absent	41	73.2%	33	71.7%	74	72.5%	0.028	0.87
	Present	15	26.8%	13	28.3%	28	27.5%		
5.6-8.5mm	Absent	4	57.1%	20	69.0%	24	66.7%	0.355	0.55
	Present	3	42.9%	9	31.0%	12	33.3%		
8.6-11.5mm	Absent	3	100.0%	1	50.0%	4	80.0%	1.875	0.17

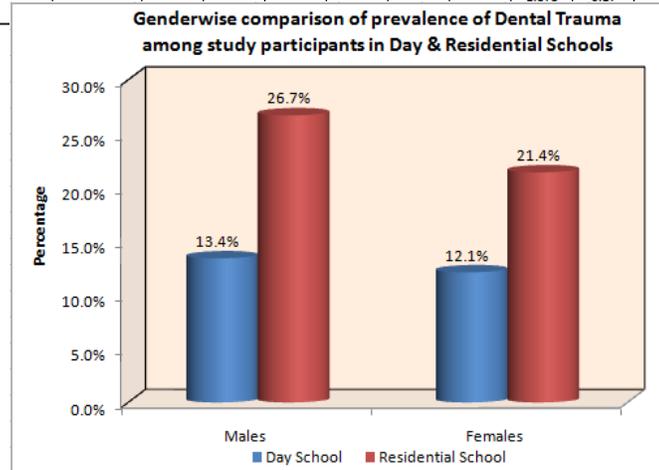


Figure 1: Gender wise comparison of prevalence of dental trauma

Lead Activity In Blood Of Children In Crude Oil Polluted Sites Of Niger Delta – Nigeria

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DOI: 10.29322/IJSRP.9.08.2019.p9246
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9246>

Abstract- Crude oil contains lead as one of its heavy metals. The Niger Delta is vast with oil facilities that is capable of causing pollution to the environment. Lead is a toxic metal that has affected the children exposed to these polluted sites. This toxicity causes severe brain damage, neuropathy, weakness and many more. Therefore, the detection of this metal is very important to know its threshold in the blood. The source of intake could be in the air or through agricultural produce from these polluted sites. From this study, Mean value for children exposed is 40.1 μ g/dl while the Standard Deviation is 30.9 μ g/dl. This also affected their Intelligent Quotient with value of 40%. The children that are not exposed, have their Mean value of 3.4 μ g/dl while the Standard Deviation is 1.6 μ g/dl and Intelligent Quotient as 60%.

I. INTRODUCTION

The Niger Delta extends over about 70,000km² and make 7.5 of Nigeria land mass. It is a petroleum-rich region and has been the centre of international controversy over pollution that has caused great devastation of land and human life. The crude oil that is being discovered has economically changed man's way of life and is a complex mixture of hydrocarbons with heavy metals. Lead which is one of the group of heavy metals that is found in crude oil causes metal poisoning in the body and the brain being the most vital part. The exposure route is the soil when being contaminated with crude oil and this percolate to affect the underground water, and the adsorption of plants of the metal.¹⁰ In the United State, 14 - 20% of total lead exposure is found in drinking water, and the Centre for Disease Control has set the upper limit for lead in the blood for adult at 10 μ /dl.⁷ At low lead concentrations 95 to 99% of blood lead is bound to red blood cells (RBC) and 1% is found in the plasma, while at higher lead concentrations, a larger percentage of lead is distributed in plasma. Plasma lead is relatively easily exchanged into bone and soft tissues such as the kidney and the brain. The amount of lead bound to red blood cells is reduced by half after approximately 36 days, also for lead found in plasma, the same process takes less than an hour.¹¹ In the soft tissues lead affects various cell processes and cause toxic effects. In bone, it replaces calcium and this is where 70 to 80% of lead is stored in children, compared to 90 to 95% in adults.¹¹ Lead can be stored in bone for years, and continues to accumulate throughout an individual's lifetime. The effect of lead is a concern in children that should be considered since exposure to lead in childhood may affect the lifetime. They are particularly vulnerable to lead poisoning because they absorb 4–5 times as much ingested lead as adults from a given source. Besides,

children's age and innate behavior of hand to mouth result in swallowing lead-containing or lead-coated objects, such as contaminated soil or dust and flakes from decaying lead-containing paint. The main disorders associated with lead exposure are emotional and behavioral disorder, muscle weakness, headache, weight loss etc.⁶ The mode of absorption of lead could be oral mucosa, nose or eye, and in children it is mainly by inhalation and food.¹ In further study, certain factors has contributed to lead poisoning such as occupational lead exposure, consumption of contaminated vegetables, playing in contaminated environment and low educational level.⁸ Studies has shown mean level of lead poisoning in children as approximately 57 μ /dl, which shows high lead poisoning among children.⁵ Also, in 2016, the institute for Health Metrics and Evaluation (IHME) estimated 540,000 death as caused by lead exposure.⁴ This has further caused concern for World Health Organization 1 of 10 chemicals of major public health concern and to protect health workers, children and women of productive age. However, the United State Centre for Disease Control considers 5 μ g/dl to be the reference blood lead level in children.⁵

Therefore, environmental pollution with crude oil and heavy metals has become a global problem. The contaminated soils are dangerous to health and is the only means by which human dispose waste for satisfaction. The crude oil pollution caused by pipe line rupture or vandalism in the Niger Delta of Nigeria, has created serious underground water pollution as contaminant infiltrate the soil up to 70 to 80cm depth or more.³ There was increase in concentration of metals in humans that were exposed to lead and chromium in industries, as samples were digested and analysed.⁹ There are many oil facilities in the rural areas of the Niger Delta, and are seasonally ruptured due to equipment failure, corrosion of pipeline and vandalism. The children at these locations are constantly exposed to lead during environmental pollution. This study will bring a close of gap of the knowledge in the danger affecting these children poor performances in education and a decline in Intelligent Quotient. This should be considered as a factor and be considered by environmental activist to protect the future of children exposed to lead and to build better nation. Although, chelators are available for treatment of lead in blood, but prevention is better than cure.

II. METHOD

The study was conducted in three rural communities in Okrika, Gokana and Akuku Toru Local Government Area. Samples of blood were taken from 60 children in rural and urban

areas, between the ages of 2 to 7 years. Children selected from urban areas are free from oil facilities (non exposed), while children from the rural areas are within oil facilities of spilled sites (exposed). The samples were taken to Rivers State University Teaching Hospital for analysis, and comparative study was done in there educational performance. Informed consent were taken from parents of these children before considered for the study. Also, the inclusive criteria were that, no previous lead poisoning case and weakness (anaemia), while the exclusive criteria are those of medical disease. The parents of these children provided relevant information about there children.

The basic apparatus used for in this study are pyrex glass of 50ml and 100ml, beakers, pipette and Atomic Absorption Spectrophotometer of frequency 100 – 400Hz. The reagents used are Hydrochloric acid (Hcl), Nitric acid (HNO₃) and Hydrogen peroxide (H₂O₂). A standard solution of lead was prepared as stock solution being diluted with 5% HNO₃ solution in distilled water. Reagent black was prepared using the stock solution and 5% HNO₃. The Atomic Absorption Spectrophotometer was used to analyse the blood sample. The accuracy being given priority, samples were prepared in duplicate.

The samples are digested using wet digestion process by adding 5ml of the sample into 10ml of nitric acid in a volumetric flask. It was then placed on a hot plate for temperature increase of about 150°C for 2 hours. The blood sample was then filtered and allowed to cooled. After the process of digestion, 10ml of H₂O₂ was added for complete oxidation process and further diluted up to 50ml.

III. RESULT

In this study, samples taken from children between the ages of 2 to 7 years is shown in table 1. The mean value for exposed children is 32.6µg/dl and standard deviation to be 14.4µg/dl, and this indicates increase concentration of lead. Also, mean value for the non-exposed is 3.4µg/dl and standard deviation to be 1.6µg/dl. In table 2, shows the percentage Intelligent Quotients of children in school age (5 to 7 years). Performance chart was used to enter children’s academic performance gotten from their teachers in school. The children exposed had percentage of 40% and non-exposed had 60% in performance.

Table 1
Mean concentration of lead in children exposed

	Exposed	Non-exposed
Sample size	30	30
Mean (µg/dl)	32.6	3.4
Standard deviation (µg/dl)	14.4	1.6

Table 2

Percentage Intelligent Quotient in children		
	Exposed	Non exposed
Sample size	19	19
% Intelligent Quotient	40	60

Figure 1, shows the concentration of lead against the non exposed children. In the graphical presentation, lower concentration was recorded in greater population of the children. Though, slight increase above 5µg/dl was randomly observed among the children. This could be considered as lead from other sources or transport of farm products from polluted rural areas to urban areas, and could be open for further studies. Also, figure 2, shows the increase concentration of greater children exposed to lead, having highest concentration of 60µg/dl with decrease concentration of 4µg/dl. Figure 3, indicates the percentage of Intelligent Quotient in exposed and non exposed children.

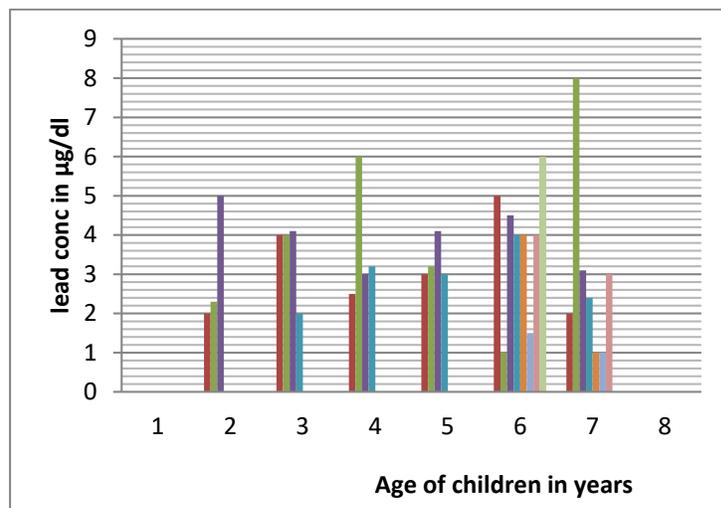


Fig. 1 Concentration of lead in non exposed children sample.

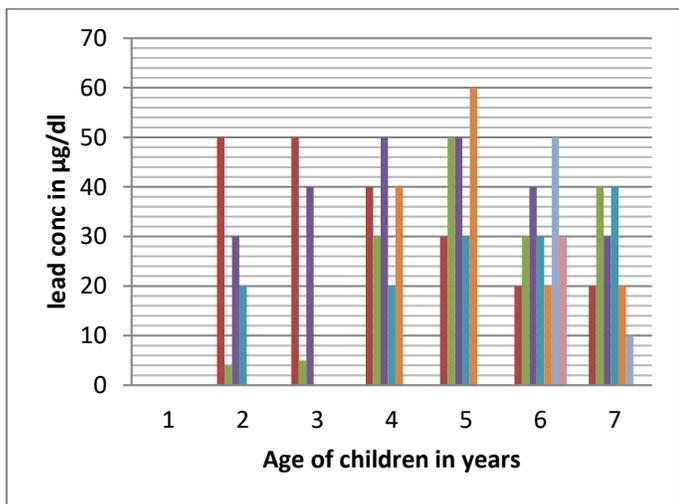


Fig. 2 Concentration of lead in exposed children sample

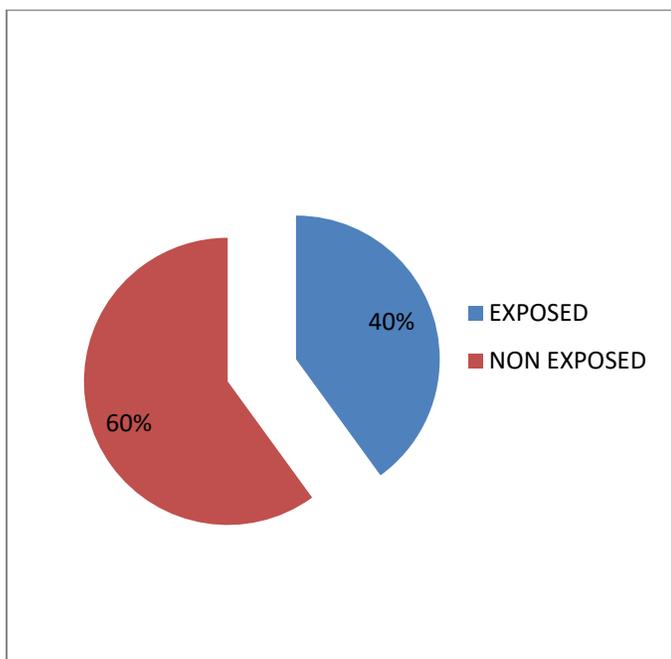


Fig. 3 Percentage of Intelligent Quotient

IV. DISCUSSION

In this study, the concentration range for lead in exposed children is 4 - 60 µg/dl while the mean value is 32.6µg/dl. Also for the non-exposed, the range is 1 -8 µg/dl while the mean value is 3.4 µg/dl. These values are found in children of 2 – 7 years carried out for this study in the rural area of Niger Delta exposed to crude oil spill, and those in the urban area not exposed to crude oil spill.

Studies have shown that symptoms such as drowsiness, exhaustion, convulsion and coma can occur in high lead concentrations of 100µg/dl and above ¹³. However, United State Centre for Disease Control considered 5µg/dl to be reference blood level in children ⁵. Studies have also shown that lead

exposure result from chronic exposure to low lead levels of ≤ 10µg/dl which causes neurological problem in children ³. Iranian’s children were found to have lead poisoning of value 57 µg/dl ⁵. Yale et al. studied British school children with lead concentration to have significantly lower Intelligent Quotient, reading and spelling score.

Presently in this study, the factor considered for increase lead in major crude oil polluted sites is pipeline vandalism and facility failure by oil industries. The children in the rural areas closed to these sites are exposed to risk factors. These crude oil contain heavy metals and of which lead is part. This should be a source of concern for the government to stop this menace and to protect the children from being exposed to lead. Also, children lead monitoring in diagnostic centres should be a concern to maintain their health and academic excellence.

V. CONCLUSION

The concentration of lead in children’s blood in these rural areas of Niger Delta, shows the risk of lead in crude oil polluted sites. This is a potential neurological problem in children and has caused low performance in learning. Government should protect the future of these children by creating awareness of danger in exposure to lead and having regular check in blood lead level in children with preschool and school age.

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Universality Of Sankaradeva's Thought For Community Development: A Study Of Assamese Muslims

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DOI: 10.29322/IJSRP.9.08.2019.p9247

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9247>

ABSTRACT- Srimanta Sankaradeva was the pioneer to disseminate noble thoughts of moral values and spiritual inspiration for the humanity and social harmony. Liberalization of these thoughts popularized his vision and cultural creations among different communities of Assam. It was a Vaishnavite movement; however, it widens the range of assimilation of dignified outlooks. Attributable to this, Assamese Muslims are one of the significant communities that inspired and accumulate several thoughts of Sankaradeva in their stream. This universality of spiritual bond and cultural involvement is a strong communicating mechanism which playing a vital role in community development of Assamese Muslims. Thus, this research paper is to study the universality and liberalization of Sankaradeva's thoughts for socio-cultural development in Assamese Muslim community that is incredibly noteworthy to highlight the different issues in modern context.

Key words- communicating mechanism, liberalization, universality, vaishnavite

I. INTRODUCTION

Sankaradeva's contributions reached the entire region of Assam influenced to get hold of social dignity and prosperity. It is significant to observe that Assamese Muslims are very attached with Vaishnavite thoughts. They have a unique rationalism which take apart them from other Muslims ideology. This is incredible to study the participation of Assamese Muslims in Sankaradeva's Neo-Vaishnavite tradition without changing the track from Islam. The adaptation and accumulation of Sankaradeva's thoughts into Islamic ideology is a living custom and to this research paper is to understand the socio-economic-cultural transformations for their community development.

II. OBJECTIVE

This research paper has been focused on its objectives mainly to study the Sankaradeva's philosophy of spiritual liberalization that inspired Assamese Muslims community to incorporate in socio-cultural life. Foremost emphasis is to study the contribution of Assamese Muslims to enhance Sankaradeva's vision as a communicating mechanism for greater community development. Also to understand the historic evolution, socio-cultural transformation of Assamese Muslims community and its future prospect with recent circumstance.

III. METHODOLOGY

This is a critical and analytical type of research. The findings of the research are based on two types of data i.e., the Primary data and Secondary data. Different information related to the adaptation and assimilation of Sankaradeva's philosophy by Assamese Muslims community from Sankaradeva era to modern period is considering as chronological edge is the primary data for the research purpose. After the data collection process, data analysis has been done. Also it includes various socio-cultural components of communication process which may establish the influence of Sankaradeva's philosophy in Assamese Muslims community as a vital dynamic aspect for community development.

IV. HISTORY OF ASSAMESE MUSLIMS

The term Assamese Muslim is stand for the religiously Islamic community who used Assamese language, folk culture and social tradition of Assam. Assamese Muslim is also referring as *Asomiya Musliman*. Historically, the Islamic tradition entered Assam during 1206 AD by the force led by Muhammad Bin Bakhtiyar, a turkey invader came to Assam through Tibet region. After this, from 15th to 17th centuries several Muslim invaders came to Assam and the so many conflicts took place were many prisoners stay put here. In between this, during 1662 AD a significant conflict occurred between Ahom dynasty and Mir Jhumla where according to a treaty a part of Assam was occupied by him. Afterward, this was again taken over by Ahom rulers. Along this, several Muslims officials were appointed by Ahom rulers in state of affairs and the acquaintances with Muslim society got increased. Simultaneously, many Intellectuals, Saints, Artists migrated to this province and enhanced Assamese Muslim community. However with the course of time, this region assimilated the Muslims people with indigenous people and culture. So many Muslims married to native girls, learned the local language, adapt folk culture and customs into their life. On the other hand, at that time conversions to Islamic creed also shown as a major fact in increasing the Muslim population. Nowadays, although they possess Islam as their religion but socio-culturally they are distinctive and vibrant which is far away from traditional Middle East Asian live hood and ideology. This is stated by Wikipedia that ' the Assamese Muslims probably one of the less orthodox Muslims communities of entire Asia. They follow many Hindu customs and take part in Hindu festivals'. Due to this distinguished socio-cultural assimilation with other indigenous communities, the Assamese Muslims evenly developed and continued as an imperative part of this multi-dimensional Assamese society.

V. SANKARADEVA'S VISION OF LIBERALIZATION

Sankaradeva was a great intellectual had immense observations on socio-cultural-political circumstance of that period. He understood about the mass appeal of his liberal philosophy of life but at the same time he well known of limitations of people in terms of acceptance. To integrate the multi-lingual, multi-coloured cultural heritage of Assam, Srimanta Sankaradeva formulated a unique form to retelling of motivational mythological stories through several artistic manifestations of drama, songs, sattriya dance etc. that never depicted rigidity of Hindu philosophy but proficient to generate universal platform and huge popularity.

Although the Neo-Vaishnavism is a stream of Hindu religious vision and practice but it is more flexible and progressive. In early period of Sankaradeva, there were so many different deities and mainly living animal and human were sacrifices in the name of *Sakti pujan*. Along this, so many blind beliefs and merciless rituals took place and the social system suffered a lot. To abolish these malpractices and to provide an appropriate divine pathway towards humanity, Sankaradeva introduced EK SARAN NAM DHARMA. *EK SARAN* is referred to be under the guidance and direction of the single God who is not other than Lord Krishna who described as *Palankarta* i.e., the protector of humanity and social values. Instead of offering many things, the three fundamental practices are formulated to worship the single God are *Kirttan*, *Smaran*, *Bandan*. *Kirttana* is to express and execute the glory of Lord Krishna in the form of poetic illustrations that articulated by Sankaradeva. *Smaran* is to bring the instructions learned from *Kritan* and Guru (the mentor) to the mind. *Bandan* is the devotional expression of thoughts towards Lord Krishna and the *Guru* for all those we learn about this world and humanity. To perform and practice these values Sankaradeva established *Sattra* and *Namghar* across the regions which were residential spirituality learning institutions and community prayer houses, respectively. *Sattra* are headed by *Gosain*, a spiritual leader who teaches moral education, social values to disciples, students and followers. And the *Namghar* are the native prayer houses where people of the locality gathered for worship practice and perform the spiritual learning in various art forms like, *Bhaona*, *Sattriya* dance, *Borgeet* presentation. These institutions are widely open for all irrespective of caste, creed, and gender that they can participate in the services and can enjoy the cultural performances.

According to the Census report of India, 1891, it is stated about the Vaishnavite influence on outcast that "when the neophyte takes the Saran, the Gosain inculcates a few moral precepts such as 'Obey your parents', never raise your hands against them', 'be always respectful to elders', tell no falsehood' etc. He then sprinkles sacred water over them and bless them. Having done this he takes his fee and departs. He interferes no farther with their old religious beliefs, nor does he insist on their abstaining from eating pork and drinking rice beer." (Para-233 Vol.1- Chapt-8). It can be assumed that Sankaradeva's philosophy of spirituality distinctly possess the path of moral, social values which does not stress to change the religious or individual identity. Therefore, beginning of Sankaradeva's

era to modern period, along with a number of tribal communities; Assamese Muslims community equally feels enlightened to incorporate Sankaradeva's school of thoughts into their life and culture.

VI. SANKARADEVA'S PHILOSOPHY IN ASSAMESE MUSLIMS COMMUNITY

Srimanta Sankaradeva's one of the distinguished disciple Chandkhai was a Muslim. He was well known for logical account. It stated that Chandkhai had seen Sankaradeva's divine form. He inspired a lot by the Sankaradeva's liberal outlook towards an outcast person like him. Chandkhai became a follower of Sankaradeva and he composed several devotional songs which spread out the message of Sankaradeva on spirituality, morality and humanity. Subsequently, a number of Muslims people were acquainted with Sankaradeva's EK SARAN NAAM DHARMA, and assimilation of Vaishnavite and folk cultures were put into practice.

VII. IMPACT ON ASSAMESE MUSLIMS

About 250 years before the birth of Sankaradeva, the Islamic ideology entered to Assam however the Sankaradeva's philosophical transmission motivated Assamese Muslims community to recognize the multi-cultured foundation of socio-cultural development. It is observed that the institutional structures of *Sattra* and *Namghar* are also established in Muslims community. In 1891, Census report of India stated about this. In Jorhat sub-division of undivided Sivasagar district, presently in Jorhat district there were about sixteen thousands of Muslim populations. The report says that Assamese Musalmans followed the Hindu customs and religious structure. Further this, they have their spiritual leaders i.e., *Gosain*. It was mandatory to all the Muslims populace get attach to the *Gosain* for acquire the knowledge of individual-social values. Namely, *Halungpuria Gosain*, *Bakirpuria Gosain*, *Hak Khoa Dewan Gosain* are some Assamese Muslims *Gosain*. Notably, *Bakirpuria Gosain* is name after the first *Pir* of the line *Bakir*. They have their own *Sattra* where resident disciple (*Bhakat*) used to live who desist from matrimonial or other physical relationships. *Gosain* are be given the offerings from other non-residents followers and disciples. The authorized village chief is called as *Gaonbura* who is appointed by *Gosain* with a turban as a symbol of recognition. Under him a number of *Barik* or peon worked and collect the offerings. In Darrang district, *Damodoria Boragi Sattra* is considerable to have a Muslim family tree that was converted but still participates in *Sattra*'s various programs.

On the other hand, the edifying practices of devotion are basically the good habits of lifestyle. Sankaradeva's philosophy of *Sanskar* i.e., reform for personal, mental and social health and hygiene. Realizing the fact, *Sayan Sadachar*, *Bhojan Sadachar*, *Goyon Sadachar* are introduced which says about the daily routine of sleeping, eating, moving to somewhere etc. Similarly, for mental recreation spiritual activities like singing the devotional songs accomplish with several instruments. It is observed that many Assamese Muslims follows these routines. As well as, while praying they perform rhythmic clapping which is similar to *Kawali* performed by *Sufis*. Such comparable

integration of Vaishnavite thoughts and Islamic culture is assumed to lead the *Baul* culture in Bengal region. It is also seen that integration of Vaishnavite ideology and Islamic tradition brought out folk songs like *Kabira Geet* or *Baadshahi Geet*, *Fakirali Geet*, *UjaUtha Geet* or *Aituti Geet*. Among this, the women participation is a significant element to understand the gender egalitarianism in Assamese Muslims.

In 1630, Azan Fakir a notable Sufi saint came for exploration and distribution of Islamic ideology in Assam. It was about eighty years after the death of Sankaradeva and Azan Fakir found that the Islamic thought of Assam is already absorbed Neo-Vaishnavism of Sankaradeva. They took part in singing of *Kirtana*, took *Prasad*. He understood the universal acceptance of Sankaradeva's philosophy and himself introduced a liberal form of Sufism. He composed *Jikir* and *Jaris* in the pattern of Vaishnava songs i.e., *Borgeet*. *Jikir* and *Jaris* put up with the similar spiritual and humane values to deliver socio-cultural harmony.

Significantly, in Azan Fakir's period there were no mosques among local Muslims in lower part of Assam. There were only community prayers houses *Namghars*. *Sattra* culture is not confined within the frame of spirituality but it leads socio-political-cultural developments of village and the state. In addition, it is to mention that in united India of Pre-Independence period, at Dhaka there were so many Muslims disciple of Madhupur Satra, Coch behar. From this point, it can be understand that the Sankaradeva's establishments straightforwardly influenced the Assamese Muslims community.

VIII. SANKARADEVA'S IDEOLOGY IN COMMUNITY DEVELOPMENT

As per the census of 2011, the Muslims population is about 34% of total population of Assam. Among these, a large number of Muslims are Assamese Muslims who possess liberalized socio-cultural life. From British rule, although there is the Muslim Personal Law (1937) and Sharia Law for Muslims community but Indian constitution provides equal rights to all citizens a Uniform Civil Code under article 44. Hence, as stated earlier, Assamese Muslims are holding global outlook about their socio-cultural development. Looking into the Human Development Index (HDI) according to Open Government Data (OGD) Platform Although the literacy rate 68.5%, which is lowest in the country, and for instance the literacy rate of Assamese Muslims is higher than this with 73.18 % age. Putting this point, social status, gender equality, mass participations are very customary for Assamese Muslims community. Because of the progressive approach a large number of scholars, eminent personalities come out from Assamese Muslims. Namely, Baag Hazarika, the Brave Commander of Ahom Kingdom, former President of India Fakhruddin Ali Ahmed, Anuwara Taimur, the only woman Chief Minister of Assam, Dr, Maidul Islam Bora, the first Assamese Doctorate, Mahanmmed Saadulah, the only Assamese member of the drafting committee of the Constituent Assembly, Fardina Adil, the first Assamese woman IAS officer, Padma Bhshan awardee Vocalist Parveen Sultana, distinguished writer Syed Abdul Malik and many other prominent figures glories the state and the nation.

This revealed the potency of the Assamese Muslims community is enlightened by high social values articulated by Sankaradeva and the disciples to generate greater Assamese community.

IX. CONCLUSION

Sankaradeva says, *Kukur srigal gadorghoru atmaram, Jania sobaku pori koriba pronam* (11/17/33 bhagawat). It means all the living creatures whatever it may be all are to be valued. Consequently, all the people of any caste, creed, and gender they are imperative & respected. These high principles also delighted Mahatma Gandhi, the father of nation who said, “A great Vaishnava revival under Sankaradeva in the sixteenth century has made Assamese people kindly, tolerant and humane. There is no sign anywhere of that form of untouchability which is to be found in South India. Assam, indeed, is fortunate for Sankaradeva has five centuries back, given the Assamese people an ideal, which is also the ideal of Ram-Rajya.”

Today, some rigid and aggressive Islamic elements is leading a faithless environment in the world. To abolish these it need to open the thoughts in a global way. Beyond the religious customs and acquaintance, Global community can incorporate Sankaradeva’s ideology of social ethics and kindness. It can be comprehend that accepting the institutional and structural sketch of Neo-Vaishnavism; the Assamese Muslim society becomes a model of community development for not only this region, also for rest of the world.

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Design and Implementation of Solar Tracking System through PIC Controller

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DOI: 10.29322/IJSRP.9.08.2019.p9248
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9248>

Abstract- Solar energy is considered to be as a renewable energy solution for most of energy crises and environmental pollutions. Sun always moves from east to west direction independent of weather condition. So with this concept, movement of the solar panel without using sensors is done with the help of programme loaded into the microcontroller. Solar tracking enables more energy to be generated because the solar panel is able to maintain a perpendicular profile to the sun's rays. As such, it is vital that those in engineering fields understand the technologies associated with this area. This thesis describes the design and implementation of solar panel tracking system by using PIC microcontrollers. These solar tracking systems are controlled using PIC16F887 Microcontroller for vertical axis and PIC16F84A Microcontroller for horizontal axis. Two stepper motors (NEMA17) is mounted to control the vertical axis and horizontal axis. The project includes the design and construction of Solar Tracking Control with the associated electronic circuits. This prototype is designed for double axis to solve solstice problem. The PIC Microcontrollers are programmed using C language in microC PRO for PIC.

Index Terms- solar tracking system, PIC microcontroller, stepper motor, double axis, microC PRO.

I. INTRODUCTION

Now, many people use solar energy or photovoltaic energy as an alternative power because it is free and renewable. The sun is the central body of this planetary system; it is the star closest to the earth. Nowadays, solar energy has been widely used in the world, and it's expected to grow up in the next years. One of the most important problems facing the world today is the energy problem. This problem is resulted from the increase of demand for electrical energy and high cost of fuel. The solution was in finding another renewable energy sources such as solar energy, wind energy, potential energy etc.

Radiation from the sun can be converted into usable energy through thermodynamic processes. However, concentrating the energy from the sun can be difficult because the incident radiation that reaches Earth is spread out over a large area. Moreover; the solar panel that many of the users use is only in one way direction. If the sun located at the direction that is not perpendicular to the solar panel, the power that can be generate is low when comparing to the sun located exactly perpendicular to the solar panel. The sun rotates from east to west during a day, from north to south over a year but the highest power that can be generate by the solar panel when the solar panel is perpendicular to location of the sun.

Therefore, it is needed to rotate the solar panel in order to follow the sun's direction. Tracking systems try to collect the largest amount of solar radiation and convert it into usable form of electrical energy (DC voltage) and store this energy into batteries for different types of applications. The sun tracking systems can collect more energy than a fixed panel system collects.

II. HARDWARE AND SOFTWARE USED IN SOLAR TRACKING SYSTEM

Solar Tracking System

The solar tracker that designed is a two axis tracker, which will track the sun on both horizontal and vertical axis. This is achieved by building a prototype that consisted of many individual parts. Some of the key hardware that used is

- 1) Stepper motors
- 2) PIC 16F microcontrollers
- 3) Driver circuit (L298N)
- 4) 7-segment display

In order to make the system completely, all these hardware had to be linked together.

1) Stepper Motor

Stepper motors are commonly used for precision positioning control applications. All stepper motors possess five common characteristics which make them ideal for this application. Namely, they are brushless, load independent; have open loop positioning capability, good holding torque, and excellent response characteristics.



Figure 1 Stepper motor

A bipolar stepper motor was selected because of the precision it offers in positioning applications. Additionally, although full bridge circuit is needed the bipolar offers higher torque than unipolar type. The motor (NEMA 17) specifically used in the project was a 12 volt, 1.8 degree-per-step, 2 phase, and bipolar motor. It was decided to half-step the motor in order to

provide greater positioning accuracy. This results in 0.9 degrees-per-step. NEMA 17 stepper motor is shown Figure 2.



Figure 2 NEMA 17 stepper motor

2) PIC16F887 Microcontroller

PIC 16F887A is one of the most commonly used microcontrollers especially in automotive, industrial appliances and consumer applications. PIC16F887 is at the upper end of the mid-range series of the microcontrollers developed by microchip Inc. It can be reprogrammed and erased up to 10,000 times. Therefore it is very good for new product development phase. There are 40 pins on PIC 16F887. Most of them can be used as an I/O pin.

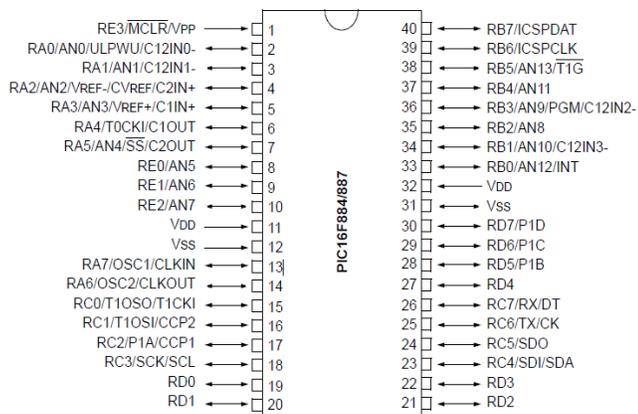


Figure 3 Pin Diagram

3) Motor Drive Circuit

The Motor Shield is based on the L298, which is a dual full-bridge driver designed to drive inductive loads such as relays, solenoids, DC and stepping motors. It can drive two DC motors, controlling the speed and direction of each one independently. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit with a Darlington transistor sink and a pseudo Darlington source. Two enable inputs are provided to enable or disable the device independently of the input signals. The driver has some features such as wide supply voltage range 4V to 35V, separate input logic supply, thermal shutdown, high noise immunity inputs, and output current 2A per

channel, peak output current 4A per channel and output clamp diodes for inductive transient suppression.

L298N driver uses four input pins and two enable pins to configure the operation of a stepper motor. Digital output pin of PIC microcontroller are wired to four input pin of the driver to control the direction of the motor. Two enable pins are connected to the supply pin of the microcontrollers.

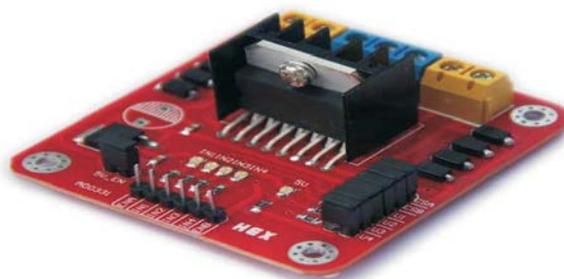


Figure 4 Motor Driver Circuit

4) 7-Segment Display

There are two types of 7-segment display: common anode (CA) and common cathode (CC). Basically the display consists of seven segments of LEDs connected either as common anode or common cathode. In a common anode display the anodes of all the LED segments are connected together and the signals are sent to the individual cathode segments as shown in Figure 5. Similarly, all the cathodes are connected together in a common cathode display and the signals are sent to the individual anode segments. Table 1. shows the segments that should be turned on to generate the decimal numbers 0 to 9.

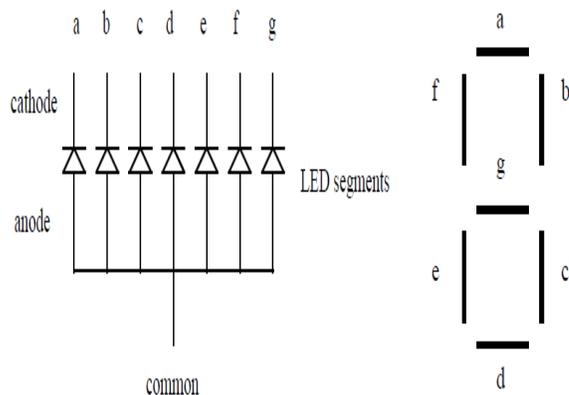


Figure 5 The signals are sent to the individual cathode segments

In this system four common anode 7-segment LEDs are used to display time. The program is written to count up seconds, minutes and hours and display the data on the 7-segment display.

Table 1 The segments are turned on to generate the decimal numbers 0 to 9

Number	g	f	e	d	c	b	a
0	0	1	1	1	1	1	1
1	0	0	0	0	1	1	0
2	1	0	1	1	0	1	1
3	1	0	0	1	1	1	1
4	1	1	0	0	1	1	0
5	1	1	0	1	1	0	1
6	1	1	1	1	1	0	0
7	0	0	0	0	1	1	1
8	1	1	1	1	1	1	1
9	1	1	0	0	1	1	1

III. CONSTRUCTION OF TWO AXIS SOLAR TRACKING SYSTEM

In order to make the automatic solar tracker, all the components are linked together to track the sun. It was very important to design the system carefully so that slightest movement of the sun can be tracked. The two complete circuits used to track the sun are Figure 7 and Figure 8. One of the microcontrollers is responsible for tracking the sun on each of the two axes. In the circuit, timer of PIC microcontroller is used and for seasonal changes push-button switch is also utilized in controller of horizontal axis for tilting solar panel by manually. Without using sensor, movement of solar panel is done with the timer of PIC.

When reaching specific time, microcontrollers control the movement of stepper motor. As each stepper motor has 4 electromagnets so 4 pulses are required from the microcontroller for each of the stepper motors. Since the stepper motors have high current rating so the pulse generated by the PIC 16F microcontroller is not sufficient to drive the stepper motors.

So, to amplify the current output from the microcontroller L298N module driver is used. As the pulse is given in sequence from the microcontroller so the stepper motors receive the pulse accordingly telling them which way to move and how many steps to move. This mechanism allows the whole system to continuously track the sun throughout the whole day.

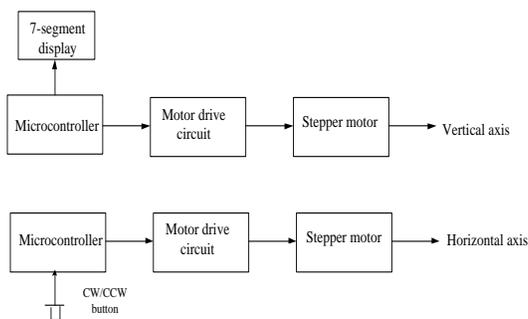


Figure 6 Hardware Block Diagram

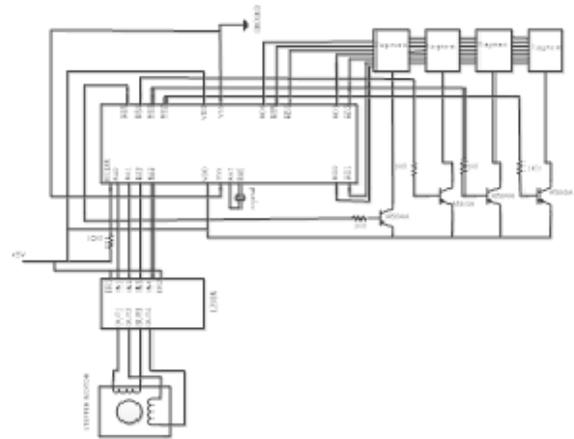


Figure 7 Hardware Circuit Diagram of Vertical Axis

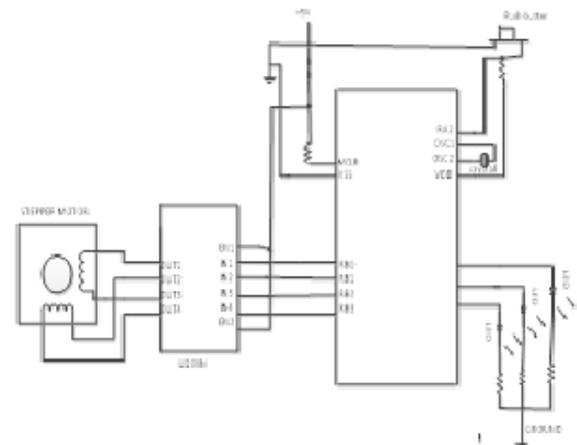


Figure 8 Hardware Circuit Diagram of Horizontal Axis

IV. TEST AND RESULT

A. Overall Circuit Diagrams of Solar Tracking System

In simulation circuit diagram, four 7-segment LED displays connected to PORTC of PIC microcontroller, enable pins of digits (1 to 4) are connected to PORTD. And PORTA pins of microcontroller generate pulses to input pins of motor driver. The controller is operated from a 4MHz resonator. In this program, timer module of microcontroller is used to get seconds, minutes and hours so that 7-segments display time. The stepper motor rotates the required direction at the specific time.

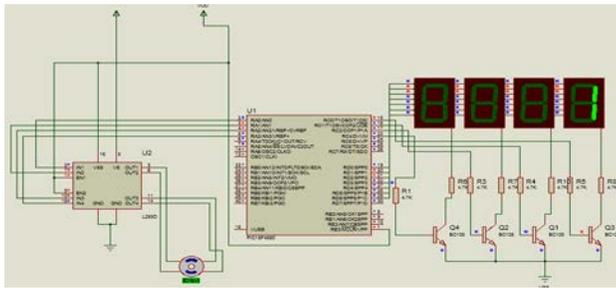


Figure 9 Simulation circuit diagram of solar tracking system for vertical axis

For giving pulses PORTB pins of PIC 16F84A are connected to input pins of L298N motor driver and are also connected LEDs. When running the motor, LEDs also emit light. If a push-button switch connected RA2 is pressed, the motor changes in the direction.

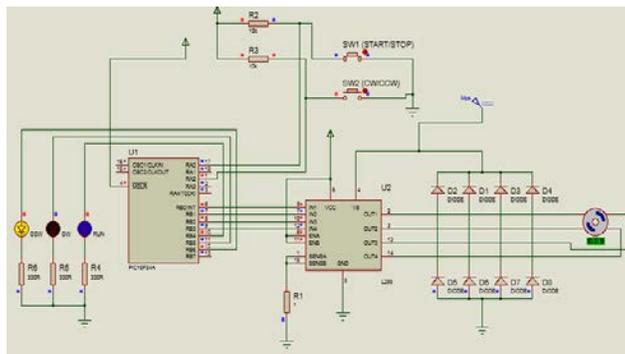


Figure 10 Simulation circuit diagram of solar tracking system for horizontal axis

B. Controller Circuits

The sample arrangement of controller circuit on project board is shown in figure. Four 7-segments display minutes and seconds. The right two display seconds and others are for minutes. When it reaches at 10minutes, PIC output pins will transmit output signals.

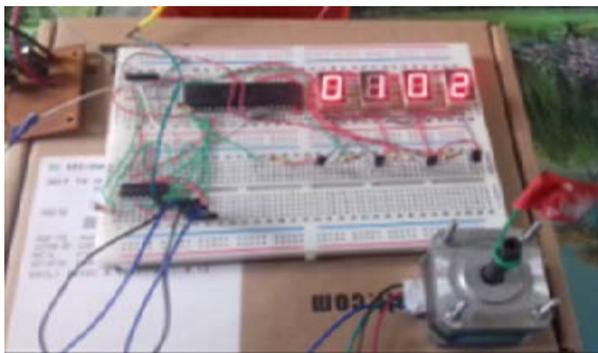


Figure 11 Testing controller circuit (PIC16F887)

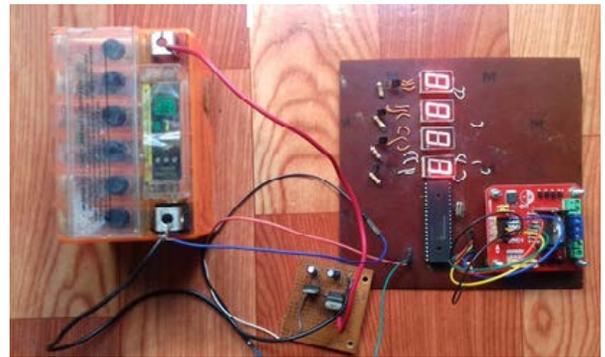


Figure 12 Testing controller circuit (PIC16F887)

The following figure is controlling circuit of PIC16F84A for horizontal axis. In this circuit, switch is utilized to control the clockwise / counterclockwise direction of the motor. Three LEDs also include to display condition (CW /CCW).

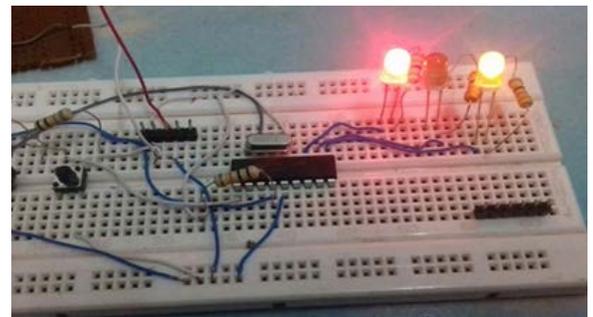


Figure 13 Testing controller circuit in project board (PIC16F84A)

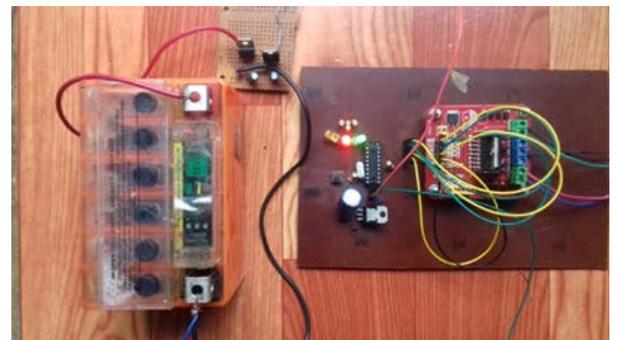


Figure 14 Testing controller circuit with PCB (PIC16F84A)

Table 2 Data of Solar Panel during Hardware Testing

Hours	Solar Tracking System			Static Solar panel		
	V	A	W	V	A	W
8:00 AM	10.14	1.12	11.357	9.87	1.09	10.758
9:00 AM	11.51	1.27	14.618	10.12	1.12	11.33
10:00 AM	12.42	1.37	17.015	10.57	1.17	12.366
11:00 AM	12.89	1.42	18.304	11.46	1.3	14.898
12:00 PM	13.12	1.45	19.024	12.51	1.38	17.264
1:00 PM	12.78	1.41	18.02	11.66	1.29	15.041
2:00 PM	12.56	1.38	17.332	11.21	1.24	13.901
3:00 PM	12.07	1.33	16.053	10.33	1.14	11.776
4:00 PM	11.82	1.31	15.484	9.73	1.08	10.508

Table 2 shows the data of voltage, current and power received from solar tracking system and static solar panel for a day.

V. CONCLUSION

This paper has presented a means of tracking the sun's position with the help of microcontroller. Specially, it demonstrates a working software solution for maximizing solar cell output by positioning a solar panel at the point of maximum light intensity. Built in timer of PIC is used in this system so that it responds more accurately. Even in a cloudy day when intensity of sun light may vary at different time of a day, the timer can be more that handy to drive solar panel correctly in that low light. So the prototype represents a method for tracking the sun both in normal and weather condition. Moreover, the tracker can initialize the starting position itself which reduce the need of any more photo resistors. To solve summer solstice and winter solstice the solar panel is titled manually with the help of switch. The PIC microcontrollers are programmed using C language in microC PRO PIC. So C language has been studied in detail. In addition; the design of mechanical structure and electrical circuit has been understood.

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Internet of Things (IoT) Communication for Refuse Monitoring System

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DOI: 10.29322/IJSRP.9.08.2019.p9249

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9249>

ABSTRACT: Increase in population around the globe today has brought about significant increase in the amount of waste generated. In other words, detection, monitoring and management of waste have become a challenge in developing countries. Due to the indiscriminate disposal of solid waste at dump sites and the environmental pollution posed by this activity, this paper proffers a solution to tackle this menace. The solution adopts an innovative approach by the application of Internet of Things (IoT) to implement a smart refuse (garbage) monitoring system. This application will tackle challenges of untimely and inefficient waste management by designated agencies. To achieve this work, ultrasonic sensors were used to detect instantaneous level of waste in trash bin at various dump sites. These sensors give feedback via a Wi-Fi module to the web application of the waste management authorities for consistent monitoring thereby curbing the over flow of refuse dumps at sites. A significant contribution in this work involves the use of an interlock mechanism that will not allow further dumping of waste once the trash bin is full. Implementing this application using a Wi-Fi module is cost effective, readily accessible, reliable and an efficient approach. This system when implemented will ensure a cleaner and healthier environment with human computer interface communication system.

Keywords: Internet of things, wireless network, sensors, microcontrollers.

I INTRODUCTION

Due to the rate of population growth, garbage management has become a global issue. Inadequate and untimely information on the conditions and state of dump sites has led to the menace of overflowing garbage bins located at strategic positions (Kanchan and Chitode 2014). This poor situation ought to be alleviated by the government and concerned authorities by implementing viable and feasible methods to overcome this challenges. This work therefore explores options, strategies, and practical way to tackle this issue.

Internet and its applications have become a fundamental and essential part of everyday life. Due to the tremendous demand in innovative ideas, researchers have gone beyond connecting just computers into the web. Internet communication over the years has widely grown from user-to-user interaction to device-to-device interactions. The IoT concepts were proposed few years back but can be applied to provide an effective and reliable platform for smart garbage management system. Some of the commonly used methods were implemented using sensors and microcontrollers. The details of each bin are monitored by the waste management authority with the help of Graphic user Interface (GUI). The implementation of smart garbage management system using sensors, microcontrollers and WI-FI module ensures waste bins are clean as soon as the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the details is sent to the higher authority to take appropriate action against the designated contractor. This system also helps to monitor falsified reports about the condition of dump sites and reduce incessant trips by garbage collection vehicles. Implementing this scheme will help to reduce cost of waste collection and ultimately help to maintain a healthy and clean environment.

II REVIEW OF RELATED WORKS

Vikrant et al, Narayan et al and Sinha et al 2015 proposed a smart garbage management system for smart cities. In the work, the level of garbage is detected with ultrasonic sensors and communicated to the authorized control room using a GSM module. A GUI was also developed to monitor the desired information related to the garbage for different selected locations. A major drawback of this system lies on the fact that it was powered with DC supply only, requiring recharging of batteries on a timely basis.

In Navghane et al 2016, a dustbin was interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage. This was actualized on mobile web browser with html page by Wi-Fi, Such that the information on the status of the bin will be updated on to the html page using a Wi-Fi module. But weight sensors were used to detect the amount of garbage rather the level of garbage in dustbin. Such information can be misleading as the weight may at times not imply that the waste in the bin has reached full capacity.

Shaficul et al 2012 provided an overview on solid waste monitoring system. Guerrero et al 2014 presented an extensive survey on the challenges associated with collection and control of waste in developing countries between 2005 to 2011. The models in the survey were tested on real time data. The outcome presented systemic approach for solid waste collection in developing countries. Although IoT based approaches were not considered at this time. But advanced scheduling and routing via exploiting modern ICT algorithms were considered. In Alexey et al 2014, a novel cloud based system was presented for data sharing and dynamic route optimization for waste management in inaccessible areas. The goal was to provide software as a service (SaaS) for customers and develop a beneficial communication between all stakeholders in the waste management system.

In Meghana and Nataraj 2015, a multipurpose infrared sensor was used to detect the level of garbage in a dump site. The sensors sense and carry signals which are distinguished by their connector names. The GUI gives the output level of the garbage, location, date and time the bin got filled. A major drawback of this system is that the latter does not ensure whether garbage is cleaned up or not.

In Mustafa and Ku Azir 2017, an IoT device which uses yet an arm controller together with ultrasonic sensors to detect the level of garbage was implemented. In Alice et al, the weight and toxic condition of the waste inside the bin was used to ascertain if the bin is due for discard by the concerned agencies. In Asima and Sumanth 2017, Zig bee approach was sought to implement the transfer of information of the bin through a mesh network. This approach suffered the limitation of low data rate applications however, Information concerning the status of the bin can be obtained anywhere in real time. In Akash et al, apart from the monitoring and detecting features of the garbage bin, additional feature like fire sensors was added to the device to detect fire outburst as a result of waste reaction within the bin. This work is therefore geared towards solving the problem of spillage of waste in refuse dump by adopting an interlock mechanism that will prevent further dump of refuse in the dumpsite as well as giving information to the relevant authorities on the condition of the site.

III METHODOLOGY

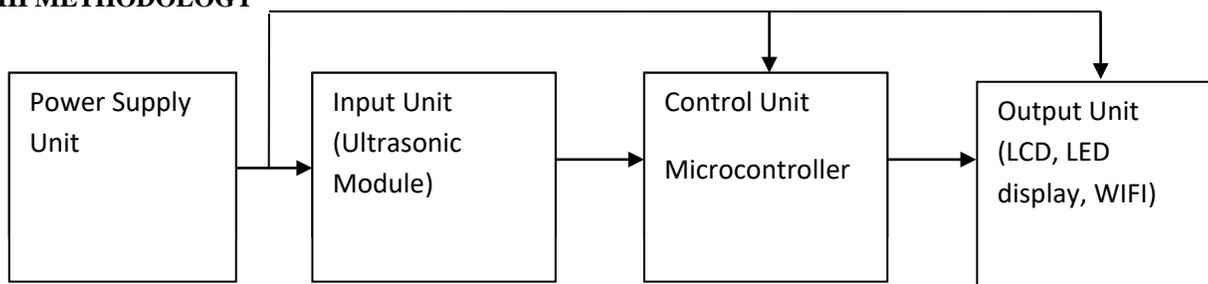


Figure 1: Block Diagram of the circuit component of the IoT based garbage monitoring system.

The circuit is divided into four sections; each section performs a specific task. The block diagram in figure 1 shows the basic parts of the circuit components.

The input unit is made of the ultrasonic module with the control unit made up of the ATMEGA328 controller. The controller has a memory space of 2 kilobyte RAM and 32 kilobyte ROM. The controller uses operating voltage of 5-volt dc. The output unit is made up of the light emitting diode, the liquid crystal display and the WIFI module (ESP8266).

The input unit consists of two HC-SR04 ultrasonic (sensor) modules which fetches the depth of the container (trash bin). It is a four terminal device with pins: Vcc, Gnd, Echo and trigger. The Vcc and the Gnd pin-outs are connected to the 5V and the Gnd of the voltage regulator respectively. The ultrasonic sensor uses the two fundamental pins: Trigger and Echo, which are used for calculating the level of the waste in the bin by generating sound waves and thus calculating the time duration of the echo. The Ultrasonic Sensor sends out a high-frequency sound pulse and then determines how long it takes for the echo of the sound to reflect. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them, (like a tiny microphone).The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

The trigger pin is used to send a sound wave; this is triggered by sending a 10 μ s signal to the trigger terminal from the unit. The sound is reflected from the intruder body. The depth of the trash bin from the device is measured by the duration of the signal times the velocity of sound wave. The duration of high level as received by the control unit is at the echo terminal connected to the control unit.

The ARDUINO ATMEGA328 microcontroller gets information from sensors and processes it. The microcontroller further compares the received data with the threshold level set to generate the required output The Atmega328 microcontroller pin-outs are connected to the ultrasonic module, the led indicator, ESP8266 and the liquid crystal display. It receives signal from the input unit and sends it to the output unit. The sensor signal is sent to the control unit where calibration is done and the information displayed on the LCD. Pin 2 to 4 of the controller (U4) is connected to the ultrasonic module, the ultrasonic module measures the depth of the container and sends the signal to the microcontroller, the program written is used in calibrating the depth of the container. The controller sends data to the LCD to display the depth of the trash can for the user. The user is able to communicate with the device using the LCD to visualize and the system. The LED indicator is also calibrated to display the level of dirt in the container.

The Atmega328 has an on-chip oscillator that requires an external clock to run it. Therefore, a quartz crystal oscillator (X1) is connected to pin 9 and pin 10 of the Atmega328 controller (U5). The crystal is used to control the processing speed of the microcontroller. The speed of the microcontroller refers to the maximum oscillator frequency connected to the crystal pins. The ESP8266 module is connected to the pin 15 and 16 of the control unit. The microcontroller communicates with the ESP8266 via the use of its serial port. The microcontroller and the WIFI (ESP8266) module communicate with the baud rate of transmission (9600 bits per second).

The output unit consist the LCD, LED indicator and the WIFI module (ESP8266).The WI-FI modem has a powerful on-board processing ability with storage capability that allows it to be integrated with the sensors and other devices. The ESP8266 has self-calibrated Radio frequency which allows it function effectively under all operating conditions. The WIFI module is used to transfer the data (level of dirt in the trash bin) to a web app, to notify the authorities in charge of cleaning the dirt, about the level of dirt in the bin. The LED indicator is arrayed in four steps, step 1; indicates that the trash can is empty, step 2; indicates the trash can is 25 percent full, step 3; indicates the trash can is 50 percent full and step 4 is used to indicate that the trash can is completely filled.

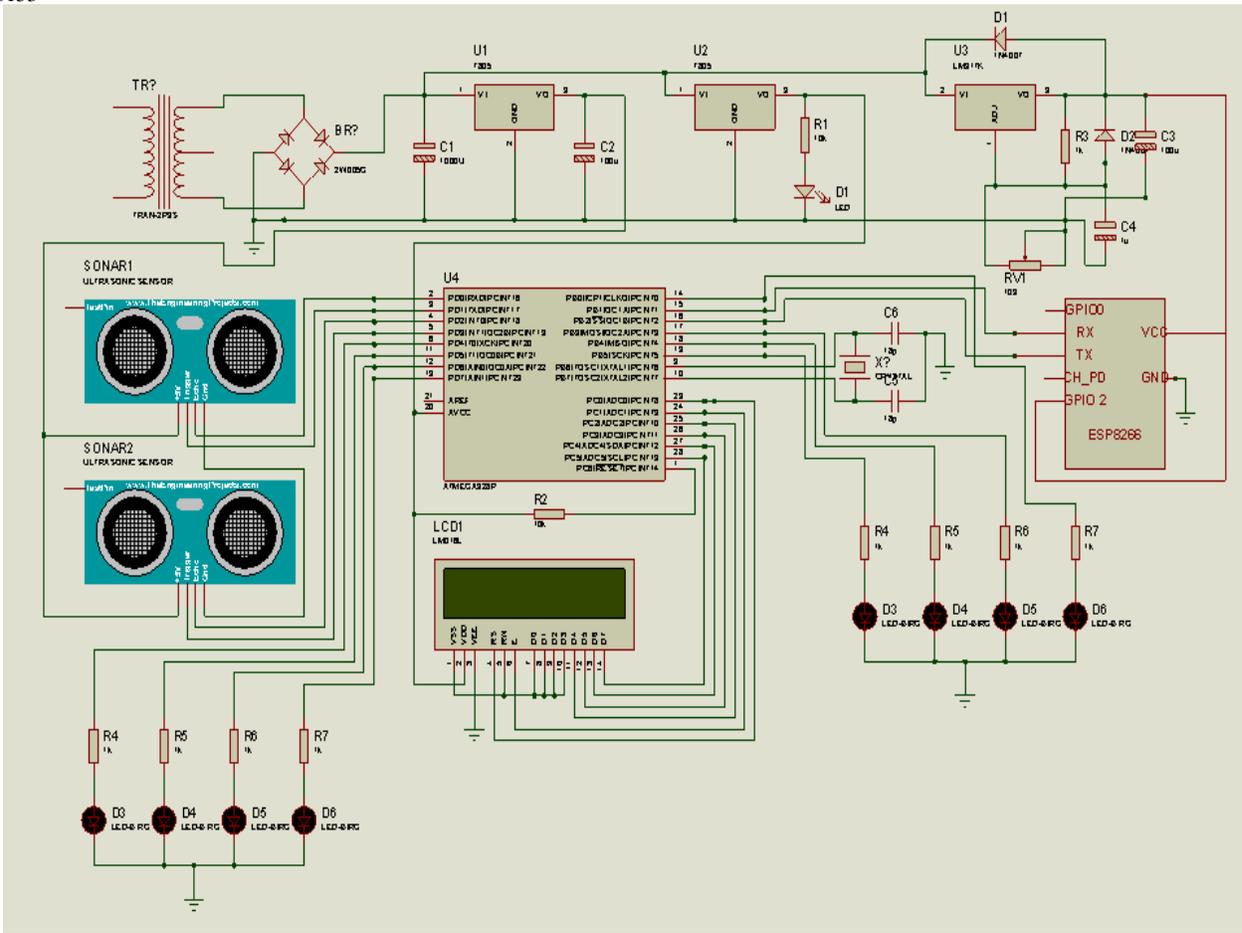


Figure 2: Circuit diagram of the IoT based garbage monitoring system

SYSTEM ALGORITHM

- Step 1: Start Process.
- Step 2: Initialize the System
- Step 3: Check for the level of dirty in trash can.
- Step 4: Check if level of trash can is empty, 25%, 50%, or full
- Step 5: If step 3 is untrue go back to step 2
- Step 6: Else Display level on the 16*2 LCD display.

Step 7: Send the level of Trash to web page.

Step 8: Repeat process by going to step 3.

Step 9: Stop process.

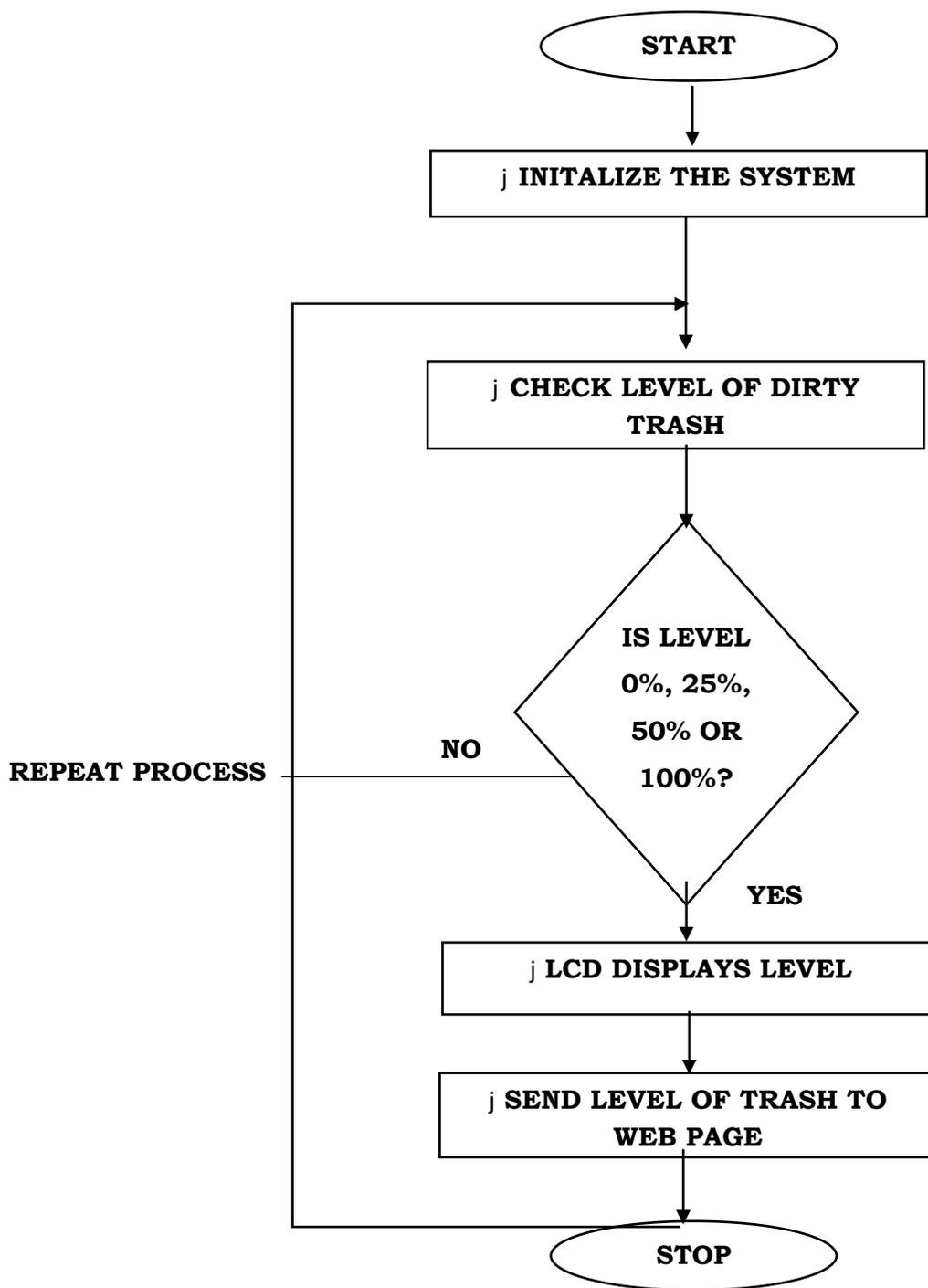


Figure 3: Flow chart showing the step-wise operation of the IoT based refuse system

IV RESULTS/DISCUSSION

Some part of the circuit diagram was simulated in the integrated environment called Proteus version 8.6 Professional. This was done to ascertain the fact that the circuit is realizable. The ultrasonic sensor senses and receives the signal which is displayed on the LCD including the garbage level indication on the bin.

Table 1: Signal Voltage during Reception, indicating the bin capacity and the corresponding display level.

Garbage bin	Action
Container is empty	Liquid crystal display shows Level 1.
Container is 25% full	Display shows Level 2.
Container is 50% full	Display shows Level 3
Container 100% full	Display shows Level 4.

Table 2: Results obtained on testing the Circuit

Process	Component	Action
Power is supplied to the circuit	Power indicator LED and program indicator LED	Both LEDs turn on
RF signal is sent out from the sensor to ascertain level of dirt in the bin	Level 1 (Container) empty	Liquid crystal display shows Level 1. Sends the information to web app
RF signal is sent out from the sensor for another specific level	Level 2 (Container 25% full)	Display shows Level 2. Sends the information to web app
RF signal is sent from the sensor for a half full level	Level 3 (Container 50% full)	Display shows Level 3. Sends the information to web app
RF Signal is sent from the sensor for maximum level	(Container 100% full)	Display shows Level 4. Sends the information to web app and prevent further dump.

5.0 CONCLUSION

The design and implementation of the ARDUINO based internet of things (IoT) Refuse monitoring system was achieved and its performance met expectation. The circuit was able to detect the level of garbage and transmit information concerning the state of the system using WIFI module to a web app. The liquid crystal display helped to visualize the state of the system. The state and condition of the site can be viewed on the web app from any internet enabled device.

The system when implemented will prevent environmental pollution. Other advantages of the system include the fact that; it involves full automation and requires less human intervention in its operation.

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The Impact of Advertisement and Sales Promotion towards the Consumer's Decision to Use OVO Application in Palembang, Indonesia

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DOI: 10.29322/IJSRP.9.08.2019.p9250

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9250>

Abstract- The objective of this research was to analyzing the influence of advertising and sales promotions on consumer's decision to use OVO application in Palembang City. The analysis used a Multiple Linear Regression by using Verse 23 of SPSS to calculate the data. The data was collected by filling out an online questionnaire for one hundred respondents. The results of this study indicated that advertising and sales promotions had a positively and significantly influenced on consumer's decision.

Index Terms- advertise, sales promotion, customer decision.

I. INTRODUCTION

The enhancement of the technology nowadays, it is not only impacted to the education, social, and politic sectors, but also to the finance sector. It is marked by the trade development of financial technology. Financial Technology is becoming a hot topic recently because it is a new thing in business and it can give a great chance in the financial industry.

PT. Visionet International as a digital payment company which belongs to Lippo Company is one of Fintech from Indonesia that facilitates payment through the application. A launched Smart Financial Application is OVO, this application tries to facilitate every needs related with cashless and mobile payment. OVO Application is now available for Android smartphone platform and iOS. OVO has been joined into 200 cities and more than 400 malls in Indonesia. Quoted from www.cnnindonesia.com (2018) page, the rate of OVO's growth in Indonesia in 2018 has reached more than 10 million users that comes from transportation, retail, and e-commerce. This company claims that it has had more than 500.000 offline tenants in 2017 that uses OVO as a payment method.

In early 2018, Telkom Group Company names MDI Ventures together with Mandiri Securities makes a report about the growth of mobile payment service. From their point of view, the business value of mobile payment in Indonesia is predicted reached in rate Rp. 459 billion in 2020. Based on www.cnbcindonesia.com (2018), in the last two years, OVO and GoPay get the top rank of digital payment tools in Indonesia. According to Fintech report in 2018 which is held by Daily Social and OJK as mentioned from 1.419 respondents, 79,4% uses GoPay. Whereas, 58,4% uses OVO and 55,5% respondents use T-Cash from Telkomsel.

Seeing the phenomenon of the development of payment instruments and the achievement of OVO in two years operating as a startup and not many studies that discuss mobile payment in Indonesia made me interested in conducting research that discusses the influence of advertising and sales promotions that influence consumer's decisions to use OVO applications.

II. LITERATURE REVIEW

Advertisement

Based on Bearden and Ingram (2007: 393), advertisement is a persuasive marketing communication element, non-personal, paid by sponsor and spread through mass communication to promote the use of product, or service. Then, according to Gitosudarmo (2008 : 228), advertisement is a main tool for the company to influence their consumer. This advertisement could be done by entrepreneur through newspaper, radio, magazine, television, or even posters that are showed in the roadside or strategic places.

H1: There is an impact of advertisement significantly-influenced towards the consumer's decision to use OVO application in Palembang.

Sales Promotion

Based on Kotler (2005:298), sales promotion is "every collection of incentive tool, which is most of the short period of time, which is programmed to stimulate the purchase of the certain product or service faster and bigger by consumer and seller". Whereas, sales promotion according to Utami (2008:134) is "a short period of time encouragement to buy or sell a product or service.

H2: There is an impact of sales promotion significantly-influenced towards the consumer's decision to use OVO application in Palembang.

Consumer's Decision

Purchasing decision based on Schiffman and Kanuk (2007), Is "the selection of an option from two or alternative choice" could be translated as purchasing decision is the one's decision to choose one of several availability choices. On the other hand, the availability of choices which were more than one was a must in taking the decision. Sweeney (2008), said that the indicator of purchasing decision is to buy or not buy related with

the conviction in purchasing and would not expect any problem where it was found a hope that was not getting any trouble or risk.

III. CONCEPTUAL FRAMEWORK

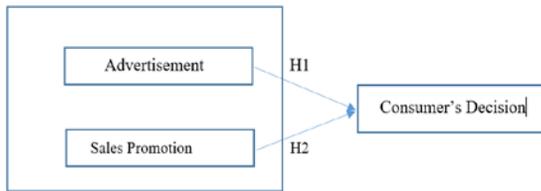


Fig-1 Conceptual Framework

IV. RESEARCH METHODOLOGY

Technic of data collection was using online questionnaire which was collected from more than 100 respondents who have used OVO Application and located in Palembang. The online questionnaire was divided into three sections. Firstly, filtering the respondents based on the above requirements. Secondly, collecting the respondents' identity. At last, collecting the idea of respondents about independent variable (advertisement and sales promotion) and dependent variable (consumer decision). Every question is valued in the Likert's scale of 6 points. The data was analyzed through the multiple linear regression by using verse 23 of SPSS.

V. RESULT

Validity Test

Based on the above instrument validity test table research, it could be seen that the rvalue on the table is having a bigger value than the rtable. It is 0,3610.

Table-1 Validity Test Result

Variable	State ment	r _{table}	R _{test}	Result
Advertisement(X ₁)	1	0,3610	0,618	Valid
	2	0,3610	0,711	Valid
	3	0,3610	0,728	Valid
	4	0,3610	0,588	Valid
Sales Promotion(X ₂)	1	0,3610	0,843	Valid
	2	0,3610	0,782	Valid
	3	0,3610	0,805	Valid
	4	0,3610	0,823	Valid
Consumer's Decision(Y)	1	0,3610	0,788	Valid
	2	0,3610	0,779	Valid
	3	0,3610	0,728	Valid
	4	0,3610	0,757	Valid

5 0,3610 0,781 Valid

Table.1 shows that all r_{tests} are bigger than r_{table}. It means that all indicators are valid as research instrument.

Reliability Test

The instruments are declared reliable if the Cronbach's Alpha value is bigger than 0,6.

Table-2 Reliability Test Result

Variable	Cronbach's Alpha	Criteria	Result
Advertisement (X ₁)	0,855	0,6	Reliable
Sales Promotion (X ₂)	0,963	0,6	Reliable
Consumer's Decision (Y)	0,902	0,6	Reliable

Alpha is bigger than 0,6. It means that all variable indicators are reliable.

Respondent's Overview

The Information which is collected by gender, respondents' age, education, and profession.

Table-3 Respondent's Distribution Identity

Age	Frequency	%
17 - 20 Years	6	6
21 - 30 Years	63	63
31 - 40 Years	27	27
41 - 50 Years	4	4
Total	100	100

Gender	Frequency	(%)
Male	53	53
Female	47	47
Total	100	100

Education	Frequency	(%)
Junior High School	1	1
Senior High School	15	15
Diploma	13	13
Bachelor	69	69
Graduate	2	2
Total	100	100

Profession	Frequency	(%)
Student	10	10
Entrepreneur	11	11
Civil		
Servant/TNI/Police Officer	7	7
BUMN Employee	10	10
Private Employee	55	55
Housewives	7	7
Total	100	100

Multiple linear regression is used to explain the relation among variables that were tested. The regression equation can be seen as following:

$$Y = 4,432 + 0,402X_1 + 0,625X_2$$

The equation can be detailed as below:

- The constant (α) is 4,432, it shows that if the variables of advertisement and sales promotion are 0, then the consumer's decision is 4,432.
- The coefficient of regression (β) advertisement is 0,402, it shows by adding one unit of advertisement, then it would be increased consumer's decision of 0,402.
- Regression coefficient (β) sales promotion is 0,625, it shows that by adding one unit of sales promotion, then it would be increased consumer's decision of 0,625.

Multiple Linear Regression Analysis

F-Test (Simultaneous)

Table-4 ANNOVA Output
ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	749.861	2	374.931	88.719	.000 ^b
	Residual	409.929	97	4.226		
	Total	1159.790	99			

a. Dependent Variable: Consumer's Decision

b. Predictors: (Constant), Advertisement, Sales Promotion

According to Table-4, it could be seen that sig was $< 0,05$ concluded that advertisement and sales promotion had (0,000 $< 0,05$). It meant that H_a was accepted. Then, it could be significantly effected on consumer's decision.

t-Test (Partial)

Table-5 Coefficients Output

Variable	Coefficients ^a			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	4.432	1.530		2.896	.005
Advertisement	.402	.080	.344	5.048	.000
Sales Promotion	.625	.073	.585	8.597	.000

a. Dependent Variable: CONSUMER'S DECISION

According to Table-5, it was described as following:

- The Sig of X_1 0,000 $< 0,05$. It meant that H_a was accepted and H_0 was rejected. Then, it could be summarized that advertisement has partially significance effected on consumer's decision.
- The Sig of X_2 0,000 $< 0,05$. It meant that H_a was accepted and H_0 was rejected. Then, it could be summarized that sales promotion has partially significance effected on consumer's decision.

Coefficient Determination

Table-6 Model Summary Output

Model Summary^b					
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	,804 ^a	,647	,639		205,574

a. Predictors: (Constant), ADVERTISEMENT, SALES PROMOTION

b. Dependent Variable: CONSUMER'S DECISION

According to Table-6, it could be seen that R^2 was 0,639 and equal to 63,9%. It meant that the advertisement and sales promotion had significantly effected on consumer's decision was 63,9%. And the rest, 36,1%, was affected by other variables which was not included in this research.

VI. DISCUSSION

The advertisement has a significance $0,000 < 0,05$ and regression coefficient is 0,402. Thus, advertisement has positively and significantly effected on consumer's decision. According to the research of Mohammad Pambudi Ary Wicaksono and Ni Ketut Seminari (2016), it shows that the advertisement has a significantly effected on consumer's decision.

Sales promotion has significance $0,000 < 0,05$ and regression coefficient is 0,625. Thus, sales promotion has positively and significantly effected on consumer's decision. Elisa dan Yurnizal Firdaus (2015) and Priccila Natalia dan Mumuh Mulyana (2010). Their research show that there are positive relationship between sales promotion and consumer's decision. The higher sales promotion, the higher consumer's decision.

VII. CONCLUSION

Based on the above result and discussion, it can be concluded as following:

1. Advertisement has positively and significantly effected on consumer's decision to use OVO application in Palembang, Indonesia.
2. Sales promotion has positively and significantly effected on consumer's decision to use OVO application in Palembang, Indonesia.

VIII. RECOMMENDATION

Based on above result and discussion, the recommendations are given as following:

For company

1. PT. Visionet International is suggested to improve the quality of OVO advertisement on social media, such as : youtube, twitter, and Instagram to embed the image of the company in consumer's mind

2. PT. Visionet International is suggested to give an interesting sales promotion to the OVO customers.

For further researcher

Based on the conducted research, the influence of advertisement and sales promotion towards the consumer's decision to use OVO application in Palembang city was 63,9%, whereas the rest of 36,1% was influenced by another variable which was not researched in this research. Therefore, it is hoped to the next researcher could add another variable which was not analyzed in this research, like marketing mix strategy, satisfaction, and the attitude of OVO service application users.

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The Influence of Wedoro Village's Local Wisdom Based Learning on Elementary Students' Creative Thinking Abilities

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DOI: 10.29322/IJSRP.9.08.2019.p9251

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9251>

Abstract : This study aims to determine the effect of learning by using a scientific wisdom-based local approach to making sponge slippers in Wedoro village towards creative thinking skills in 4 elementary schools . Subjects of this study was Grade 4 MINU Tropodo Waru Sidoarjo as many as 28 students to design *one group pretest-posttest* . Methods of collecting data using observation sheets of student activities during the learning process and thinking skills test . Data analysis techniques use if quantitative descriptive . The result showed that the method of scientific approach using local wisdom in the form of the manufacture of slippers in the village Wedoro District of Waru Sidoarjo to increase creative thinking skills showed high category and students activity give positive response with good category to learning. The results of the study found that learning using a scientific wisdom-based approach to making Wedoro village sandals on material of various styles and their benefits is appropriate to be used to improve students' creative thinking skills.

Index Terms - Local Wisdom , Creative Skills , Scientific Approach .

I. INTRODUCTION

Learning with a scientific approach is learning that emphasizes the discovery of something with the process through scientific steps. The 2013 curriculum that emphasizes the learning system must contain substantive learning experiences, such as: observing, asking questions, gathering information, associating, and communicating (BSNP, 2013). The science learning model is a learning model using stages such as: (A) Obtaining information through empirical methods, (B) Information obtained by investigations has been arranged logically and systematically and (C) Is a combination unit in the process of critical thinking that can trusted and valid (Kemdikbud, 2014)

The scientific approach or also called the scientific approach is a learning approach that emphasizes the activities of students through observing, asking, reasoning, trying and networking in learning activities in schools (Rusman, 2015). The scientific approach includes observing, asking, reasoning, trying and processing (Sudarwan, 2013). These steps are not always followed sequentially, especially in integrated thematic learning for elementary schools whose learning uses themes as a unifying of some lesson content. The scientific approach, beginning with the observation process that can be done using media images, audio, audio visual and other media such as problems. Next, ask. Students who are still sitting in elementary school are not easy to ask questions if they are not faced with interesting media. Effective teachers should be able to inspire students to improve and develop the realm of attitudes, skills and knowledge.

Basically science learning is emphasized to provide experience directly to students, to develop their competencies so that students are able to understand the natural environment. Science education is intended to investigate and take action so that it can help students get a deeper understanding of the universe. The method for studying science varies greatly, but in a wrong perspective, for example, the viewpoint of the context of students is more appropriate if it can optimize local wisdom (Azizahwati, *et al.* , 2005). The procedure for teaching science can be developed through the uniqueness and superiority of an area (Kartono, 2010). The integration of scientific material with local wisdom based on the science learning process has the opportunity for students to be able to express their thoughts, accommodate their concepts, foster creativity, create effective learning, which has implications for a more conducive learning atmosphere (Warpala, *et al.* , 2010)

Efforts to strengthen local resources as a foundation for enriching the educational space are considered important because they are based on the conclusion that the condition of the modern world and all accompanying devices are not sufficient to deliver the inhabitants of the earth to live a more valuable life. The idea in the development of education based on local resources rests on the conclusion that each group has certain ways and techniques that are developed to play a role in life in accordance with the context. Value-based education is needed to develop moral quality, personality, and togetherness that are increasingly eroded by the progress of the age (Aspin, *et al.* , 2007). As an effort to develop the value of local wisdom in education needed creative thinking skills as a provision of valuable experience for students in facing the challenges of the advancement of science and technology that continues to grow rapidly.

Education based on local power or local wisdom is education by utilizing local excellence as a source of development of student competence in aspects of culture, economy, information technology, communication, language, ecology and others that support the learning process in Asmani elementary school (2012). While the local power of an area can be in the form of crops, artistic creations, traditions, culture, services, human resources, natural resources and various other types. The advantages of local power possessed by an area can be utilized by educators to foster learning skills in schools so that they can increase knowledge about the potential of the region .

Creativity as a demand for the 21st century will continue to be increased for various jobs, many even believe that our current age of knowledge is rapidly giving way to the age of innovation, where the ability to solve new ways such as energy use, to create technology or make existing technology applications such as electric cars and efficient solar panels, or even find new knowledge and discoveries that are entirely new industries (Bernie Trilling ,2009). Lack of attention to developing creativity and innovation skills is based in part on a number of common misconceptions that creativity is only for geniuses, or only for young people, or cannot be studied or measured. In fact, creativity is based on something virtually every person's imagination has.

The ability to think creatively is part of the basic capital that must be possessed in looking at the progress of this era. This thinking habit includes skills in exploring and formulating information, processing it, making decisions and solving problems creatively (Wulandari, *et al.* , 2011). One of the reasons for the low creativity of students in Indonesia is the result of a less supportive environment for expressing their creativity, especially in the family and school environment. Creative thinking skills is a way of thinking that contain characteristics: fluency, flexibility , originality and elaboration (Filsaime, 2008).

Wedoro Subdistrict Waru Sidoarjo is a center for making sponge slippers that has been around since the 1980s. According to the information obtained from the Wedoro village government, there are currently around 150 manufacture of slippers which are spread throughout the village. The large number of small industries that have developed there makes it very easy to find the industry. Departing from that, the researcher will utilize local wisdom in making sliper in force material for fourth grade students to foster students' creative thinking skills. Learning with creative thinking skills is expected to bring up creative solutions and ideas in the process of making sponge sliper.

Force material in class IV is new knowledge for students so it needs to be recognized directly through teacher explanations as well as seeing and practicing directly. The concept of various styles can be embedded by choosing the right media especially by giving examples by linking it to real life that is often encountered by students. The activities of the students developed by the researcher are made in such a way that students are able to build their own knowledge about material of various styles by linking local wisdom to the local area in the form of making sliper.

Observation results at MINU Tropodo Waru Sidoarjo as a preliminary study in November 2018 stated that educators had not conducted learning by teaching about local cultural values in the local area. This condition has resulted in the students' lack of understanding of the culture that contains the value of local wisdom in the local area. Learning by using the scientific approach that has been taught without being integrated with the value of existing local wisdom. Scientific approach activities have not been able to foster creativity in giving arguments to answer questions.

Based on the results of interview with educators at MINU Tropodo Waru Sidoarjo on theme 4 Various Jobs. The result, the value of class IV A students in science subjects as much as 60% of the results are below the standard set so it can be concluded that the student learning outcomes are still below the average. According to observations on the activities of the students in the class, educators have explained that the students are fairly active. However, educators should provide stimulation to students to be able to improve their creative thinking skills. Because, so it is necessary to do the learning process by using a scientific approach based on local wisdom to foster the creative thinking skills of students in the school.

II. RESEARCH METHODS

This study used the One-group Pretest-posttest design because the tests were carried out in one group without a comparison group. The design of this study was used to obtain results about pretest scores and post test scores on students' creative thinking skills in material styles and benefits.

Subject and location of the study

The research subject was 4th grade student at MINU Tropodo Waru Sidoarjo consisting of 12 boy and 16 girl. This research was conducted at the MINU Tropodo school which took place at Tropodo 1 No. 1 Street. 241 Waru Sidoarjo.

Data collection technique

1. Observation

Observation as a data collection technique is carried out to obtain research data in the implementation of the learning process based on the learning plan that has been made. Observations to get the desired phenomenon must be carried out by two observers to find out the implementation of the activities of teachers and students, and the obstacles that occur. Observation of the implementation of the lesson plan is done to see the steps of learning. Observations for students by observing the activities contained in learning when it takes place.

2. Creative thinking skills test

To measure the learning outcomes of students using the pretest and posttest in the form of a description that is adapted to the indicators of creative thinking, namely flexibility, detail, fluency and authenticity. Test of creative thinking skills in the form of descriptions are 8 questions used to determine students' creative thinking abilities.

3. Data validity and data analysis

1. Student activities

Observation of the results of student activities is measured by the following formula

$$P = \frac{\Sigma R}{\Sigma N} \times 100\%$$

P : percentage of student activity

ΣR : Amount of frequency of student activity

ΣN : number of frequencies of all student activities

2. Test of creative thinking skills.

To measure creative thinking skills students use the following formula:

$$M = \frac{\Sigma f}{N} \times 100\%$$

Information

M: The ability to think creatively

f : Scores obtained by students

N : Maximum score

Table 1.
 Value Range of Creative Thinking Skills

No.	Value	Predicate	Information	Category
1	> 92-100	A	Very skilled	Complete
2	> 83-92	B	Skilled	Complete
3	≥ 75-83	C	Fairly Skilled	Complete
4	<75	D	Less skilled	Not completed

III.RESEARCH RESULT

A. Student activities

The activity of students in this study is by making observations during the learning process related to the material presented. From the results of the study during the learning process activities with the average student was very interested in the material taught. The use of media and textbooks that are interesting has made students happy about the activity, as evidenced by 100% of students observing the video or picture that was delivered. The use of teaching books is also a concern for children where an average of 98% of students are also interested in existing textbooks. In addition 98% of students were also very enthusiastic about conducting experiments in accordance with the instructions on the worksheet.

Table 2
 Observation results of student activities

No.	Student activities	The first meeting	Second meeting	Third meeting
1	Observe the pictures / videos shown by the teacher	100%	97 %	97%
2	Listen to the explanation	97%	94%	97%
3	Asking question	89%	97%	94%
4	Read textbooks to find important information	97 %	97%	100 %
5	Discuss with friends in groups	97%	94%	86%
6	Students work in groups according to the teacher's instructions	92%	92%	92%
7	Students carry out experiments / observations according to the worksheet instructions	92 %	97%	100 %
8	Students present group work in front of the class	84%	86%	84%
9	Students evaluate the results of other group presentations	86%	89%	86%
10	Students show deviant behavior	89%	94%	94%

B. Test results of students' creative thinking skills

The creative thinking skills test is given twice before and after learning using a device developed at the first meeting. The results of the test of creative thinking skills are used to determine the level of thinking of students. Scores obtained during posttest showed that 92%

of students scored with less skilled categories. After treatment of 28 students using the local wisdom-based santific approach as much as three times 85% of students scored highly skilled and the remaining 15% were skilled.

Table.3 Value of pretest and posttest of creative thinking skills

No.	Student initials	Pretest	Posttest
1	A A	67	92
2	AW	69	90
3	BD	65	95
4	BS	65	93
5	DF	69	92
6	DT	69	89
7	EA	67	91
8	ER	74	93
9	EG	75	94
10	FS	80	92
11	GU	79	90
12	GK	82	97
13	HT	81	95
14	IJ	69	90
15	LT	67	89
16	MA	82	90
17	MD	74	92
18	MJ	70	94
19	MR	75	94
20	NA	70	89
21	PU	68	90
22	PT	76	93
23	Hospital	75	90
24	IT	77	93
25	TU	69	89
26	VE	70	89
27	ZJ	70	90
28	ZM	67	90

IV. CONCLUSIONS AND RECOMMENDATIONS

Based on data analysis and discussion of research results, then linked to the formulation of the problem and research objectives, it was concluded that local wisdom-based learning of Wedoro village sandals can improve the creative thinking skills of MINU grade 4th students at Tropodo Waru Sidoarjo on the material styles and benefits in life daily.

Based on the results of the study, there are several suggestions including:

1. Students' creative thinking skills developed using learning tools with a local wisdom-based scientific approach provide positive results for the learning process so that it needs to be broadly developed in other science materials.
2. Learning using learning tools with a scientific approach requires good time management, so that all stages can run optimally.
3. The development of learning devices with a local wisdom-based scientific approach to teach creative thinking skills can be used as a reference in the implementation of the 2013 curriculum.

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Development of Local Wisdom Based Science Teaching Materials in Ngingas Village to Improve the Critical Thinking Skills of Fifth Grade Students of Elementary School

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DOI: 10.29322/IJSRP.9.08.2019.p9252

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9252>

Abstract - This study aims to produce local wisdom-based teaching material products in Ngingas Village to improve critical thinking skills of fifth grade students of elementary school. This research is a development research owned by Thiagarajan, Semmel, and Semel (1974) or called 4D Research and development which has four stages including: determination, design, development, and distribution. The subject of the study was the development of local wisdom-based science teaching materials in Ngingas Village by being tested in the fifth grade of SDN Ngingas Subdistrict Waru Sidoarjo using the design of the one group pretest-posttest. Teaching materials and their devices have received valid category mode from the validator. The practicality of teaching materials can be shown from (1) The implementation of overall learning gets a very good category. (2) Learning activities show an increase in the stage of understanding the focus of the problem and drawing conclusions. (3) Students' responses to learning using local wisdom-based teaching materials in Ngingas Village have a category of levels of interest from students . The effectiveness of teaching materials that have a good level of readability, learning outcomes on the test of critical thinking skills is very good because being able to achieve the minimum completeness criteria means that students complete in learning, and. The conclusion of this study is that local wisdom-based science teaching materials in Ngingas Village developed meet the criteria of validity, practicality and effectiveness so that they can be used to improve critical thinking skills of fifth grade students of elementary school.

Keyword- Teaching Materials, Local Wisdom, Critical Thinking Skills.

I. INTRODUCTION

Basic education is the main basic pillar of all levels of sustainable education aimed at providing education to prepare students to become human beings who have character, become citizens who are able to carry out their main obligations in achieving their future (Ali in Prastowo, 2013). Considering the importance of basic education in primary schools, the consequence is that the government must strive to improve the quality of relevance of basic education through curriculum development that has complemented the previous curriculum. The 21st century competency for four competencies supports the weaknesses that occur for education in Indonesia by improving students' thinking skills . The importance of critical thinking can make students interact, analyze, or even manipulate information beforehand so it is not monotonous. Critical thinking does not make difficult school learning material easy to understand, but the subject matter can teach a variety of critical thinking skills practiced in everyday life, namely increasing the ability to understand arguments or developing issues so that we can avoid making decisions that incorrect or not in accordance with the problem (Bassham, et al., 2011) .

The teacher as a learning designer must design learning plans according to the needs of students . Good planning will make learning regular so that learning will attract both students . Development of science materials based on local wisdom will help and facilitate the learning process in achieving predetermined goals. Each teacher is obliged to arrange learning tools which consist of: teaching materials, syllabus, learning implementation plans, student activity sheets, and student assessment sheets. Active collaboration between observers of education, stakeholders / community, business world, and bureaucracy, is very significant in the success of local wisdom-based education programs. Local wisdom-based education requires kema m ladies creation and innovation (Asmani, 2012) .

Local wisdom in each area is the basis for policy making at the local level in the fields of health, agriculture, natural resource management and community activities (Tiezzi, et al., 2007). Development of material depends on student books owned by learners. Facts prove that there are many young generations who do not understand the local wisdom that arises in their respective regions, students have not been able to integrate the concept of learning with the phenomena encountered in their environment. Though local wisdom contains local culture from the past that supports life now. Local wisdom is needed in the tradition that grows in the community to manage existing natural and human resources so that sustainability is maintained. Sidoarjo regency, precisely in the

Ngingas Village, Waru District is known as a metal industry village which produces many metal objects both domestically and abroad. So that it is appropriate for the local wisdom of metal villages to be internalized into learning in schools, so that students are more familiar with the local wisdom of metal villages in their area. Because from the results of the questionnaires it turned out that 780% of students stated that they did not yet know the local wisdom in their area could be used as learning materials that supported the material. One of the innovations that can be done to overcome the above problems is to develop teaching materials based on local wisdom in Ngingas Village.

Some alternatives to solve this problem are by developing local wisdom-based teaching materials in Ngingas Village. This teaching material is also adapted to the conditions of students in the surrounding area. Another expected outcome of the development of this teaching material is that it can improve students' critical thinking skills. Critical thinking has many benefits in everyday life. Critical thinking teaches a variety of thinking skills which, if practiced significantly, can improve the ability to understand arguments or issues discussed in teaching materials (Bassham, et al., 2011).

The development of local wisdom-based science teaching materials in Ngingas Village in learning is believed to be one of the teacher's methods for making learning easier for students to understand the science concept, so that their thinking develops. The local wisdom-based development strategy can provide a nurturant effect of developing skills such as critical logical thinking (Hariri, et al., 2016). People who think critically will evaluate and then conclude things based on facts to make decisions (Hassoubah, 2007). So that one characteristic of people who think critically will always look for and explain the relationship between the problems discussed with experience or other similar problems. This relates to the experience of students in utilizing local wisdom in their area in supporting learners' learning about the material encountered in learning.

Critical thinking is often referred to as thinking that seeks deficiencies or mistakes of people or groups, whereas criticism is not the same as criticism which tends to attempt to overthrow or attack others, critical thinking is the ability to issue logical and rational opinions to find facts from a view. This misunderstanding is the limitation of freedom in increasing thinking in order to develop. According to the father of modern critical thinking tradition explained that critical thinking is an activity in weighing, continuing and researching a belief or knowledge that is not easily accepted but by expressing various arguments that support rational conclusions. Critical thinking is considered the same as active thinking (John Dewey in Sihotang, et al, 2012). Critical thinking is taught to students to think critically at different points of view on related issues and their consequences in daily life and evaluate a problem from a social and environmental perspective (Mapeala & Siew, 2015). Critical thinking is a reasonable thing that is reflective thinking focused on deciding what to believe or do, it involves affective dispositions and cognitive skills (Ennis, 1987). The approach used to make it easier to recognize elements in the critical thinking process that can use the FRISCO approach (Ennis, 2012). These elements include : focus, reason, inference, situation, clarity, and overview.

Teaching materials are the most important supporting part for curriculum development in the implementation of education. Teaching materials are part of learning tools including syllabus and plan for implementing learning. Teaching material is a composition of materials collected from various learning resources that are systematically made (Prastowo, 2016). The importance of teaching materials used by various parties has functions including for teachers and students. For teachers, among others, can shorten the time in teaching activities, change the teacher from the teacher to become a facilitator, improve the learning process to be more interactive and effective, as a reference in focusing all learning activities that are part of the substance of competencies taught to students, as well as evaluation tools mastery of learning outcomes.

Local wisdom is the personality or identity of the inventions, feelings and intentions of a nation that has the ability to absorb, even cultivate cultures originating from foreign cultures or other nations into their own character and abilities (Wibowo, 2015). Local wisdom is a habit that is formed in the community based on the results of a particular nation which is not necessarily owned by other nations. For this reason, skills are needed to maintain the management of existing natural resources by increasing human resources owned by a nation so that the existing culture remains and is preserved. Local wisdom-based education is education that utilizes the needs of global competitiveness and local excellence in aspects of economics, language, culture, information and communication technology, students' human and environmental conditions, etc. which contain benefits for the development of student competencies at all levels of education units. especially elementary schools both formal and non-formal education that have accreditation or recognition from the government (Toto Ruhimat in Asmawi, 2012).

II. RESEARCH METHODE

The following research is development research using the 4D model, namely the development of local wisdom-based Science Teaching Materials in Ngingas Village to improve the critical thinking skills of fifth grade students of elementary school. The subjects in this study were local wisdom-based science teaching materials in Ngingas Village to improve the critical thinking skills of fifth grade students of State Elementary School in the even semester of the school year 2018-2019. This research will be carried out in the even semester of the school year 2018-2019 which is located in Ngingas Elementary School, Waru District, Sidoarjo Regency. Ngingas Elementary School was chosen as a research site because it was one of the areas where most of the population worked as metal entrepreneurs which was a form of local wisdom in the school. The research design uses research and development development research designs belonging to Thiagarajan, Semmel, and Semel (1974) or referred to as 4D which consists of four stages including: Define, Design, Develop, and Disseminates. The stages of defining to analyze the objectives and boundaries of the subject matter include five steps, among others, a needs analysis based on the characteristics and abilities of fifth grade elementary school students shows that 80% of students have never used local wisdom to develop heat transfer

material. Analysis to students related to the academic ability of students, the emotional and social background of students, physical characteristics, and the level of cognitive development of students . design phase consists of several stages, among others by arranging the test, media selection, the selection format, the preliminary draft. The development phase includes teaching materials, syllabus, learning implementation plans (RPP), student activity sheets (LKPD) , and tests of critical thinking skills. Validity learning measured from teaching materials and learning tools, learning practicality measured by adherence to learning, the activities of students , and the response of students to learning. The effectiveness of learning is measured by the readability of teaching materials and the increase in learning outcomes from tests of critical thinking skills from pretest to posttest.

III. RESULT AND DISCUSSION

Preparation of research results based on data obtained during the development of teaching materials and the results of limited trials conducted at the Ngingas Waru Sidoarjo. The research subject was in the form of local wisdom-based teaching materials in Ngingas Village related to heat transfer, while those acting as observers were fifth grade teachers at Ngingas Elementary School. The results of the development and implementation of teaching materials developed along with supporting devices include syllabus, Learning Implementation Plan (RPP), Student Activity Sheet (LKPD), and Critical Thinking Skills Test.

A. Results Validity development of teaching materials

Complete and understandable layout design of teaching material contents. Complete teaching materials include writing titles, subtitles, understanding concepts, page numbers, and captions of each material supported by related images. A consistent layout according to a predetermined pattern with spaces between paragraphs that are clearly arranged between the right and left margins. Teaching materials can be understood by the use of the upper and lower desian , as well as the middle part based on white to clarify the material contained in the teaching material so as to facilitate the level of readability of students . Local wisdom chosen in the study of this material included making crowbar. Crowbar is an object made of iron, the shape of both ends is flat and pointed, making semi-traditional crowbar with combustion. Making crowbar is one form of activity that is still semi-traditional as a work carried out for generations . shows that overall the development of teaching materials has a valid category mode. The average percentage of suitability of the assessment given by the validator to the instructional materials developed is 94.15%. The development of teaching materials is declared valid based on the preparation in accordance with the steps in accordance with the development instruments found in the Minister of Education and Culture in 2017.

B. Practicality of Teaching Materials

Practicality teaching materials can be observed from some of the following activities: (1) H acyl learning keterlaksanaan shows the general assessment of the enforceability of the third meeting of the RPP on many found very good category. Overall the percentage of RPP implementation in the score is between 75% and 100%. So that it can be stated that learning using local wisdom-based teaching materials can be carried out very well. (2) Student activities during the learning process using local wisdom-based teaching materials indicate that the activities of students during the learning process using observed local wisdom-based teaching materials have a very good category. Both observers have the same and consistent results so that the instrument is said to be very good and reliable. In the activity propose a simple explanation students have the ability to provide an explanation based on existing knowledge. This affects the existence of teaching materials that support students to better understand the existence of existing local wisdom related to learning materials. While the irrelevant aspects there are still students who do not focus on learning and are a little crowded which makes the class less conducive. (3) The response of students' interest in the development of teaching materials carried out in class towards the use of local wisdom-based teaching materials in learning to improve critical thinking skills. The results of the response of students in a questionnaire to measure the practicality of teaching materials that produce a response that is carried on the process of learning, t erdapat 20 questions to support the development of teaching materials so that researchers concluded that based teaching materials keraifan local village Ngingas developed by the researchers have the category level of interest higher than students .

C. Effectiveness of Teaching Materials

The effectiveness of teaching materials is measured from the results of readability and learning outcomes of tests of critical thinking skills. (1) The readability test of local wisdom-based teaching materials is used to determine the level of readability of the teaching materials developed. The results of the calculation using sentence hitching by using appropriate words so that the teaching material can be read shows the average number of words that can be completed by students is 36 words out of 50 words or the percentage obtained is 72%. This shows that teaching materials based on local wisdom can be used in learning activities. (2) Practicality Critical thinking skills are assessed using assessment rubrics that are presented in the form of numbers. The following results of the pretest and posttest of the critical thinking of students in using local wisdom-based teaching materials in Ngingas Village showed that the average results of the prestige scores of students' critical thinking skills were 84.8 % . The results of critical thinking tests can be observed in table 1.

Table 1 Learning Outcomes Pretends and Postings Critical Thinking Skills

No.	Name	Value				N	Kat
		Pretest	Completeness	Postes	Completeness		
1	FS	24	Not completed	42	Not completed	0.23	Low
2	Elementary school	30	Not completed	84	Complete	0.68	Is being

No.	Name	Value			N	Kat	
		Pretest	Completeness	Postes			Completeness
3	AF	38	Not completed	88	Complete	0.64	Is being
4	ZS	36	Not completed	88	Complete	0.65	Is being
5	SW	80	Complete	100	Complete	0.25	Low
6	FZ	40	Not completed	94	Complete	0.68	Is being
7	AF	82	Complete	100	Complete	0.23	Low
8	ID	36	Not completed	94	Complete	0.73	High
9	MA	22	Not completed	92	Complete	0.88	High
10	A A	36	Not completed	92	Complete	0.7	High
Average		42.4		84.8		0.742	Is being
% Complete		20%		90%			
% hasn't finished yet		80%		10%			

N-gain value meme n Uhi category is, it indicates there is an average increase in critical thinking test students after learning using teaching materials based on local wisdom. Students who complete learning are as much as 90%, while those that have not been completed are 10%. Based on the analysis of the results of critical thinking tests the students' incompleteness as a result of lack of understanding the text contained in the test questions.

Based on this description, local wisdom-based science teaching materials in Ngingas Village along with supporting tools for overall learning have met all the criteria of a good learning component because they have validity criteria, practicality, and effectiveness. Teaching materials that have been developed and received validation from the expert team have a high percentage of agreement .

IV. CONCLUSION

Data analysis and discussion of the results of the discussion from the previous chapter related to the formulation of the problem and the purpose of the study, resulted in the conclusion of local wisdom-based science teaching materials in Ngingas Village along with supporting devices that have been developed as follows.

1. Science development of teaching materials based on local wisdom in the village Ngingas along with supporting devices have been validated by a team of experts has declared to the level of an invalid 's good at 94.13% and can be used to improve critical thinking skills fifth grade elementary school.
2. Learning using science materials based on local wisdom to improve critical thinking skills has good practicality criteria supported by the implementation of learning plans , including student activities that have a good category during the learning process, as well as student responses of more than 70% who are interested in teaching materials developed.
3. Local wisdom-based science teaching materials in Ngingas Village have a readability level of 72% which means teaching materials are easily understood to influence the increase in results from pretest to post-test to reach completeness so that the developed learning material meets the effectiveness criteria for improving critical thinking skills of fifth grade students .

Suggestions that can be stated by researchers related to research that has been done include:

1. The application of local wisdom-based science teaching materials in Ngingas Village to improve critical thinking skills for teachers must be able to further explore the local wisdom found in the area of learning and be able to provide a link between local wisdom and the knowledge of natural science in it.
2. Application of science teaching materials based on local wisdom in the village Ngingas to improve critical thinking skills of students can be developed for conserve where local knowledge of the region with the cooperation of stakeholders in the area.
3. Learning related to improving students thinking skills is very important to be applied in learning activities because it can attract students interest and activeness .
4. Learning by using local wisdom-based teaching materials in Desa Ngingas can be developed by expanding the subject of students along with a more complex study of material.

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Study Attitude and Academic Achievement in Biology at Secondary School Level in Mubi Metropolis of Adamawa State

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DOI: 10.29322/IJSRP.9.08.2019.p9253

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9253>

Abstract- This study examined the study attitude and academic achievement in Biology at secondary school level in Mubi metropolis of Adamawa State. The population of the students was all students in public secondary schools in Mubi metropolis of Adamawa State, out of which a sample size of three hundred was drawn through stratified sampling technique. The research instrument for data collection was self-developed by the researcher. The validity of the instrument titled “Study Attitude and Academic Achievement in Biology at Secondary School Level Questionnaire” was carried out by an expert in Counselling Department, while t-test reliability method was used to carry out the reliability of the instrument, and the reliability co-efficient was 0.85. Data were analyzed using mean, Pearson moment correlation coefficient and t-test statistics. Students generally have a favourable attitude towards Biology. Attitude towards Biology is influenced by the perception and beliefs about Biology, learning abilities and competence in Biology and the previous performance and rankings in Biology in schools where the later poses a negative influence. The attitudes of the students also influence their confidence level in Biology mostly in terms of their feeling about getting good grades, tackling tasks and their desire to pursue Biology related courses in the future. It was concluded that achievements in Biology mostly can be attributed to the students attitude towards the subject, school environments, abilities, future interest, personal effort. It was recommended that school administration should advantageously make use of the learners’ positive attitude to create a strong inclination and culture of Biology as a subject in secondary schools where the students can score favourably like in any other subject and the curriculum designers and the teachers should articulate well on the usefulness and applicability of Biology in general so that students create positive minds towards the subject and subsequently strive to improve in the subject.

Index Terms- Study attitude; study habit; factors; study skills and academic achievement.

I. INTRODUCTION

Student attitude towards study is a complex construct. Attitude is a fairly stable emotional tendency to respond consistently to some specific object, situation, person, or category of people. It has three components: cognitive core, affective values and

behavioural action tendencies. The cognitive aspect of attitude consists of beliefs and ideas that a person has about the attitude object. The affective component includes the feelings of like and dislike toward any object, and the behavioural aspect consists of intentions to respond in a particular way toward the object. The making of perceptual and cognitive organization, with reference to formation of attitudes, depends upon the individual’s social environment. The process of social interaction, which starts from the family, brings about certain developments, including formation of attitudes (Uroog, 2000).

The study attitude is one of the main factors that affect academic performance of learners. Academic achievement is a function of study attitude of the students (Hussain, 2006). Numerous studies have reported a positive correlation between attitudes toward subject and achievement (Sarwar, Bashir & Alam, 2017; Ajayi, Kassim, Adewale & Abayomi, 2016; Crede & Kuncel, 2008; Ogunyemi & Hassan, 2011). Yet, in spite of the perceived importance of study habits and study attitudes to educational achievement, very little attention were given by academic institutions to improve these factors. This is manifested from the very low understanding level and the equally poor and deteriorating knowledge of many students which is still a great concern of educators, parents and governments (Riaz, Kiran, Malik cited in Aquino, 2011). This problem is pointed out by Hurlburt, *et al.* in Aquino, (2011) as contextual and systemic: it is rooted in the educational process shared by students and schools. Cultural differences among societies will be reflected in differences in attitudes among the individuals in those societies. In Pakistan, there is difference in rural and urban cultures, so the attitudes of rural and urban students are different. In rural areas, the people are comparatively simple and have positive attitudes toward life, so they are more hard-working. The social roles of males and females are quite distinct in Pakistan. The girls are trained to confine themselves in the house and to serve the family whereas boys remain outside the house most of the time and indulge themselves in different activities. In early adolescence, the peers can positively and negatively affect one’s attitude (Duke & Meckel in Sarwar, Bashir & Alam (2017).

Study attitude serves as an index of how we think and feel about studying. If the learning experience is not pleasant, then the resulting study attitude is not favourable. Successful learners adopt positive study attitudes. [McHale, Kim and Whiteman \(2006\)](#) stated that siblings are a fixture in the family lives of children and adolescents, and a body of work documents their role in one

another's everyday experiences as companions, confidantes, combatants, and as the focus of social comparisons. By extension the attitude of elderly ones towards studying will consequently affect the adolescent. From the foregoing, it could be deduced that Biology is one of the science subjects that is popular and studied by students in order to be enrolled in medical sciences programmes which concern with human life. Considering the reasons above, one would have expected the students of Biology to do well. Rather, their performances in various examinations are a thing of concern as many of the students who enrolled for biology examination are falling below credit pass in the subject. This assertion is supported by the examination performances of all Nigerian students in WASSCE and NECO.

Obe in Ajayi, Kassim, Adewale & Abayomi, (2016) referred to study habit as those behaviours that one manifest when studying such as listening to music, chewing kolanut, smoking coffee, taking memory pills and ant sleeping drugs, lying down while studying and so on. He said further that not all behaviours manifest during study positive rather those that are positive are called study habits. He concluded that study skills is the ability to acquire information, do mental processing of information for logical organization and understanding, re-reading and memorizing for a long time meaningful retention and recalling of information on important occasions such as during test or during examination situations.

According to Ball in Ajayi, *et al.* (2016), the following study habits usually contribute to unsatisfactory grade of students in tests or examinations: procrastination and overloading, lack of study time plan, not making notes while reading, truancy by skipping classes or refusal to take notes during lectures, laziness and ignorance, memorization and orphaning. He concluded that many committed students experience frustration and despair in schools not because they lack the potential, but because they do not have the appropriate study skills to learn. This assertion was supported by Rana and Kausar (2011) who said that many students fail not because they lack ability but because they do not have adequate study skills.

Some of the techniques of studying are: Robinson's Formula for Effective Study which is Survey, Question, Read, Recite and Review (SQ3R), Pauk's Formula for Effective Study (OK4R) which stand for overview, keywords in the study piece, Read, Review, Reflect and Review, Tussig's Formula for Effective Study (PAT) which stand for Preview, attack (Rob, Read, Precite) and Pauk's Formula for Effective Note-taking (5Rs) which stand for Record, Reduce, Recite, Reflect and Review. The SQ3R method stands for Survey, Question, Read, Recite and Review.

- Survey means get the best overall picture of what you're going to study BEFORE you study it in any detail. It's like looking at a road map before going on a trip.

- Question - ask questions for learning. Questions should lead to emphasis on the what, why, how, when, who and where to study contents. As you answer them, you will help to make sense of the material and remember it more easily because the process will make an impression on you.

- Read - reading is not running your eyes over a book or material, it means read in order to answer the questions you have asked yourself or questions that the instructor or author had asked. Always be alert to bold or italicized print. Also, when reading, be

sure to read everything, including tables, graphs, and illustrations because they can convey ideas better than the written texts.

- Recite and Review - the process of recite and review involve catabolization and anatomization process. When you recite, you stop reading periodically to recall and reflect on what you have read, while review on the other hand means breaking down of the information into smaller pieces or items which will make the retention easier, the more you rehearse, the more information you retain. A review is a survey of what you have covered and re-readings an important part of the review process.

Consequently, the need to improve student's study attitudes is deemed necessary to improve student's academic achievement. Accordingly, it is essential for schools to determine factors which affect these characteristics adversely propose remedial measures and employ strategies for the development of good study attitudes (Hussain, 2006). This is further supported by Hurlburt, *et al.* cited in Aquino, (2011) from their study which suggested that a confluent educational philosophy (systemic and holistic) and using confluent educational strategies (through which students' social-emotional and personal empowerment needs are met) may enhance the school experience, improve study attitudes, and ameliorate the high dropout rate among the students.

There are many factors that influence attitudes and achievement among adolescents. Some of the factors are associated with parental background and family environment. Other factors relate to individual characteristics such as study attitude, self-concept, locus of control, and achievement motivation. Still other variables are associated with schools influences such as class climate, teachers, and administrative styles (Talton and Simpson in Soltani, 2011). According to Osborne *et al.* in Soltani, (2011). Studies have incorporated a range of components in their measures of attitudes to science including: the perception of the science teacher; anxiety toward science; the value of science; self-esteem at science; motivation towards science; enjoyment of science; attitudes of peers and friends towards science; attitudes of parents towards science; the nature of the classroom environment; achievement in science; and fear of failure on course. The premise that improving study attitudes will lead to academic success, this study will be conducted to assess the study attitude and academic achievement in biology at secondary school level in Mubi metropolis of Adamawa State.

II. STATEMENT OF THE PROBLEM

The differences in attitudes of male and female students towards Biology have been an issue in many countries. The researcher observed that students' achievement in Senior Secondary school Certificate Examination (SSCE) in the study area has shown that the level of students' academic achievement in Biology over the years was not encouraging. Also the researcher observed that in the study area, the students with distinctions in Biology and other science subjects in West Africa Senior Secondary School Certificate Examination (WASSCE) and National Examination Council (NECO) are low. However, because of the nature of Biology as the most important science subject in medical sciences, one would expect majority of the students to have distinctions and credit passes in the subject.

This weak performance called for concern by researchers, parents, school administrators and other stakeholders in the education business. The low performance is likely to be caused by some factors like low cognitive ability, medical problems, gender, prematurity, teachers' variable, and government factors more especially the negative attitude of students towards their studies. Consequently, students get involved in very many activities outside their studies which are not helpful. They may engage in very many unlawful activities like, cultism, robbery, prostitution, spending much time on WhatsApp and tyranny, among other vices. Hence, this study sought to investigate the extent to which study attitude determined students' academic achievement in Biology at secondary school level in Mubi Metropolis of Adamawa State.

III. PURPOSE OF THE STUDY

The main purpose of this study is to investigate the study attitude and students' academic achievement in Biology at secondary school level in Mubi Metropolis of Adamawa State. The specific objectives of this study are to;

1. Determine the study attitude of secondary school students in Biology in Mubi Metropolis.
2. Determine the factors influencing study habits of secondary school students in Biology in Mubi metropolis.
3. Investigate the academic performance of secondary school students in Biology in Mubi Metropolis.
4. Examine the correlation between study attitude and achievement of secondary school students in Mubi Metropolis.
5. Compare the study attitude of secondary school students in the rural and urban areas in Mubi Metropolis.

Research Questions

The following two research questions were formulated to guide the researcher

1. What is the study attitude of secondary school students in Biology in Mubi Metropolis?
2. What are the factors influencing study habits of secondary school students in Biology in Mubi metropolis.

IV. RESEARCH HYPOTHESES

Three null hypotheses were formulated and will be tested at 5% level of significance

H₀₁: There is no significant difference between study attitudes of rural and urban secondary school students.

H₀₂: There is no significant difference between the study attitudes of female and male in secondary school students.

H₀₃: There is no significant relationship between study attitude scores and achievement scores at the secondary school level.

Research Design

This study adopted a survey research design to assess study habit and academic achievement in Biology at secondary school level in Mubi Metropolis of Adamawa state. An assessment of the study habit and students' academic achievement will be carried out to determine the relationship between study habit and students' academic achievement.

3.2 Population and Sample

The target population for this study comprised of all public secondary schools students of secondary schools with three hundred as sample size. From the population, six schools were selected by simple random sampling technique while three hundred students were selected by simple random technique. Therefore fifty students were selected from each school.

Research Instrument

A self-developed questionnaire titled 'Study Attitude and Academic Achievement in Biology at Secondary School Level Questionnaire' (ATAABSSLQ) was used to collect data. The questionnaire was divided into three sections. Section A comprised of demographic characteristics of teachers such as name of school, sex, class taught and school location. Section B comprised of 20 items on study attitude of secondary school students in Biology. Section C comprised of 15 items on the factors influencing study habit of secondary school students in Biology. The record of continuous assessment will be collected from sampled schools.

Validity and Reliability of Instrument

The validity of the instrument was carried out by an expert in Counselling Psychology in the Department of Science Education, Adamawa State University, Mubi. The reliability of the research instrument was carried out in Government Secondary School (GSS) Hong which is outside the study area. The researcher used test-retest reliability method. The first test was administered on 30 teachers, while the second test was administered within the interval of a week. The reliability coefficient was 0.85.

Data Collection and Analysis

The researcher with two research assistants administered the questionnaires and collected them on the spot. Thus, retrieved data were analyzed using descriptive and inferential statistics such as percentage and t-test analysis.

V. RESULTS

Research Question 1: What is the study attitude of secondary school students in Biology in Mubi Metropolis?

Table 1: Summary of responses relating to the study attitude of secondary school students

S/N	Items	A (%)	D (%)	Total (%)
1	When I don't understand something I ask the teachers.	213(71)	87(29)	300(100)
2	I exchange views with my classmates about what we study.	266(88.67)	34(11.33)	300(100)
3	In my exercise or study-works I concentrate on others which are already corrected.	153(51.00)	147(49.00)	300(100)
4	When I finish a test I read it again before handing it.	275(91.67)	25(8.33)	300(100)
5	When I study, I use to consult other books besides the adoption of Biology book to clarify or widen/increase knowledge.	248(82.67)	52(17.33)	300(100)
6	I revise frequently so as not to forget what I have learnt.	242(80.67)	58(19.33)	300(100)
7	To learn something, I have to understand it before.	173(57.67)	127(42.33)	300(100)
8	I read all the questions of the test before beginning to answer it.	197(65.67)	103(34.33)	300(100)
9	When I have to do some study-work, before starting, I read a lot about the theme, organize the ideas and write an outline.	168(56.00)	132(44.00)	300(100)
10	I ask questions on what I study and try to answer them.	157(52.33)	143(47.67)	300(100)
11	I study Biology daily.	203(67.67)	97(32.33)	300(100)
12	I feel distracted when I am studying Biology.	145(48.33)	155(51.67)	300(100)
13	I have a jotter that is used to take down note during Biology study.	207(69.00)	93(31.00)	300(100)
14	During Biology class, I take down note always.	265(88.33)	35(11.67)	300(100)
15	I always compare my class note with the Biology textbook.	226(75.33)	74(24.67)	300(100)
16	I always relax for 30 minutes after 2 hours study	172(57.33)	128(42.67)	300(100)
17	I always attained Biology class.	211(70.33)	89(29.67)	300(100)
18	I always study my Biology note before exams.	285(95.00)	15(5.00)	300(100)
19	I have a sense of mental pressure before examination.	163(54.33)	137(45.67)	300(100)
20	I feel afraid of examination failure.	297(99.00)	3(1.00)	300(100)

Table 1 shows that out of 300 respondents 212(71.00%) agreed with the statement that when I don't understand something I ask the teachers, while 87(29.00%) disagreed. Out of 300 respondents 266(88.67%) agreed that I exchange views with my classmates about what we study, while 34(11.33%) disagreed. Out of 300 respondents 152(51.00%) agreed with the statement that In my exercise or study-works I concentrate on others which are already corrected, while 147(49.00%) disagreed with the statement. Majority of the respondents 275(91.67%) agreed with the statement that when I finish a test I read it again before handing it, while 25(8.33%) disagreed. Also, majority of the respondents 248(82.67%) agreed with the statement that when I study, I use to consult other books besides the adoption of Biology book to clarify or widen/increase knowledge, while 52(17.33%) disagreed. Out of 300 respondents 242(80.67) agreed with the statement that I revise frequently so as not to forget what I have learnt, while 58(19.33%) disagreed. Out of 300 respondents 173(57.67%) agreed with the statement that to learn something, I have to understand it before, while 127(42.33%) disagreed. Out of 300 respondents 197(65.67%) agreed with the statement that I read all the questions of the test before beginning to answer it, while 103(34.33%) disagreed. Out of 300 respondents 168(56.00%) agreed with the statement that when I have to do some study-work, before starting, I read a lot about the theme, organize the ideas and write an outline, while 132(44.00%) disagreed with the statement. Out of 300 respondents 157(52.33%) agreed with the statement that I ask questions on what I study and try to answer them, while 143(47.67%) disagreed.

The table further shows that out of 300 respondents 203(67.67%) agreed that they study Biology daily, while 97(32.33%) disagreed. Out of 300 respondents 145(48.33%) agreed with the statement that I feel distracted when I am studying Biology, while 155(51.7%) disagreed. Out of 300 respondents 207(69.00%) agreed with the statement that I have a jotter that is used to take down note during Biology study, while 93(31.00%) disagreed. Out of 300 respondents 265(88.33%) agreed with the statement that during Biology class, I take down note always, while 35(11.67%) disagreed with the statement. Out of 300 respondents 226(75.33%) agreed with the statement that I always compare my class note with the Biology textbook, while 74(24.67%) disagreed with the statement. Out of 300 respondents 172(57.33%) agreed with the statement that I always relax for 30 minutes after 2 hours study, while 128(42.67%) disagreed with the statement. Majority of the respondents 211(70.33%) agreed with the statement that I always attained Biology class, while 89(29.67%) disagreed with the statement. Also, majority of the respondents 285(95.00%) agreed with the statement that I always study my Biology note before exams, while 15(5.00%) disagreed with the statement. Out of 300 respondents 163(54.33%) agreed with the statement that I have a sense of mental pressure before examination, while 137(45.67%) disagreed with the statement. Out of 300 respondents majority 297(99.00%) agreed with the statement that I feel afraid of examination failure, while 3(1.00%) disagreed with the statement.

From the result above it can be established that students attitude toward Biology is generally positive. This indicated that

Biology students in Mubi metropolis have positive attitude towards Biology and they love the subject.

Research Question 2: What are the factors influencing study habits of secondary school students in Biology in Mubi metropolis.

Table 2: Summary of responses relating to factors that influence study habits of secondary school students in Biology

S/N	Items	A (%)	D (%)	Total (%)
1	My parents always encourage me to study my books.	215(71.67)	85(28.33)	300(100)
2	I have my note and writing materials to take Biology note always.	213(71.00)	87(29.00)	300(100)
3	My Biology teacher doesn't miss his/her lesson.	196(65.33)	104(34.67)	300(100)
4	My Biology teacher gives us test three times per term and always mark and give back feedback.	202(67.33)	98(32.67)	300(100)
5	My Biology teacher always accompany every topic teach with practical.	127(72.33)	83(27.67)	300(100)
6	My colleagues always encourage me to read my books.	172(57.33)	128(42.67)	300(100)
7	My parents always employed lesson teachers to teach me Biology at home.	149(49.67)	151(50.33)	300(100)
8	My school Biology laboratory is well equipped.	143(47.67)	157(52.33)	300(100)
9	I always understand Biology teaching.	194(64.67)	106(35.33)	300(100)
10	I always take my breakfast before going to school.	283(94.33)	17(5.67)	300(100)
11	The Biology laboratory is always congested, and this discourage me from attending Biology practical.	162(54.00)	138(46.00)	300(100)
12	My Biology teacher is very good in explaining new topic.	172(57.33)	128(42.67)	300(100)
13	I don't have Biology textbooks.	94(31.33)	206(68.67)	300(100)
14	My parents always attend the PTA meetings.	156(52.00)	144(48.00)	300(100)
15	My Biology teacher always gives Biology notes to class captain to write for us.	163(54.33)	137(45.67)	300(100)

Table 2 shows that out of 300 respondents 215(71.67%) agreed with the statement that my parents always encourage me to study my books, while 85(28.33%) disagreed with the statement. Out of 300 respondents 213(71.00%) agreed with the statement that I have my note and writing materials to take Biology note always, while 87(29.00%) disagreed with the statement. Out of 300 respondents 196(65.33%) agreed to the statement that my Biology teacher doesn't miss his/her lesson, while 104(34.67%) disagreed with the statement. Majority of the respondents 202(67.33%) agreed with the statement that my Biology teacher gives us test three times per term and always mark and give back feedback, while 98(32.67%) disagreed with the statement. Out of 300 respondents 217(72.33%) agreed with the statement that my Biology teacher always accompany every topic teach with practical, while 83(27.67%) disagreed with the statement. Out of 300 respondents 172(57.33%) agreed with the statement that my colleagues always encourage me to read my books, while 128(42.67%) disagreed with the statement. Out of 300 respondents 149(49.67%) agreed with the statement that my parents always employed lesson teachers to teach me Biology at home, while 151(50.33%) disagreed with the statement. Out of 300 respondents 143(47.67%) agreed with the statement that my school Biology laboratory is well equipped, while 157(52.33%) disagreed with the statement.

The table further shows that out 300 respondents 194(64.67%) agreed with the statement that I always understand

Biology teaching, while 106(35.33%) disagreed with the statement. out of 300 respondents majority 283(94.33%) agreed with the statement that I always take my breakfast before going to school, while 17(5.67%) disagreed with the statement. Out of 300 respondents 162(54.00%) agreed with the statement that The Biology laboratory is always congested, and this discourage me from attending Biology practical., while 138(46.00%) disagreed with the statement. Out of 300 respondents 172(57.33%) agreed with the statement that my Biology teacher is very good in explaining new topic, while 128(42.67%) disagreed with the statement. Out of 300 respondents 94(31.33%) agreed with the statement that I don't have Biology textbooks, while 206(68.67%) disagreed with the statement. Out of 300 respondents 156(52.00%) agreed with the statement that my parents always attend the PTA meetings, while 144(48.00%) disagreed with the statement. Out of 300 respondents 163(54.33%) agreed with the statement that my Biology teacher always gives Biology notes to class captain to write for us, while 137(45.67%) disagreed with the statement.

From the results above it can be established that the factors that influence study habit of secondary school students in Mubi metropolis are my parents always encourage me to study my books, writing materials, Biology teachers punctuality in class, frequent assessment, practical class in Biology, encouragement by the peer group, lesson teacher to teach at home, proper understanding of the subject, proper feeding of the students, effectiveness and efficiency of Biology teachers, availability of

Biology textbooks, parental involvement in their children studies and the Biology teachers always give notes on what being taught to students.

Hypothesis Testing

Hypothesis 1: There is no significant difference between study attitudes of rural and urban secondary school students.

Table 3: t-test analysis of the differences between study attitude of rural and urban students

Variable	N	Mean	SD	df	t-cal.	t-crit.	P
Rural	100	231.30	47.78	298	2.578	1.960	P > 0.05
Urban	200	256.90	58.62				

*** Significant**

Table 3 reveals that t-cal. (2.578) is greater than t-crit. (1.960) at 0.05 level of significance. The null hypothesis, which states that there is no significant difference between study attitudes of rural and urban secondary school students, is rejected. Therefore, there is significant difference between study attitudes of rural and urban secondary school students.

Hypothesis 2: There is no significant difference between the study attitudes of female and male in secondary school students.

Table 4: t-test analysis of the differences between study attitude of female and male students

Variable	N	Mean	SD	df	t-cal.	t-crit.	P
Male	150	208.60	43.56	298	1.112	1.960	P > 0.05
Female	150	195.35	37.22				

*** Not Significant**

Table 4 reveals that t-cal. (1.112) is less than t-crit. (1.960) at 0.05 level of significance. The null hypothesis, which states that there is no significant difference between the study attitudes of female and male in secondary school students is accepted.

Therefore, there is no significant difference between the study attitudes of female and male in secondary school students.

Hypothesis 3: There is no significant relationship between study attitude scores and achievement scores at the secondary school level.

Table 5: Pearson correlation of attitude score and academic achievement

Variables	N	Mean	SD	df	r-calculated	r-critical
attitude score	300	201.48	40.64	598	0.266	0.087
Academic achievement	300	64.63	19.15			

***Significant**

Table 5 shows that the r-calculated (0.266) is greater than r-critical (0.087) at 0.05 confidential levels. The null hypothesis, which states that there is no significant relationship between study attitude scores and achievement scores at the secondary school level, is therefore rejected. This implies that there is a significant relationship between study attitude scores and achievement scores at the secondary school level.

VI. DISCUSSION

The findings of the study revealed that students study attitude toward Biology is generally positive. This indicated that Biology students in Mubi metropolis have positive attitude towards Biology and they love the subject which help them to achieved better results in the subject. This findings is in line with Valle (2009) who aimed at studying the relationship between university students' self-efficacy for performance and learning and their effort regulation. The researcher found that when students possessed a higher self-efficacy, they were more likely to put more effort into their academic studies. Similarly, Khan and

Ali (2013) enquired about the relationship between attitudes of students towards Science with their academic achievement and found that both the variables are interlinked and correlated. The higher the positive attitude of students towards Science, the more likely to get better results in their academics. Apart from all the above studies, a large number of studies (Ali & Awan, 2013; Tiwari & Anwar, 2015; Hacieminoghu, 2016; John, 2014) have also proclaimed that those students who possess positive attitude towards Science also do better in their academic achievement.

The result further revealed that the factors that influence study habit of secondary school students in Mubi metropolis are my parents always encourage me to study my books, writing materials, Biology teachers punctuality in class, frequent assessment, practical class in Biology, encouragement by the peer group, lesson teacher to teach at home, proper understanding of the subject, proper feeding of the students, effectiveness and efficiency of Biology teachers, availability of Biology textbooks, parental involvement in their children studies and the Biology teachers always give notes on what being taught to students. This finding agrees with Talton and Simpson in Soltani, (2011) who stated that there are many factors that influence attitudes and achievement among adolescents. Some of the factors are associated with parental background and family environment. Other factors relate to individual characteristics such as study attitude, self-concept, locus of control, and achievement motivation. Still other variables are associated with schools influences such as class climate, teachers, and administrative styles. Similarly, According to Osborne *et al.* in Soltani, (2011) studies have incorporated a range of components in their measures of attitudes to science including: the perception of the science teacher; anxiety toward science; the value of science; self-esteem at science; motivation towards science; enjoyment of science; attitudes of peers and friends towards science; attitudes of parents towards science; the nature of the classroom environment; achievement in science; and fear of failure on course.

Test of hypothesis one revealed that there is significant difference between study attitudes of rural and urban secondary school students. This finding is contrary to the reports of Dike, Anyanwu, Zachariah and Folashade (2018) who did not found significant difference between students performance in Chemistry, Physics and Biology from school to school. Similarly, Lawrence (2012) who also did not found significant difference between students' performance with respect to school environment i.e. urban and rural schools.

Test of hypothesis two revealed that there is no significant difference between the study attitudes of female and male in secondary school students. This finding agrees with Bhan and Gupta (2010) conducted a study for academic achievement and study habit among the students belonging to scheduled caste and non-scheduled caste group. The result revealed that sex has no significant impact on academic achievement and study habit of students. This finding is contrary to Singh (2011) who examined academic achievement and study habits of higher secondary students and the results indicate that girls and boys differ significantly in their study habits and academic achievement.

Test of hypothesis three revealed that there is a significant relationship between study attitude scores and achievement scores at the secondary school level. This finding agrees with Okpala (2006) who reported a positive relationship between students'

attitude and their performance in academics. Also Narmadha and Chamundeswari (2013) found that there exists a positive impact of learning Science on academic achievement. Even though most studies stated that there was a positive relationship between study attitude and academic achievement, there were few studies arguing the opposite. For example, in a study conducted by Chassie, O'Conner and Walther (2004

VII. CONCLUSION

Students generally have a favourable attitude towards Biology. Though Positive attitudes alone may not significantly predict good performance as shown by the students' grades, there are other mediating factors including student effort and commitment that connect attitude and achievement without which attitude alone may not reflect achievement. Students attribute their achievements in Biology mostly to the school environments, abilities, future interest and personal effort. Hence, the students should be motivated through persuasion, use of reinforcements, provision of learning resources and improving on teacher support which cuts across the home and the school environments.

VIII. RECOMMENDATIONS

Based on the findings of the study, the study makes the following recommendations:

- The school administration should advantageously make use of the learners' positive attitude to create a strong inclination and culture of Biology as a subject in secondary schools where the students can score favourably like in any other subject.
- The curriculum designers and the teachers should articulate well on the usefulness and applicability of Biology in general so that students create positive minds towards the subject and subsequently strive to improve in the subject.
- The Ministry of education, teachers and parents should ensure that performance of Biology among students is improved so as to dislodge the negative attitude and create a positive one on performance of Biology in secondary schools. This will counteract the effect of previous failures and rankings in the subject which may degenerate into negative school culture and definitely low performance.
- The parents and the teachers should explore other avenues to change the behaviour of students towards Biology and the interests of the students towards the subject. The students should be motivated through persuasion, use of reinforcements, provision of learning resources and improving on teacher support which cuts across the home and the school environments.
- The learners should be able to understand the need for a commitment to be fully engaged and to be willing to embrace logic behind every success in Biology so as to acquire the necessary knowledge and skills for examinations.

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Applications of Wearable Technology in Healthcare

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Abstract: *Recently, wearable technology is utilized to observe and supervise a patient's health. These devices are in close contact with the patient. So, it may be used to acquire data in the form of time series data (i.e. minute-by-minute or second-by-second data) such as heart rate, blood pressure, body temperature and saturation of oxygen in the blood.*

Keywords: *Wearable Technology, Ubiquitous Computing and Cloud Storage.*

DOI: 10.29322/IJSRP.9.08.2019.p9254
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9254>

1. Introduction

The origins of new wearable technology are affected by the restraints to the discernment of ubiquitous computing. In the early 1980s, there was the first wearable device which was the hearing aid. A little while later, the calculator watch invaded the markets and it was vastly adopted [1, 2]. After its invention, wearable devices have gone through eighteen generations of improvements, with research going on at prestigious institutions such as MIT, Georgia Tech and Carnegie Mello University. In 1997, the first PhD was completed from MIT in wearable technology. Recent reports illustrate that the universal market for wearable technology in the medical field will accomplish more than twelve billion dollars. In fact, the United States of America is considered the most enormous market in the whole world [3, 4].

Researchers sometimes intended to call wearable devices as body-borne computers. This is because these devices can be worn by the user without punching keys or other manipulations. These devices have some important features such as it is always on, it is always working, perform calculations and process information. In fact, wearable devices consist of two main parts. The first part consists of sensors, glasses, watches and even wearable foot. The second part consists of information aggregator and analyzer [5].

Wearable technology offers multiple modern options like multimedia, Bluetooth, Wi-Fi, cameras and Samsung Galaxy Gear Watch. Besides, there are smart glasses which brings technology to our vision such as Google Glasses. Recently, a revolution has made on interactive clothing. These clothing can supply doctors and sports trainers with the real-time health status of the wearer such as Hexoskin [6].

2. Forces Driving the Growth of Wearable Technology

Indeed, there are some reasons that drive the excessive revolution of wearable devices like

- i. Cloud storage: cloud storage services exceeded 2 billion by 2014. Hence, this extensive storage capacity enables the wearable devices to get significant benefits from the cloud as well as sending time series signals and parameters to the cloud. The cloud storage also enables to present and perform reduced information technology (IT) costs. Also, the cloud enables the opportunities to get key advantages of the new technology named the Internet of Things (IoT) [7].
- ii. Faster, cheaper and smaller hardware: wearable technology gets advantages from the golden rule in electronics which illustrates that electronic chips are getting 100 times smaller each decade. Thus, devices based on this technology can be worn easily and held in pockets readily. These features qualify these devices to be used in military fields and in spy era. Recent studies report that by 2020, batteries are expected to be 2.2 times more powerful.
- iii. Location data: wearable devices can provide the medical team with its user's location implicitly. This technology has a device-based location service (i.e. GPS). Besides, it has some up-to-date operating systems (OSs) such as Android, Blackberry OS, Windows Mobile and Symbian S60 [8].

3. Fast-Evolving Gadgets in Fitness, Wellness and Healthcare

Wearable devices in healthcare can be used to measure different parameters such as calories burned, steps walked, issue of definite biochemicals, time spent exercising as well as time spent sleeping. The aforementioned parameters and other parameters can be composed in a particular unit such as activity tracker and smartwatch. Wearable devices can be utilized in some significant fields in healthcare such as determining the percentage of alcohol in blood especially for the drivers, determining the performance of athletics, measuring and supervising the degree of illness for a patient and monitoring of patients with heart diseases especially those with old ages and live alone in faraway places. Here are some applications of wearable devices in healthcare [9]. Figure (1) bellow illustrates the use of smart watch to monitor the heart rate. This application is very useful in fitness field as well as it has many benefits in training aerobically and understanding the heart rate vital sign.



Fig 1: Fitness & Heart Rate Monitor

Figure (2) below shows a new wearable device called fuel band. This device has the ability to track and measure everyday movements.



Fig 2: Fuel Band

Another fruitful application is the wearable device used for continuous glucose monitoring. This device is very helpful to patients who suffer from unbalanced levels of glucose in the blood [10]. Figure 3 below illustrates this technology which can monitor retrospectively review patients' glucose.



Fig 3: Continuous Glucose Monitoring

Some patients suffer from sleep apnea. It is considered impractical to connect the patient to a patient monitor while sleeping. Wearable technology provides a practical solution for these patients [11]. Figure (4) below shows this wearable technology.



Fig 4: Sleep Sensor

There are some significant modifications that transform the way we experience the world. In fact, one of these wearable devices that makes revolution in the medical field is the invention of sensory fitness socks. Some patients suffer from ischemia (i.e. a little blood supply to foot, hands and other organs). These wearable devices have sensors that can communicate with Bluetooth-powered anklet [12]. Then, feeding all data to the user's smartphone. Figure (5) illustrates sensory fitness socks



Fig 5: Sensory Fitness Socks

4. The Future of Wearable Technology

These revolutionary applications are not the end road of this technology. There are promising applications associated with this technology. Recently, Google announced that it released a Software Development Kit (SDK) which can be applied for Android-powered wearables. Moreover, another well-known trademark which is Looxcie. Looxcie has released a live streaming wearable headset with live-feed access from a proprietary tablet and smartphone. There are also devices invaded babies' world. Sensible baby is a wearable device that fits into a chest pocket and sends information and active alerts about temperature, baby orientation and breathing to a parent's mobile device.

Recently, MIT labs invented a wearable device that simulates science fiction. Sensory Fiction is the new wearable device in which the reader can soon experience physical sensation while reading the written words. Moreover, the medical field does not stop receiving modern technology in wearable devices. Smart Contact Lenses is a new wearable technology which can help measure glucose levels in tears [13].

The international theme parks receive a large number of visitors on a daily basis. Some of these visitors are not free of problems and attempts to sabotage. Disney's MyMagie+ is capable of monitoring visitors and collecting data about their behaviours in Disney World theme parks.

5. A Few Hidden Limitations

There are some limitations and restrictions associated with this technology such as

- i. Less versatile
- ii. Small in size

- iii. Ambient noise
- iv. Not as widely accepted
- v. Expensive
- vi. A lot of wirings at times
- vii. Heat emission may cause irritation
- viii. Some side effects such as headaches
- ix. Data security threats especially when the device is lost or stolen

6. Conclusions

Without a doubt, wearable technology will be the most prevailing topics in the upcoming years. Wearable devices will continue to reign in popularity. However, focuses needed on better designs for mass appeals. Moreover, future projections seem to be reaching to the highest level. This revolutionary technology will integrate more seamlessly into daily life.

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Major Aspects for Ultrasound Equipment in Medical Applications

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Abstract: this medical device is one of the most important radiology devices used to diagnose patients. This machine is utilized to generate an image of interior body structures and endeavor to discover a cause of an illness or to eliminate pathology. Compared to other prevalent processes of medical imaging, ultrasound has a key advantage which is providing images in real-time.

Keywords: Echo, Sound Wave, Ultrasound and Transducer.

DOI: 10.29322/IJSRP.9.08.2019.p9255

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9255>

1. Introduction

Before the middle of the last century, specifically in 1940, the American scientist Floyd was able to invent the first ultrasonic echo imaging equipment [1]. It was first used to reveal interior flaws in the mineral casting. Shortly thereafter, this technique entered the medical field [2]. The first physician who used the ultrasound waves in diagnosing human structures was John Wild. He used the ultrasound waves to estimate the density of bowel tissue. Not only this, but he was also known as the father of medical ultrasound [3].

The working principle for the ultrasound equipment is represented in 3 phenomena. The first step is generating a sound wave, then drawing the echoes and the last step is interpreting the echoes.

- i. Generating a sound wave: A piezoelectric transducer is a chip responsible for producing a sound wave. This transducer is masked in a plastic covering. Then, electrical pulses lead the transducer at the required frequency. Moreover, modern approaches of transducers utilize phased array technologies to qualify the equipment to alter the tendency and depth of focus. Here, the sound wave is converged by two techniques. The first technique is the form of the transducer. The other technique is the complicated series of control pulses from the scanner. In fact, the sound waves move to the structure of the body and focuses on a required depth [4].
- ii. Drawing the echoes: In this step, the returning sound wave from the body vibrates the transducer. This will generate electrical pulses that move into the scanner which will be responsible for processing and converting the electrical pulses into a digital image [5].
- iii. Interpreting the echoes: In this stage, two principles should be determined by the ultrasound scanner. The first principle is determining the time that requires the sound wave to be produced and returned as an echo wave. The second principle is determining the strength of the echo wave. After determining these two principles, then, the ultrasonic scanner enables to determine the location of the pixel in the image to ignite as well as its intensity [6].

2. Working Principle

Indeed, the density depth depends highly on the media that the electrical pulses pass through. However, if the electrical pulses strike either gases or solids, then, the density difference will be considerable. Hence, a large amount of acoustic energy is reflected which will lead to difficulty on discovering deeper. The promptness of sound waves differs when it moves through various media. This velocity depends mainly on the acoustical impedance of the media. Besides, the sonographic tool proposes that the acoustic speed is fixed at 1540 meter per second. This proposition affects the body with non-uniform structures where the ray turns into a little de-focused as well as the resolution of the image is decreased [7, 8].

For producing a two-dimensional image, the ultrasonic waves are swept. There are two approaches to sweep the transducer which is either mechanically or electronically. The obtained data is addressed and utilized to structure the image. This image is after that a two-dimensional performance of the interior structure of the real body. In fact, three-dimensional images might be produced via obtaining a sequence of contiguous two-dimensional images.

Besides two-dimensional images and three-dimensional images, there is also Doppler ultrasounds which are utilized to address the flowing of blood and the movement of muscles. Here, the various received velocities are performed in color owing to easiness of performance. Colors might alternately be utilized to illustrate the capacities of the received echoes.

3. Modes of Ultrasound

There are different modes of ultrasound utilized in medical imaging such as

- i. A-mode: The letter "A" here is the abbreviation of amplitude. In fact, the amplitude of the reflected wave is demonstrated on an oscilloscope display. This mode is considered the plainest kind of ultrasounds. Here, a singular transducer scans a line over the body with the waves represented on screen as a representation of depth. An example of this mode is the therapeutic ultrasound that targeted at a precise tumor [9, 10]. Figure (1) below illustrates the A-mode

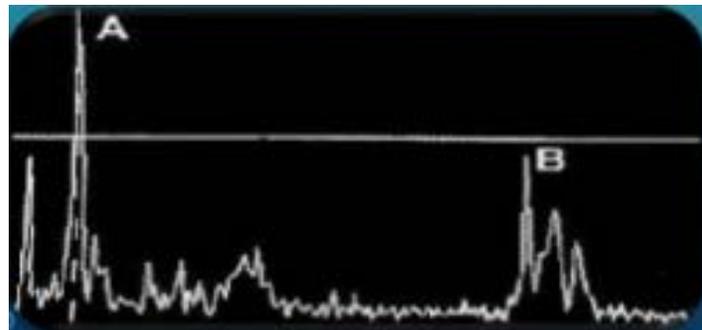


Fig1: A-Mode

- ii. B-Mode: The letter "B" here is the abbreviation of brightness. Indeed, a linear array of transducers altogether scans a scale over the body which can be examined as a two-dimensional image on the monitor. So, it is sometimes called a 2D-mode. This mode is considered an important imaging modality in the diagnostic ultrasound. An amplitude of the received ultrasound signal is transformed into a gray scale image [11, 12]. Figure (2) below shows the B-mode.



Fig (2): B-Mode

- iii. D-Mode: The letter "D" here is the abbreviation of Doppler. This type of modes is based on Doppler's effect. The modification in frequency is triggered by the mutual activities of sound generator and the observer. There are different types of this mode such as color Doppler, Continuous Wave (CW) Doppler and Pulsed Wave (PW) Doppler [12]. Figure (3) below illustrates the D-mode

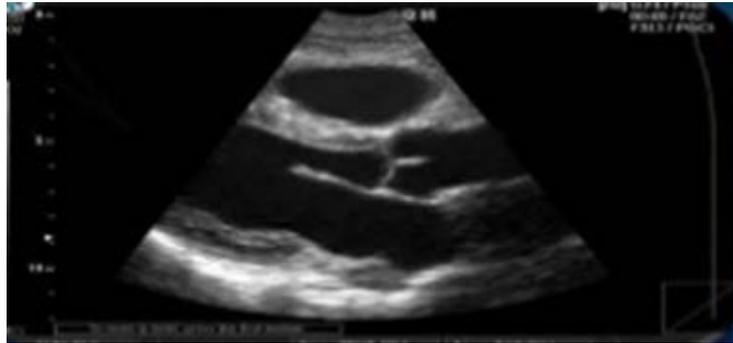


Fig 3: D-Mode

- iv. M-Mode: The letter "M" here is the abbreviation of motion. This mode imitates the movement of the organ's structure such as the heart over time because of its outstanding chronological resolution. It is considered the most precise mode among all. After a while, this is equivalent to recording a video in ultrasound [13]. Figure (4) illustrates the M-mode

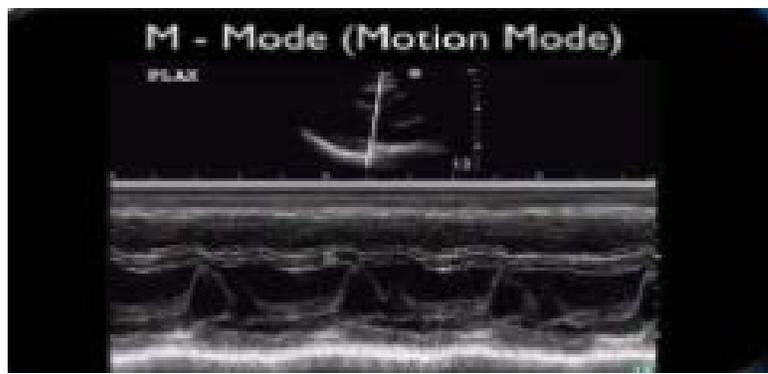


Fig (4): M-Mode

4. Maintenance, Safety and Precautions

Many biomedical engineers' advice physicians that frequently use ultrasound machines to properly calibrate the equipment after every six months. They also requesting from them to clean all external surfaces and filters. Besides, they also inform the technicians and the operators to frequently check system and power supply fans. They also advice technicians to look over system controls, power cords and cables for crack, cuts and wear [14].

Having considered some rules in preventive maintenance of ultrasound machines, it is also reasonable to look at some steps associated with safety and precautions. One of the important rules in this manner is the aim of reducing the potential of adverse events, so that the operator has to utilize least exposure to accomplish anticipated reimbursements. Moreover, the physician should care about the transducer position. It should be at an angel of 90' during use and has to gradually transfer with the purpose of reducing the hazard of triggering hot spots [15].

Another advice associated with ultrasound is to disconnect the probe when the patient feel of any pain during diagnosing. The reason behind this cause is that the overheat of tissue.

5. Conclusions

The ultrasound machine is considered a safe and painless equipment. It can image muscles, soft tissues and bone surfaces perfectly and is predominantly convenient for allocating the boundaries among hard and fluid-filled spaces. Ultrasound machine extracts "live" images, where the physician enables to animatedly chose the most valuable subdivision for identifying and authenticating variations, frequently permitting prompt diagnoses. Live images similarly permit ultrasound-

channelled operations or injections, that might be burdensome with other imaging modalities. Moreover, ultrasound machines can illustrate the composition of organs.

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The Role of Using Concussion Detection Sensors in Healthcare Management

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DOI: 10.29322/IJSRP.9.08.2019.p9256
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9256>

Abstract: Concussion is a critical brain condition which may lead to temporary loss brain function. Commonly, it is related to sport activity and accidents where around 57 million people around the world suffering from traumatic brain injury. Application of sensors technology promotes early detection of concussion and playing a significant role in clinical diagnosis and management. As well as, telemedicine provides a smart solution for detection and management of Concussion over remote area.

Keywords: Concussion sensor, Concussion detection and management, Telemedicine, Connected Health.

Introduction

Concussion is one of the most critical brain injury commonly related to sports activities. Also, it can be resulted from vehicle accidents affecting part of the community. High ratio of concussion injuries among all ages found in young children participated in sport activities due to the disproportionately of their heads are large compared to their growing body at this certain age. On the other hand, Large ratio of people who are suffering from concussion don't experience and recognize any indicators or symptoms. Making the detection of concussion is crucial and require special care to diagnoses and management. Impact of technology into the healthcare services provide a great promoting solution to early detection of concussion. As same as, improve and develop diagnosis techniques and management solutions based on telemedicine and smart technology. Therefore, in this review I would discuss the potential using of sensor and medical devices to detect signals and data required to diagnose concussion and explore commercial systems that are used to support and manage patients.

Definition and overview

Concussion can be defined as a complex of pathological conditions affecting the brain leading to traumatic brain injury with temporary loss of functions by direct blow to head or by impulsive force shaking the head and upper part of the body causing temporary neurological impairment including physical (e.g., headaches, nausea), cognitive (e.g., difficulty with concentration or memory), emotional (e.g., irritability, sadness), and maintenance (e.g., sleep disturbances, changes in appetite or energy levels) symptoms. Sport and physical activities are responsible for more than 15% of head and spinal cord injuries, as the popularity of sport rises it is suggested to increase the incident of sport related injuries (McCrorry et al. 2009). Human brain protected by skull bone and surrounded by cerebrospinal fluid functioning as shock absorber for small blow forces. Acceleration and deceleration of head can cause a concussion when the brain bump to the anterior part of the skull as a reaction to the impact force. While in the case of deceleration the brain hits the opposite side of the skull. Rotational movement of the brain inside calvaria producing shear forces that establish torque leading to concussion.

Symptoms and indicators of concussion are divided into temporary and delayed signs; the common temporary symptoms headaches or feeling of pressure, dazed feeling, confusion, vomiting and loss of memory (amnesia). Other types of symptoms may be delayed for hours or days after injury such as sensitivity to light and noise, sleep disturbance and concentration complaints. Moreover, researches (Daneshvar et al. 2011) exposed that a relation between concussion and long term effects may lasting decades certainly for patients with previous treated concussion. A recent study showed that after three decades of concussion injured athletes had medical indicators and symptoms comparable to patients with early Parkinson disease (MNT, 2013).

More than 57 million people around the world suffering from traumatic brain injury, with 10 million need to hospital admission. In the United States of America around 1.7 million people had experience the concussion every year, making 275.000 patients at hospital and about 52.000 deaths. In the last decade, the incident of concussion increased significantly resulting economic impact to the healthcare sector around more than 15 billion regarding the medical treatment and hospitalization cost and the expenses of lost productivity. It is estimated that concussion related to sport and physical activities is most common to occur in young children due to

their heads are disproportionately large compared to their bodies. The second reason for concussion in young children is football sport where more than 250,000 of children in USA experienced the concussion annually (Kimblor et al. 2012).

Required patient data to detect/diagnose/manage concussion

Concussion detection and management need precise recognition of patient's previous exposure history of concussion and their family medical history too. Patient baseline concussion test is helpful to measure reaction time, memory, speed of mental functioning and decision making processing, recording all these data of each participant over the sport season. Performing this test again in case of concussion presence to establish some comparative scores of studies before and after the injury.

A landmark study achieved by Levin and his team showed that neurophysiological (NP) assessment of concussion in sport designed the foundation of current management system of concussion. Where the recovered concussion participants were examined by neurophysiological (NP) test battery paper pencil tasks showed a significant decrease in neurocognitive functioning after injury had occurred compared with first baseline test (Levin et al. 1989).

The application of neurophysiological examination contains a clinical data and valuable information in concussion assessment. Evaluation of concussion based on neurophysiological indicators including cranial nerve, visual acuity monitoring, muscles strength and reflexes and test balance. Visual activity screening involves the assessment of pupil's response and eye movement to detect any abnormality of eye response or sudden change in visual field. Balance test system is beneficial tool of neurophysiological measurement to assist acute postural stability deficits, brain functioning and valid and reliable addition; certainly, when the symptoms show balance irregularities. Indeed, Balance Error Scoring System (BESS) is commonly used simple technique to evaluate athletes balance capability after brain injury to make decision for play return. More advanced test that can be performed to evaluate balance abnormality is Sensory Organization Test (SOT) by quantifying sways of patient while standing in fixed point using six conditions to identify balance disorder, three of six conditions are related to postural control: somatosensory, visual, and vestibular. SOT can detect balance abnormality during 30 days after injury comparing with 3 days for BESS.

In addition to that, several types of electrophysiological recording methods such as evoked response potential can provide significant clinical information about short and long term of concussion regarding the visual abnormality symptoms (Pillai & Gittinger 2016). Concussion is frequently associated with abnormalities of saccades (Molloy et al. 2017) demonstrated that King-Devick test as rapid visual valuable measure that can be used on sidelines by nonmedical personnel, including parents of youth athletes to improve the potential of concussion detection in sport. Other studies showed the impact of computerized cognitive evaluation test and batteries based test offering a solution for practical problem. (Collie et al. 2001) presented the role of Computerized test designed primary to investigate patients with neurological and brain lesion while the batteries based test modulated for computer presentation and recording such as Cambridge Neuropsychological Test Automated Battery (CANTAB) (Robbins et al 1994). Also, Cognitive tests are needed to detect deficits result in various brain functions such as Wechsler Digit Span Test, Wechsler Letter Number Sequencing Test and Stroop Color Word Test (Maroon et al. 2000).

More over Fluid biomarkers can be useful to detect mild traumatic brain injury and related conditions, Zetterberg and Blennow conclude that the valuable fluid biomarkers are associated neuronal and blood brain barrier injury and neuroinflammation. The capability of fluid biomarker depends on sampling time to quantify brain damage or concussion should be taken as soon as possible after the injury. While bio indicators fluid for delay effects such as neuroinflammation should reach suitable concentration after days or week after trauma. However, limitation for Fluid biomarkers are still under investigation and improvement to establish reference standards for neuropathology to create the diagnosis (Zetterberg & Blennow et al 2016).

Recently medical imaging system play an important role in clinical assessment and classification of brain abnormality. Typical imaging techniques such as X Ray, Computed Topography or Magnetic Resonance Image are not satisfied enough to prove diagnoses of concussion separately. Therefore, more advance imaging technique based on molecular imaging to investigate brain function via measurement of glucose consumption and metabolism activities shows a promotion outcomes when Positron Emission Tomography (PET) integrate with MRI and diagnostic software may be recommended to examine the changes directly after traumatic brain injury and detect any complications could be occurred (Byrnes et al. 2014).

Commercial systems on the market for concussion management

Integrated concussion examination X2 ICE is a useful smart tool based on tablet device combined with windows and iOS software to manage and evaluate player during sport activities to make a decision about suspected athletes using the principle of comparing base line information with after injury signs. X2 ICE system allow the facility to store and match all examination data with previous collected data for the player. Several examination modules are embedded in the system to support short and long term memory test, balance test, cognitive and baseline matching. Furthermore, X2 ICE system is accessible anytime and anywhere due to the possibility to upload collected data to a cloud (Biosystem X2 ICE 2017).

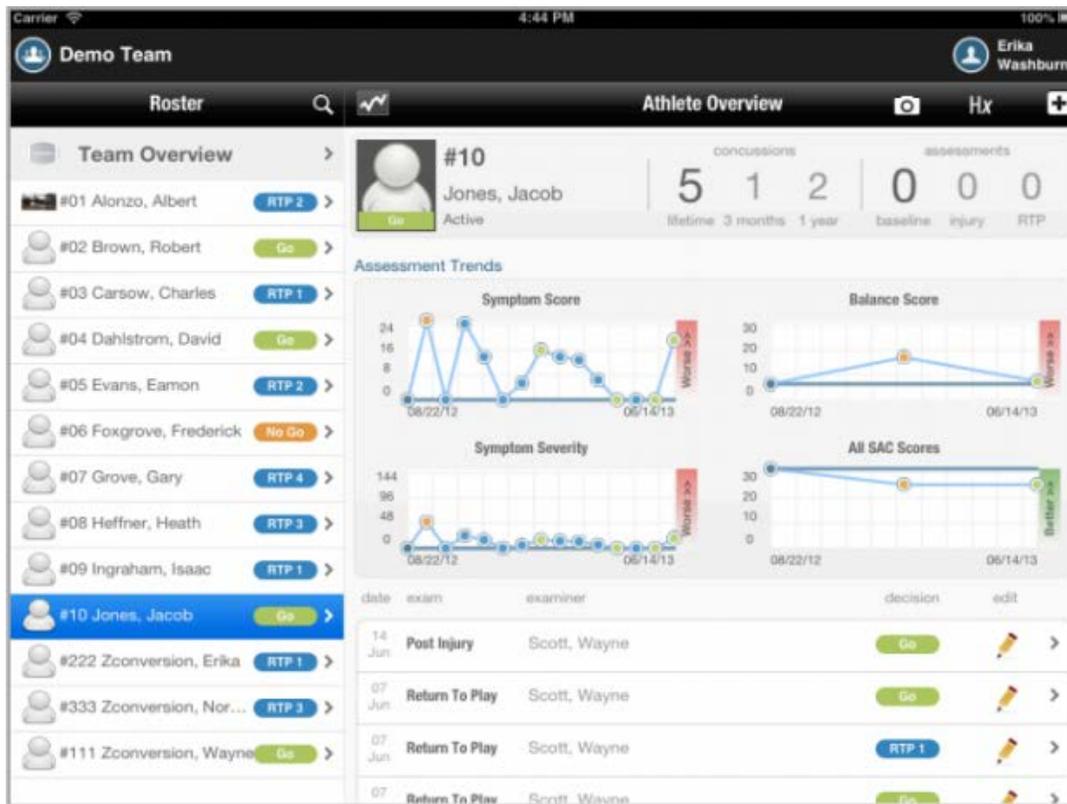


Figure 1: Biosys X2 ICE concussion examination system (Biosystem X2 ICE 2017).

In 2005 researches have demonstrated that measurement of angular and linear acceleration lead to more precise prediction of concussion (Yoganandan et al. 2005). While others were interested to specify the ideal location to position the accelerator sensor, (King et al. 2014) explained the superiority of mouth guard positioning. Therefore, Leading Force impact technology company introduce a digital mouth piece called X2IMPACT Guard to solve the problem with players who are return to play while they are still under high probability of brain traumatic injury. X2IMPACT Guard consider as smart device that can measure and store the impact forces affecting inside the head. All collected data can be send to sideline where X2IMPACT application allow direct access to concussion data including previous medical information of players. The clinical of the team assist the real-time concussion data and make a decision to allow participant to return or no.

Head Impact Telemetry (HIS) system is a unique device to measure and record the acceleration of exposure head in real time. Riddell Insite is a commercial impact response system uses during Americans football games, it is based on five accelerator sensors distributed inside the helmet with decoder and transmitter hardware, and interference software compatible with PC and smart phones to access the impact information. HIS integrated with computational algorithms to process data with wireless transmitter to establish real time continuous monitoring data, transmitted directly to a receptor inform of PC or smart phone to correlate the relation between head acceleration and concussion in sport. Software application support the smart phones and computer to record the participant’s history, baseline data, environmental setting and impact threshold.



Figure 2: Riddell Insite Impact Response System (Riddell 2017)

Ongoing research on devices

Biodirection company performs researches and studies to investigate world first nanowire biosensing platform for concussion and other types of traumatic brain injury based on rapid detection of biomarkers in blood. Tbit device will be able to detect blood protein bioindicator released in bloodstream immediately after TBI within short time around 90 seconds and low cost. As well as that Tbit is point of care platform providing the ability to be portable detection system for TBI. Biodirection company declared that they are still in the middle of clinical researches to prove data needed to be submitted with Food and Drug Administration (Biodirection 2017).

United states company called BrianScop is granted \$28 million from department of defense to establish a wearable EEG portable machine to detect electrical brain activity via smartphones. The device suggested to use algorithm allowing comprehensive outcomes panels. Clinicians and researchers require to concentrate on developing multi-modular assessment platform that explain deficits inhibiting an individual's physical activity. Studying is ongoing phase to specify suit of measure to deliver the most medical related information.

Regulations and guidelines of sport related concussion

Many researches and studies achieved over several years to establish and develop regulations, strategies and laws that managing the sport activities to ensure prevention or at least reduce the possibility of brain injuries. Rules and guidelines for sport related concussion can be summarized into three main points.

High level of awareness and understanding of concussion by coaches, athletes and team medical staff. Significantly the symptoms and medical indicators pointed to concussion, first aid medical procedures to reduce the effect of injuries and protect patient. Applying a plan of proactive regulation to prevent and reduces the brain injuries. Specialized training and education in parallel with brochure and short reports will increase the recognition of all condition related to sport concussion. Currently, social media and on line training courses are widely speared and accessible all around the world, thus could participate significantly to build the knowledge and awareness (CATT 2017).

The 4th International Conference on Concussion in Sport held in Zurich, November 2012 focused on the rules and regulation to decide the return of athletes to play again. The decision should be taken by and certified medical expert after looking for recommended protocol including several medical procedures and test such as cognitive and physical rest is needed to allow for recovery before playing again. Moreover, in case of concussion occurrence, short and simple physical exercises should be applying in the first steps of rehabilitation procedures, then progress to an intermediate and fully practices should be covered under the supervision of specialized medical team. However, the allowance to return to play should be provided with medical clearance (Kimble et al. 2012).

Finally, in many countries around the world parent's acceptance to allow their child to participate are compulsory, also concussion training courses for formal coaches are imposed by law. During the game, it is emergence need to take any player with suspected injury out of the playing area and provide the suitable medical care. Playing rules and laws modified by some countries to prevent, diagnose, and early detect players with suggested concussion, some colleges and sport league adopt additional strategies and policies

including; build up a plane including information needed to call emergency medical centers, and to follow several procedures in case of emergency. As possible as can reduce the contact between players by changing and modifying playing rules and assure the safety equipment as recommended by manufacturers (Institute of Medicine 2013).

Connected health for management of concussion

The management of patients after concussion injuries or people a high risk of suspected to traumatic brain injury faces several limitations and problems. Firstly, lack of specialized clinicians who can work with this situation, due to the fact that most sport facilities are spread widely into the countries with huge number of participants, making it difficult to enroll at least one specialist for each facility. Another problem is the failure of people in certain location such as country side or isolated places to access medical services. Connected health solution could have the ability to solve such problem or reduces the side effects of particular limitations.

Continuous educational system offers a significant opportunity for athletes, coaches, parents and medical staff to update their information with the latest results from researches and studies in the field. Portable and Web education resources such as brochure or online training tools will improve the education and reduce the gap between non-medical person who involved concussion risks. Questioner forms or survey will help involved person to record and report the information when concussion incident by answering several questions related to the place and strength of blow, and addressing symptoms and signs. As a result, if the concussion is suspected, the mobile education tool will order to follow certain recommendations and instructions to deal with concussion temporary until the emergency team arrive. On the other hand, some smart applications allow the user to connected to specialist medical staff who can support the patient situation based on obtained information and provide required instruction and recommendations to guarantee the dealing quality with patient case. This type of application is useful in rural and isolated geographical places (Lee et al. 2014).

Nowadays remote medical sensors and devices are useful to evaluation, diagnoses and management of concussion. (Yoganandan et al. 2005) explore that 47% of athletes are playing without recognition the risk of concussion incident. Therefore, it is recommended to wear safety and protective equipment with novel sensor technology that allow early detection of concussion. A good example of safety tool and remote detection equipment is smart helmet. It contains set of biosensor that detect blow forces. When the detected force exceeds a preset threshold value of force, LEDs and alarm system immediately notify the responsible person via wireless or Bluetooth technology at smart phone as receiver which include an application to detect the possibility of injury automatically based on the transmitted value of force hit the player. It also improves the existing technology by calculating the magnitude of the hit, in order to take instant serious measures, allowing specialist medical staff to explain patient information including patient history, severity of injury, signs and symptoms, etc. this medical expert can also contact the patient remotely to detect the suspected injury and transmits patient data to a central database bank (Veena et al. 2014).

Challenges with concussion connected health solution

There are many interests and challenges regarding using the connected health in the management of concussion. Recognizing and assessment of concussion within player on the field is a challenging procedure and responsibility for the medical care provider. Achieving this task requires rapid assessment according to standard objective evaluation of injury. Specialist medical staff considers as the main point in the management of concussion in the field, consulting education and training is major difficulties for healthcare provider due to the high cost of training and education in this field. More over this desired training and education is time consuming regarding to several related conditions and details that must be covered to achieve certain level of medical support. On the other hand, the connected health care system based on using internet and wireless signal in data transmitting may lead to break the privacy and confidentiality of patient's information.

Conclusion

Finally, telemedicine is a significant tool to manage, detection and diagnose concussion in parallel with smart phones applications and biosensors. Incorporating biosensors with safety equipment and tools in sport lead to early detection of concussion by measuring the hit force or both types of acceleration allowing health care specialist to proceed remotely tests and evaluation of concussion over internet connection or mobile signal allowing to early detect of injury even at isolated places. In addition to that, smart solution and application provide a great opportunity to develop and improve the management and treatment of concussion patients and help clinical to make correct decision of return to play. Consequently, good management, correct decision and early detection of concussion are fundamental for rapid recovery and relieve the effects of concussion.

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Differentiation of Breast Lesion in Digital Breast Tomosynthesis (DBT) By Using Digital Image Processing

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DOI: 10.29322/IJSRP.9.08.2019.p9257

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9257>

Abstract- Aim of this study was to differentiate the benign and malignant tumors according to the density values within the tumors. This study was based on the preprocessed mammograms obtained from the DBT machine and to calculate the density value by using matlab. Effects of breast thickness and age of the patient also considered. Craniocaudal (CC) and Mediolateral Oblique (MLO) views of Mammograms were collected by using data base of Digital Breast Tomosynthesis system. Already reported 48 images were collected and assess the density of the tumor by measuring of pixel values within the benign and malignant lesion. customized MATLAB programme. According to the quantitative analysis there was a significance difference between mean pixel value of the tumor in both CC and MLO views among benign and malignant group ($P < 0.05$). And it was evident there was a strong positive linear regression between Pixel value of the tumor and the age of the patient. But there was no significant relationship between pixel value of the tumor, and the thickness of the breast in both views. Study was concluded that the pixel value of the tumor can be used to differentiate benign and malignant breast tumors. According to the discriminant analysis sensitivity was less in CC than MLO images. Therefore less percentage of false negative was reported in MLO view images. Specificity was high in both CC and MLO view images. Therefore few percentage of false positive was reported.

Index Terms- Mammography, Digital breast tomosynthesis, Pixel value

I. INTRODUCTION

Digital Breast Tomosynthesis (DBT) also known as 3-Dimensional (3-D) is recent technical improvement in mammography. Digital breast tomosynthesis aids the early detection and accurate diagnosis of breast diseases^[1]. Conventional mammography examination is 2-dimensional and two x-ray images are taken of the breast. In mammography breast is compressed in order to produce breast images. But it may cause overlapping of the breast tissue. Therefore abnormal tissue can be hidden^[2]. Tomosynthesis producing the images by moving x-ray tube in an arc over the compressed breast and captured multiple 3-D images as well as 2-dimensional fulfilled digital images (2-D FFDM). These 3-D images clearly distinguish the normal breast tissues from the abnormal breast tissue^[3].

Breast masses mainly categorized in to benign and malignant. Mammograms clearly reveal breast lesions which may not be clinically palpable. Breast mass has a volume & it occupies space within the breast. The tissues within the breast mass different from the other areas of the breast^[4]. Most of breast tumors are benign such as fibrocystic changes, fibroadenoma, papilloma. Malignant breast tumors having different characteristics from benign tumors. These malignant tumors should be detected and treated early to avoid the metastasis^[5].

An accurate diagnosis of breast lesions is required for optimal treatment Mammography has become important in breast imaging up to date. But not all the cancers can be detected by Mammography^[6]. There are some factors which lower the sensitivity of Mammogram include technical & interpretative errors, rapid tumor growth patterns and extensive mammographic breast density. Hence it will obscure the lesion detection^[3]. Breast density changes with the age of the women and other reason such as hormone replacement therapy (HRT). Mammographic density is higher among younger, premenopausal women.

As a clinical imaging modality DBT improve the detection of breast lesions in women with dense breast. It enables the acquisition of three dimensional images (3D-images) of the breast and it creates sequential thin images through breast^[7]. DBT overcomes the limitations caused by overlapping tissues during standard two dimensional imaging (2D-Imaging) in conventional mammography. It is allowing the visualization of breast lesions which are not appears in 2D conventional mammography^[2].

DBT gives potential advantage of evaluation of masses and other pathologies associated with breast with its advanced technology compared to 2D conventional mammography. Therefore in this study, evaluating the lesion morphology on DBT to distinguish between malignant and benign tumors of the breast by using digital image processing^[8].

II. JUSTIFICATION

Breast cancer is currently considered the most common cancer among women. Early and accurate diagnosis may benefit to provide successful treatment for the patient. In all over the world mammography plays a major role in screening of breast cancer as it detects breast cancers at their early stage. But mammography show low sensitivity when patient is having dense breast. Digital breast tomosynthesis overcomes the limitations occurred with conventional mammography and improve the detection of breast lesions in women with dense breast.

Density is the one of the main feature of differentiation of malignant and benign lesions. In this study, mainly measure the density values within the lesion quantitatively. In order to suggest a range of density value for malignant and benign lesion respectively.

III. RESULTS

The study sample was included DBT images from 48 patients. Data was collected through machine storage with no inconvenience to hospital setup. DBT images of Patients who have already diagnosed as malignant and benign lesion.

Images were stored in MATLAB and display as grayscale image. All the images were preprocessed for visual enhancement. Measurement of pixel values within the benign and malignant lesion was taken from the customized MATLAB application

According to the developed MATLAB programme in this study I have removed the pectoral major muscle and prominent blood vessels within the breast area.

A whole breast area was selected to get the pixel value of normal breast tissue. Pectoral major muscle, prominent blood vessels and tumor area was excluded from the normal breast area. The tumor outline was selected separately. A pixel value was taken for normal breast area and tumor with the help of MATLAB programme. The ratio of the pixel values were taken between tumor and the breast area.

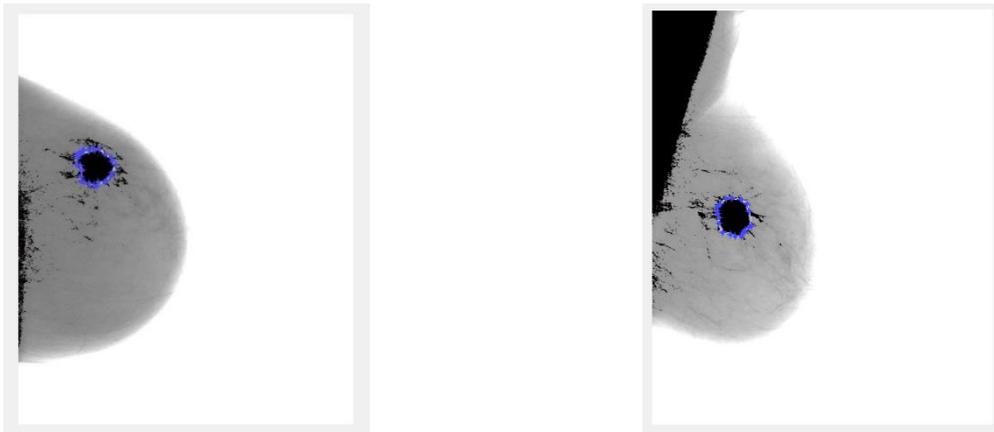


Figure 1: CC & MLO view images with selected tumor

Out of total sample of 48 of patients, there were 28 benign tumor images and 20 malignant tumors.

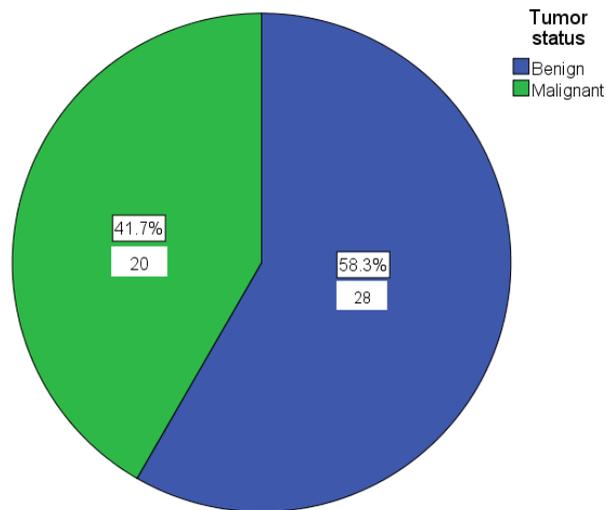


Figure 2: Distribution of tumor status of total sample population

Table 1: Descriptive statistics of the explanatory variables: Craniocauded view

	N	Range	Minimum	Maximum	Mean	Std. Deviation
pixel value of the tumor	48	2234.08	1249.28	3483.36	2458.53	412.13
pixel value of the breast	48	566.88	742.65	1309.54	1071.30	137.56
ratio of the pixel value	48	2.59	1.04	3.64	2.34	0.52
Thickness (mm)	48	54.00	25.00	79.00	42.69	10.68
Force	48	26.70	14.30	41.00	26.78	6.02
kVp	48	5.00	26.00	31.00	27.88	1.24
mAs	48	314.00	56.00	370.00	178.56	82.87
Age	48	48.00	28.00	76.00	54.92	10.64

Table 2: Descriptive statistics of the pixel value and the pixel value ratio of the benign and malignant tumors: CC view

	Conditions					
	Benign group			Malignant Group		
	Mean ± SD	(Min- Max)	Range	Mean ± SD	(Min- Max)	Range
Pixel value	2344.28 ±451.71	1249.28 - 3483.36	2234.08	2618.33 ±290.03	2067.49 - 2985.27	917.78
Ratio of the pixel value	2.24 ±.55	1.04 - 3.04	1.99	2.48 ±.45	1.83 - 3.64	1.8

Table 3: Summary of independent t-test-CC view

	t-test for equality of means						
	t	df	Sig.(2-tailed)	Mean difference	Std.error difference	95% confidence interval of the difference	
						Lower	Upper
Pixel value of the tumor	-2.380	46	0.021	-273.950	115.080	-505.609	-42.303
Ratio of the pixel value	-1.587	46	0.119	-.238	0.150	-0.540	0.064

Mean pixel value of the tumor in benign group was 2344.38 and range was 2234.08. Mean pixel value of the tumor in malignant group was 2618.33 and range was 917.78 (table 2). Mean value of the tumor in malignant group was higher than that of the benign group. Since P value was 0.021 for the pixel value of the tumor (P<0.05) which indicate there was significant difference in pixel value of the tumor between benign and malignant group for CC view.

When compared ratio of the pixel value in benign and malignant group P value was 0.119 (P>0.05) which indicate there was no significant difference of ratio of the pixel value between benign and malignant group for CC view.

Below scatter plots were created to see the distribution of pixel value of the tumor and pixel value ratio of the tumor with age of the patient and thickness of the breast in CC view.

Table 4: Descriptive statistics of the explanatory variables: MLO view

	N	Range	Minimum	Maximum	Mean	Std. Deviation
pixel value of the tumor	48	1904.87	1288.48	3193.35	2424.64	400.56
pixel value of the breast	48	475.51	889.92	1365.43	1093.27	119.61
ratio of the pixel value	48	1.93	1.26	3.19	2.24	0.46
Thickness (mm)	48	52.00	35.00	87.00	53.96	10.45
Force	48	22.9	17.0	39.9	28.90	5.92
kVp	48	8.00	25.00	33.00	29.46	1.79
mAs	48	378.00	81.00	459.00	264.88	121.19
Age	48	48.00	28.00	76.00	54.92	10.64

Table 5: Descriptive statistics of the pixel value and the pixel value ratio of the benign and malignant tumors: MLO view

	Conditions					
	Benign group			Malignant Group		
	Mean ± SD	(Min- Max)	Range	Mean ± SD	(Min- Max)	Range
Pixel value	2322.21 ±80.58	1288.48 - 3125.84	1837.36	2568.05 ±71.21	2102.77 – 3193.35	1090.58
Ratio of the pixel value	2.21 ±.09	1.26 - 3.19	1.93	2.28 ±.08	1.68 - 3.14	1.45

Table 6: Summary of independent t-test-MLO view

	t-test for equality of means						
	t	df	Sig.(2-tailed)	Mean difference	Std.error difference	95% confidence interval of the difference	
						Lower	Upper
Pixel value of the tumor	-2.178	46	0.035	-245.84	112.86	-473.028	-18.659

Ratio of the pixel value (Equal variances not assumed)	-0.554	45.989	0.582	-0.071	0.128	-0.330	0.187
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Mean pixel value of the tumor in benign group was 2322.21 and range was 1837.36. Mean pixel value of the tumor in malignant group was 2568.05 and range was 1090.58. (table 5) Mean value of the tumor in malignant group was higher than that of the benign group. Since P value was 0.035 for the pixel value of the tumor ($P < 0.05$) which indicate there was significant difference in pixel value of the tumor between benign and malignant group for MLO view.

When compared ratio of the pixel value in benign and malignant group P value was 0.582 ($P > 0.05$) which indicate there was no significant difference of ratio of the pixel value between benign and malignant group for MLO view.

Table 7: Classification results-CC view

Original	Tumor status	Predicted group membership		Total
		Benign	Malignant	
Count	Benign	22	6	28
	Malignant	11	9	20
%	Benign	78.6	21.4	100.0
	Malignant	55.0	45.0	100.0

According to the classification results sensitivity was 45.0% and specificity was 78.6% for CC view

Table 8: Classification results for MLO view

Original	Tumor status	Predicted group membership		Total
		Benign	Malignant	
Count	Benign	22	6	28
	Malignant	9	11	20
%	Benign	78.6	21.4	100.0
	Malignant	45.0	55.0	100.0

According to the classification results sensitivity was 55.0% and specificity was 78.6% for MLO view.

IV. CONCLUSION

The study concluded that quantitative analysis of the pixel value of the tumor is a reliable technique for differential diagnosis of benign and malignant tumor while ratio of the pixel value between tumor and normal breast area not improve the diagnostic performance.

This quantitative measuring of pixel value within the tumor can be used to confirm the radiologist's decision when difficult to diagnose the patient's tumor condition.

Sensitivity was less in CC than MLO images. Therefore less percentage of false negative was reported in MLO view images. Specificity was high in both CC and MLO view images. Therefore few percentage of false positive was reported.

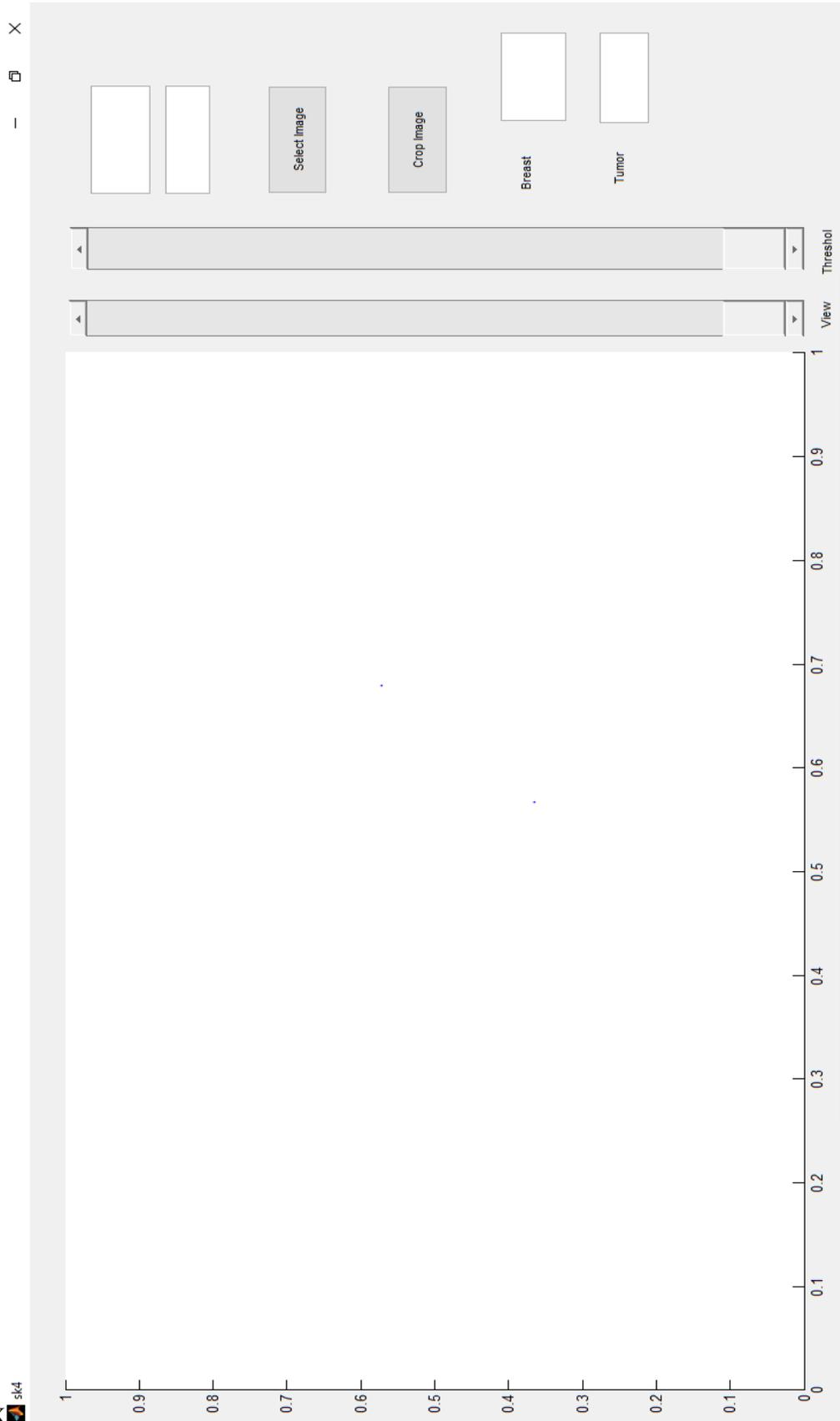


Figure 3: Customized MATLAB application to obtain pixel value

VI. ACKNOWLEDGMENT

I would like to express my deepest gratitude to my supervisor in this study Dr. Janaka P Wansapura, Senior lecturer, Department of Physics, University of Colombo, for accepting me as his student and for his valuable advice, encouragement and guidance throughout my project.

It is my utmost duty to extend my heartiest thanks and gratitude to my Co Supervisor Dr. Gayani Senanayake Senior lecturer, Department of pre-clinical sciences, Faculty of Medicine, General Sir John Kotelawala Defence University for her tremendous dedication, interest and guidance for this research work throughout the study.

My sincere thanks to director, Radiology manager, chief Radiographer and radiographers in mammography unit of data collected hospital for granting permission to carry out this research project.

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Association Between Body Mass Index (BMI) And Histopathologic Grade Of Endometrioid Endometrial Carcinoma (EEC)

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DOI: 10.29322/IJSRP.9.08.2019.p9258
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9258>

Abstract- Endometrioid Endometrial Carcinoma (EEC) is one of the malignant primary epithelial tumors in the endometrium, a glandular neoplasm that shows acinar, papillary or partially dense configuration and potentially affects the myometrium. Histopathological grading is based on the degree of structural differentiation and cell atypia. BMI is a body mass index calculated by comparing body weight with height, calculated by dividing body weight in kilograms with height in meters squared. The exact cause of EEC is unknown, most of the EEC cases associated with endometrial exposure to chronic estrogen stimulation will cause excessive proliferation resulting in endometrial hyperplasia which is a precursor to the occurrence of EEC. This study used endometrial tissue samples to assess the relationship BMI and histopathological grading of EEC. As many as 31 paraffin blocks fixed by formalin from EEC patients were examined and assessed for histopathological grading. The basic characteristics of the sample are obtained through medical records or pathology archives. the relationship between BMI and histopathological grading EEC was analyzed using SPSS version 22. The results of the analysis showed that there was no significant relationship between BMI and histopathological grading of EEC ($p > 0.05$).

Index Terms- Endometrioid Endometrial Carcinoma (EEC), Body Mass Index (BMI), Grading histopathology

I. INTRODUCTION

Endometrial carcinoma is the most common carcinoma of the female reproductive tract in developed countries and is the third most common cause of death in carcinoma in women. In 2012, endometrial carcinoma occurred in 320,000 women and caused 76,000 deaths worldwide.¹ In developed countries, 75% of cases of endometrial carcinoma occur in patients around 60 years of age during the post-menopausal period, so the most common symptom is post-bleeding menopause. Evidence about the relationship between the Body Mass Index (BMI) is high, and the risk of endometrial cancer, including subtypes in Asian populations is still limited. In Indonesia, the latest study found the prevalence of endometrial carcinoma in Cipto Mangunkusumo Hospital (RSCM) Jakarta reached 7.2 cases per year. The age of patients tends to be younger, which is as much as 63.9% at the age of ≥ 50 years and as much as 12.5% at the age

of ≤ 40 years. The most common type based on histopathology type is endometrioid endometrial carcinoma (EEC) of around 75-80%, serous papillary carcinoma 5-10% and clear cell carcinoma 3-5%. Serous papillary carcinoma and clear cell carcinoma are aggressive types.^{2,3,4,5}

Excess Estrogen is allegedly the cause of endometrial carcinoma. Ovaries produce and release estrogen, but fat tissue also has the power to convert some hormones into estrogen. The more fat tissue, the more hormones that are converted to estrogen, increasing estrogen levels in women and at the risk of EEC.⁶

Some experts argue, there is a correlation between weight gain and EEC events. According to Arem, et al. (2013) there may be an association of obesity with the risk of EEC and women with EEC with normal weight may have better survival than obesity.^{7,8}

BMI is a measure of weight adjusted for height, calculated as weight in kilograms divided by square of height in meters (kg / m^2). Research has shown that BMI levels correlate with body fat and with future health risks. High BMI predicts future morbidity and mortality. Therefore, BMI is the right measure for obesity screening and its health risks.⁹

Some studies suggest that increasing weight and obesity can increase the risk of EEC. The risk was greatest in women who had a $\geq 35\%$ increase in normal BMI or women who averaged $\geq 1\%$ increase in normal BMI during the period from the age of 21 years. In Japanese and Americans, a 5% increase in normal BMI increases the risk of EEC.¹⁰

Differentiation of malignancy for EEC according to the World Health Organization (WHO) is made based on structural histopathology and cell atypia. These grading are grouped according to the degree of differentiation of the EEC seen from the growth patterns of non-squamous or non-morula shapes. Core grades are determined by variations in the size and shape of the nucleus, chromatin distribution, and size of nucleoli.¹¹

II. MATERIAL AND METHODS

Sample selection

This study was conducted in a cross-sectional manner in the Anatomy Pathology Department, Medan H. Adam Malik General Hospital and included 31 EEC cases, which aimed to assess

whether there was a relationship between BMI and EEC histopathological grading. All samples are obtained through surgical procedures. The inclusion criteria were EEC cases with adequate clinical data, fixed tissue blocks with undamaged formalin-fixed with adequate tumor tissue. Detailed clinical data obtained from medical records or pathology records consisting of age, and BMI status or body weight and height, can then be calculated the number of BMI of these patients. Histopathological grading was determined independently by the researchers through a slide examination of hematoxylin and eosin.

Body Mass Index (BMI)

BMI is a body mass index calculated by comparing body weight with height, calculated by dividing body weight in kilograms with height in meters squared.

$$BMI = \frac{\text{Weight Loss (Kilograms)}}{\text{Body Height (Meter)}^2}$$

BMI Category

BMI	Weight Status
< 18.5	Underweight
18.5 – 24.9	Normoweight
25.0 – 29.9	Overweight
30.0 and above	Obesity

Grading

Histopathological grading is based on the degree of structural differentiation and cell atypia.¹⁵ This grading is grouped according to the degree of differentiation of EEC seen from the following non-squamous or non-morula solid growth patterns as follows: GI (5% or less), G-II (6 -50%), G-III (> 50%). The core grade is determined by variations in core size and shape, chromatin distribution, and nucleoli size. The grade-I core is oval, slightly enlarged, and has evenly spread chromatin. The grade-III nucleus showed a striking and pleomorphic enlargement, with irregular coarse chromatin and a prominent eosinophilic nucleoli. Grade-II core images between grade-I and grade-III. Mitotic activity is an independent variable but generally increases with an increase in core grade.^{11,12,13,14,15,16}

Statistical analysis

Statistical analysis was carried out using the SPSS version 22.0 software package (SPSS Inc., Chicago) with 95% confidence intervals and Microsoft Excel 2010. Variable categories were presented in frequency and percentage. The Kruskal-Wallis test was applied to find the relationship between BMI and EEC histopathology grading. P values> 0.05 were considered insignificant.

III. RESULT

The average age for Endometrioid Endometrial Carcinoma (EEC) patients is 53.4 (± 14.1) with the youngest patients aged 21-26 as many as 1 case (3.2%) and the oldest age is the 81-86 age group year with a total sample of 1 case (3.2%), and the age of most patients was in the age group 51-56 years with a total

sample of 9 cases (29.0%). Characteristics based on EEC patient age are summarized in table 1.

Table 1. Characteristics of EEC patients based on age

BMI	Number of cases	Percentage (%)
Age, mean ± SD, years	53,4 ± 14,1	
21 – 26	1	3,2
27 - 32	2	6,5
33 – 38	1	3,2
39 – 44	2	6,5
45 – 50	6	19,3
51 – 56	9	29,0
57 – 62	2	6,5
63 – 68	2	6,5
69 – 74	4	12,9
75 – 80	1	3,2
81 - 86	1	3,2
total	31	100

Frequency distribution of EEC patients based on histopathological grading obtained data on frequency of EEC patients with histopathological grading of Grade I were 14 people (45.2%), Grade II was 8 people (25.8%), and Grade III was 9 people (29.0%) shown in table 2.

Table 2. Grading of EEC patients histopathology.

Grading	Total (n)	Percentage (%)
Grade I	14	45,2
Grade II	8	25,8
Grade III	9	29,0
total	31	100

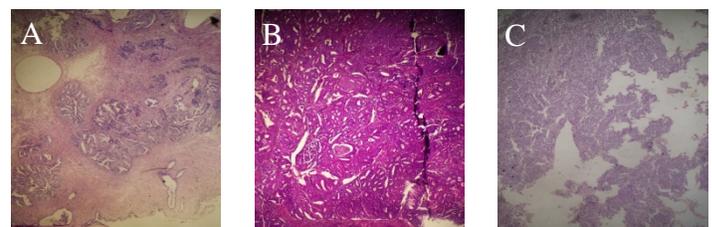


Figure 1. EEC A. Gr I, B. Gr II, C. Gr III

Characteristics of EEC patients based on the BMI category in EEC patients obtained data namely underweight with the number of 2 people (6.5%), normoweight as many as 15 people (48.4%), overweight as many as 8 people (25.8%), and obesity as many as 6 people (19.3%) listed in table 3.

Table 3. BMI category in EEC patients

BMI	Total (n)	Percentage (%)
Underweight	2	6,5
Normoweight	15	48,4
Overweight	8	25,8
Obesity	6	19,3
total	31	100

Based on the WHO classification, EEC consists of grade I, grade II and grade III. And BMI consists of 4 categories of underweight, normoweight, overweight and obesity. The frequency distribution of all EEC patients based on BMI and histopathological grading can be seen in table 4.

Table 4. BMI Distribution Based on Patients Grading

No	BMI	Grading						P-value*
		Grade 1		Grade 2		Grade 3		
		n	%	n	%	n	%	
1.	Underweight	1	50,0	1	50,0	0	0	0,563
2.	Normoweight	5	33,3	4	26,7	6	40,0	
3.	Overweight	4	50,0	2	25,0	2	25,0	
4.	Obesity	4	66,6	1	16,7	1	16,7	

*p>0,005

Based on table 4, it is stated that patients with underweight category have 1 case (50.0%) in grade 1 histopathological grading and 1 case (50.0%) in grade 2 and not even 1 case (0%) in grade 3. Furthermore in the normoweight category, there were 5 cases (33.3%) in grade 1 and 4 cases of histopathology grading (26.7%) in grade 2 and found 6 cases (40.0%) grade 3. While in the overweight category, there were 4 cases (50.0%) in grade 1 and 2 cases of histopathology grading (25.0%) in grade 2 and found 2 cases (25.0%) grade 3. And in the obesity category, there were 4 cases (66.6%) in grade 1 histopathology grading, 1 case (16.7%) in grade 2 and 1 case (16.7%) in grade 3. But the results of the analysis of the relationship between BMI and histopathological grading of EEC patients in this study obtained p-value = 0.563 (p> 0.05) which showed no significant relationship.

IV. DISCUSSION

EEC is a malignant primary epithelial tumor in the endometrium, a glandular neoplasm that shows acinar, papillary or partially dense configurations and potentially regarding myometrium.¹⁷ Most cases of EEC are often associated with endometrial exposure to estrogen stimulation. In this study it was found from 31 samples of EEC patients that many occurred in the age range of 51 - 56 years (29.0%). This situation is in accordance with Sofian A (2010) study where the age of EEC patients at the age of ≥50 years.³ While in the Nevadunsky NS (2014) study, the results of the study showed that the average age of patients with EEC was 67.1 years with a standard deviation of ± 11.9 years.¹⁸

From this study also found that the highest rate of EEC patients was grade I as many as 14 people (45.2%). This is in accordance with the study of Nevadunsky NS (2014) which also stated that the highest number of EEC patients was grade I as many as 380 people (64.3%)¹⁸. While in the study of O.G. Trifanescu found the highest number of EEC patients in grade III histopathology.¹⁹

Characteristics of EEC patients based on the BMI category in EEC patients from this study, found the normoweight category as the highest number with 15 people (48.4%). While in the study

of Nevadunsky NS (2014) the highest number was in the category of obesity (66.3%).¹⁷

Some experts argue, there is a relationship of weight gain with the EEC event where excess estrogen is allegedly the cause. This excess produced estrogen will be stored cumulatively, considered to increase the risk of EEC.²¹ Various factors known to affect EEC development include (1) obesity, (2) diabetes, (3) hypertension, (4) infertility, and (5) exposure against unopposed estrogen (estrogen used in replacement / estrogen therapy without progestin administration to prevent side effects). Prolonged estrogen replacement therapy and ovarian tumors that secrete estrogen increase the risk of endometrioid endometrial carcinoma.

The relationship between BMI and histopathological grading of EEC patients in this study found that the category of obesity with grade I histopathology grading was the highest incidence (66.6%). This is in accordance with the results of the Nevadunsky NS (2014) study which also obtained the category of obesity with grade I histology grading as the highest incidence (60.9%) 30. But the results of the analysis of the relationship between BMI and histopathological grading of EEC patients in this study obtained p-value = 0.563 (p> 0.05) which showed no significant relationship. This may be the data of BMI or body weight and height of the patients who came to RSUP HAM Medan, assessed at the same time. While the possibility of patients suffering from EEC has occurred long before the patient came to RSUP HAM Medan.

But from this study there is an interesting one although statistically the relationship between BMI and EEC histopathology grading is not significant. The consistency of the characteristics of overweight and obesity seems consistent in grade 1 with the highest incidence and decreasing with increasing histopathological grading of EEC. There is a tendency of overweight and obesity most often found in grade 1. While in grade 2 and grade 3 the incidence rate decreases. This may occur because of the patient's health condition which is decreasing due to the disease, or perhaps due to the patient's psychological state of the illness. Side effects of therapy also cannot be excluded as a cause of a decrease in the patient's BMI category along with the course of the disease.

V. CONCLUSION

There is no significant relationship between BMI and EEC histopathology grading.

COMPETING INTERESTS

The author has no financial interests relevant to the product or company described in this article.

ACKNOWLEDGMENT

We would like to thank all staff of the Anatomical Pathology Department, University of North Sumatra / H. Adam Malik Central General Hospital, Medan, Indonesia for all their assistance and cooperation.

ETHICAL APPROVAL

Health Research Ethical Committee, University of Sumatera Utara, Medan, Indonesia approved this study.

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Analysis of Gear Box Design in Head Stock for CNC Lathe Machine

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DOI: 10.29322/IJSRP.9.08.2019.p9259

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9259>

Abstract

The CNC Lathe machines are constructed base on conventional lathe machine. This paper is the conventional lathe can be modified to CNC lathe machine. For 2.5 m length conventional lathe machine to be CNC lathe machine, reassembling is done. With the dislodge parts of conventional lathe, some changes, substitutions and necessary parts construction is done to be CNC. For converting to CNC, some necessary parts for changes and substitutions fagor materials are used. Gear box design of the spindle unit in CNC lathe machine and design calculation of Gears and Shafts in Head Stock are expressed. This study is including Gear Train, Gear Design, Strength Check, Dynamic Check and Shaft design material.

Keyword; Gear Train, Gear Design, Strength Check, Dynamic Check, Shaft design

I. INTRODUCTION

A lathe is machine tool for producing cylindrical, conical and flat surfaces. It can be used for drilling and boring holes which may be cylindrical or conical shape.

In its operation the lathe holds a piece of material between two rigid supports called centers, or by some other device such as a chuck or face plate, screwed or secured to the nose or end of the spindle.

The tool post is supported on a cross-slide which moves perpendicular to the spindle axis whilst the cross-slide is integral with a carriage which slides along the bed of the lathe. The spindle axis is parallel with the slideways of the bed, so that movement of the carriage along the bed causes the tool to move parallel with the spindle axis.

The CNC system are constructed with an NC unit integrated with a programmable logic controller (PLC) and sometimes with an additional external PLC (non-integrated). The NC controls the spindle movement and the speeds and feeds in machining. It calculates the traversing paths of the axes as defined by inputs. The PLC controls the peripheral actuating elements of the machine such as solenoids, relay coils, etc. Working together, the NC and PLC enable the machine tool to operate automatically. Positioning and part accuracy depend on the CNC system's computer control algorithms, the system resolution and the basic mechanical machine inaccuracies.

By utilizing computers as an integral of the control system, modern manufacturing technique and industrial production become advanced and developed. Computer Numerical Control (CNC) is one of the major development in Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) technology. It is the process of manufacturing machine parts in a production environment to control and allocate by a computerized controller. Due to the digital technology used in such controller, the design of automation systems have more flexibility which is the keyword to characterize the manufacturing system. With the programs of computer technology and programming technique, CNC machines enable to automate the machining process with flexibility. This means capacity in a short time. As a consequence, CNC machines are economical for mass, batch and in many cases single-item production. It can provide the higher productivity rate, better quality, accuracy of manufactured parts and stabilization to produce complex or otherwise impossible jobs.

The main purpose of this study is to design a CNC lathe machine modified from a conventional lathe.

The carriage movements are made by hand wheel via a lead screw (ACME thread) in conventional lathe. Whereas these movements are driven by stepper motor in CNC lathe machine. These motor can be controlled for exact revolutions. And the ball screw is more efficient than ACME thread. The surface finish of CNC lathe is more precise than that of the conventional lathe and power losses is significantly decreased.

The gearing system and pulleys are required in conventional lathe to speed up and down the spindle of lathe. But in CNC lathe machine speed up and down can be adjusted by the voltage control of the spindle motor. So efficiency the process of increases because power transmission losses decreases.

The following figure (1) is Gear Trains in Head Stock at Conventional lathe machine. Gears arrangement and shafts rotation are shown in figure

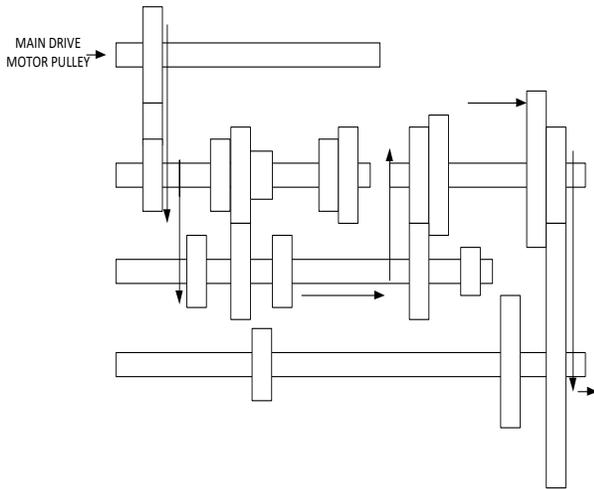


Figure (1) Gear Trains in Head Stock at Conventional Lathe

To get the desired three speed ranges gear trains in conventional lathe machine was changed, figure (2) is gear trains in Head Stock at CNC lathe machine.

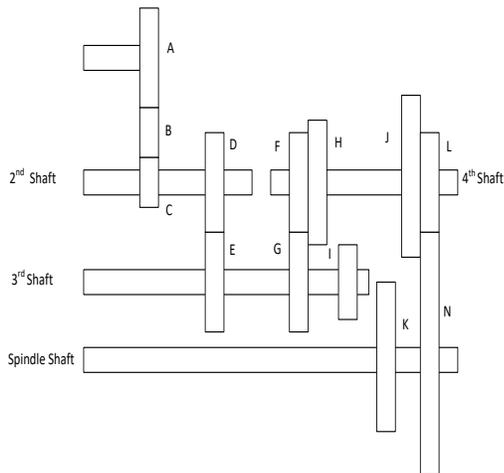


Figure (2) Gear Trains in Head Stock at CNC Lathe Machine

The desired three speed ranges are 0-100 RPM at low speed position, 0-500 RPM at middle speed position and 0-1500 RPM at high speed position

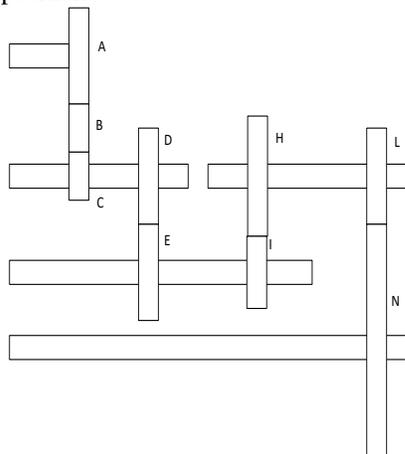


Figure (3) Gear Arrangement at 0-100 RPM

II. DESIGN CALCULATION OF GEAR TRAINS

Calculation of Input Shaft Speed
 For Gear Arrangement at 0-100 rpm
 Output speed of Spindle = 100 rpm

$$\text{Train Value, TV} = \frac{\text{Input speed}}{\text{Output speed}}$$

$$\begin{aligned} \text{TV} &= - \frac{N_B}{N_A} \times \frac{N_C}{N_B} \times \frac{N_E}{N_D} \times \frac{N_H}{N_I} \times \frac{N_N}{N_L} \\ &= - \frac{36}{50} \times \frac{36}{36} \times \frac{42}{42} \times \frac{68}{17} \times \frac{72}{18} \\ &= - 11.52 \\ &= 11.52 \text{ (opposite direction)} \end{aligned}$$

$$\begin{aligned} \text{Input Speed} &= \text{TV} \times \text{Output Speed} \\ &= 11.52 \times 100 \\ &= 1152 \text{ rpm} \end{aligned}$$

$$(\text{rpm})_A = (\text{rpm})_P = 1152 \text{ rpm}$$

$$\frac{(\text{rpm})_{\text{motor}}}{(\text{rpm})_{\text{pulley}}} = \frac{D_P}{D_m} \times \frac{(100 - s)}{100}$$

Slip (0-5 %)
 Maximum slip, $s = 5\%$

$$\begin{aligned} (\text{rpm})_{\text{motor}} &= 1152 \times 2 \times \frac{100 - 5}{100} \\ &= 2188.8 \text{ rpm} \\ &= 2189 \text{ rpm} \end{aligned}$$

The theoretical desired meter speed = 22189 rpm

Design Calculation of Spur Gear
 Pinion (B) on Idler Shaft and Gear (A) on 1st Shaft
 Input power = 10 kW (motor)
 Material = Cast Steel

$$\begin{aligned} S_o &= 140 \text{ MN/m}^2 \\ \text{BHN} &= 400 \\ E_p &= 200 \times 10^9 \text{ N/m}^2 \\ E_g &= 200 \times 10^9 \text{ N/m}^2 \\ C &= \text{precision cut} \\ (\text{rpm})_p &= 1600 \text{ rpm} \end{aligned}$$

$$\begin{aligned} \text{VR} &= 1.388 \\ N_p &= 36 \\ D_p &= 108 \text{ mm} \\ N_g &= 50 \\ D_g &= \frac{50}{36} \times 108 = 150 \text{ mm} \\ \frac{(\text{rpm})_p}{(\text{rpm})_g} &= \frac{1600}{(\text{rpm})_g} = \frac{50}{36} \\ (\text{rpm})_g &= 1152 \text{ rpm} \end{aligned}$$

Gear and pinion are same material.

Base design on pinion.

Strength Check

Known diameter case

$$\left[\frac{1}{m^2 y} \right]_{all} = \frac{S_{all} k \pi^2}{F_t}$$

$$V = \frac{\pi \times D_p \times (rpm)_p}{60} = \frac{\pi \times 0.108 \times 1600}{60}$$

$$= 9.048 \text{ m/s} < 10 \text{ m/s}$$

$$S_{all} = S_o \left[\frac{3}{3+V} \right]$$

$$= 140 \left[\frac{3}{3+9.048} \right] = 34.861 \text{ MN/m}^2$$

$$F_t = \frac{9550 \times kW}{(rpm)_p \times D_{p/2}} = \frac{9550 \times 10}{1600 \times \frac{0.108}{2}} = 1105.324 \text{ N}$$

Let $k_{(max)} = 4$

$$\left[\frac{1}{m^2 y} \right]_{all} = \frac{34.861 \times 4 \times \pi^2}{1105.324} = 1.245 \text{ MN/m}^2$$

Assume, $y = 0.1$

$$\left[\frac{1}{m^2 \times 0.1} \right] = 1.245 \times 10^6$$

$$m = 2.834 \text{ mm}$$

Standard module series, 1, 1.25, 1.5, 2, 2.5, 3, 4, 5, ...

Try, $m = 2.5$

$$N_p = \frac{108}{2.5} = 43.2 \neq \text{integer}$$

Try, $m = 3$

$$N_p = \frac{108}{3} = 36$$

$N_p = 36, y_p = 0.12$ (From form factor Table)

$$\left[\frac{1}{m^2 y} \right]_{indu} = \frac{1}{(0.003)^2 \times 0.12} = 0.926 \text{ MN/m}^2$$

$$\left[\frac{1}{m^2 y} \right]_{all} > \left[\frac{1}{m^2 y} \right]_{indu}$$

$$k_{redu} = k_{(max)} \times \frac{\left[\frac{1}{m^2 y} \right]_{indu}}{\left[\frac{1}{m^2 y} \right]_{all}}$$

Design Satisfactory
Choose, $m = 3$

$$= 4 \times \frac{0.926}{1.254} = 2.975$$

$$\text{face width, } b = k_{redu} \times \pi \times m$$

$$= 2.975 \times \pi \times 3$$

$$= 28 \text{ mm}$$

Dynamic Check

Endurance Force

$$F_o = S_o \text{ by } \pi m$$

$$= 140 \times 10^6 \times 0.028 \times 0.12 \times \pi \times 0.003$$

$$= 4433 \text{ N}$$

$m = 3$, Tooth Error = 0.01

$C = 114$ (from Table 4.2)

Dynamic Force

$$F_d = F_t + \frac{21V(bC + F_t)}{21V + \sqrt{bC + F_t}}$$

$$= 1105.324 + \frac{21 \times 9.048(0.028 \times 114 + 1105.324)}{21 \times 9.048 + \sqrt{0.028 \times 114 + 1105.324}}$$

$$= 2048.560 \text{ N}$$

Wear Force,

$F_w = D_p b K Q$

$$Q = \frac{2N_g}{N_g + N_p} = \frac{2 \times 50}{50 + 36} = 1.163$$

$$S_{es} = [2.75(\text{BHN}) - 70] \text{ MN/m}^2$$

$$= [2.75(400) - 70] = 1030 \text{ MN/m}^2$$

$$K = \frac{S_{es}^2 \sin \phi \left[\frac{1}{E_p} + \frac{1}{E_g} \right]}{1.4}$$

$$= \frac{(1030 \times 10^6)^2 \sin 20^\circ \left[\frac{2}{200 \times 10^9} \right]}{1.4}$$

$$= 2591.779 \text{ kN/m}^2$$

$$F_w = 0.108 \times 0.028 \times 2591.779 \times 10^3 \times 1.163$$

$$= 9115.059 \text{ N}$$

$F_o > F_d, F_w > F_d$

\therefore Design is Satisfactory.

III. DESIGN CALCULATION OF SHAFTS FOR GEAR ARRANGEMENT AT 0-100 RPM

2nd Shaft

$D_c = 108 \text{ mm}, D_D = 126 \text{ mm}$

$(rpm)_c = 1600 \text{ rpm}$

Power = 10 kW

$$M_t = \frac{9550 \times kW}{rpm} = \frac{9550 \times 10}{1600} = 59.688 \text{ Nm}$$

$$F_{t1} = 1105.33 \text{ N}, F_{r1} = F_{t1} \tan 20^\circ = 402.307 \text{ N}$$

$$F_{t2} = 947.429 \text{ N}, F_{r2} = F_{t2} \tan 20^\circ = 344.836 \text{ N}$$

From HLD

Taking moment about R_1 ,

$$\sum M_{R_1} = 0 [\downarrow +]$$

$$-R_2 \times 0.3335 + 947.429 \times 0.139 + 1105.33 \times 0.05 = 0$$

$$R_2 = 560.597 \text{ N}$$

$$[\sum F_y \uparrow = 0]$$

$$R_1 + R_2 - 947.429 - 1105.33 = 0$$

$$R_1 = 1492.162 \text{ N}$$

From H.B.M.D

$$M_1 = 1492.162 \times 0.05 = 74.608 \text{ Nm}$$

$$M_2 = 560.597 \times 0.1945 = 109.036 \text{ Nm}$$

From VLD

Taking moment about R_3

$$\sum M_{R_3} = 0 [\leftarrow +]$$

$$R_4 \times 0.3335 - 344.836 \times 0.139 + 402.307 \times 0.05 = 0$$

$$R_3 = 140.88 \text{ N}$$

From V.B.M.D

$$M_3 = 140.88 \times 0.05 = 7.044 \text{ Nm}$$

$$M_4 = 83.409 \times 0.1945 = 16.223 \text{ Nm}$$

$$M_{R_1} = \sqrt{M_1^2 + M_3^2} = 74.939 \text{ Nm}$$

$$M_{R_2} = \sqrt{M_2^2 + M_4^2} = 110.236 \text{ Nm}$$

$$k_b = 1.5, k_t = 1$$

$$\text{Max : } M_b = 110.236 \text{ Nm}$$

$$S_s = 40 \text{ MN/m}^2$$

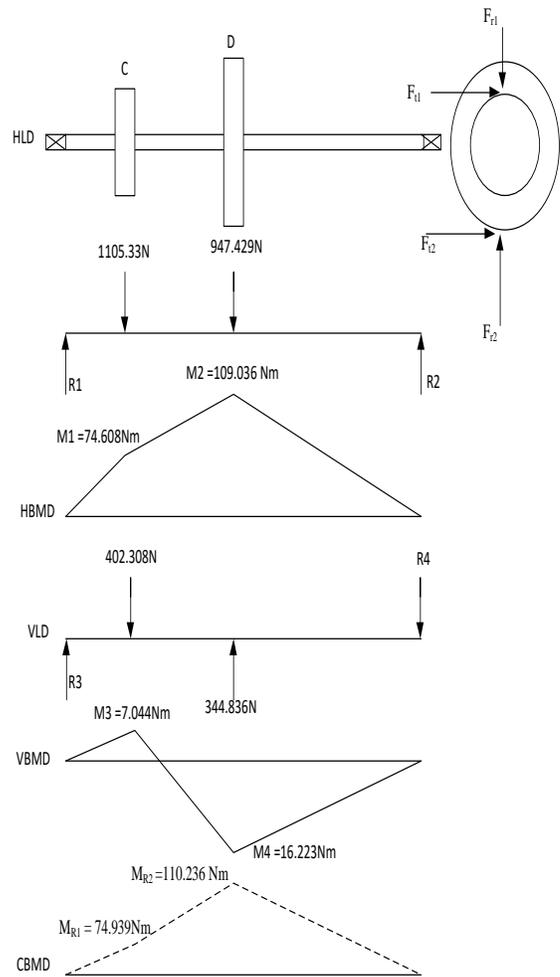
$$d^3 = \frac{16}{\pi S_s} \sqrt{(k_b M_b)^2 + (k_t M_t)^2}$$

$$= \frac{16}{\pi \times 40 \times 10^6} \sqrt{(1.5 \times 110.236)^2 + (1 \times 59.688)^2}$$

$$d^3 = 0.02818 \text{ m}$$

$$= 28.18 \text{ mm}$$

$$\text{Std, } d = 29 \text{ mm}$$



Fig(4) Bending Moment diagram

Table.1 Results of Spur Gear Design

Detail	GearA	GearB	GearC	GearD	GearE
Type	Spur	Spur	Spur	Spur	Spur
Material	Cast Steel				
S_o	140 MN/m ²				
BHN	400	400	400	400	400
Diameter	150 mm	108 mm	108 mm	126 mm	126 mm
ϕ	20 Full Depth				
V.R	1.388	1	1	1	1
R.P.M	1152	1600	1600	1600	1600
Type of Cut	Precision cut	Precision cut	Precision cut	Precision cut	Precision cut

Table.2 Results of Spur Gear Design

Detail	Gear H	Gear I	Gear L	Gear N
Type	Spur	Spur	Spur	Spur

Material	Cast Steel	Cast Steel	Cast Steel	Cast Steel
S _o	140 MN/m ²	140 MN/m ²	140 MN/m ²	140 MN/m ²
BHN	400	400	400	400
Diameter	204 mm	51 mm	72 mm	288 mm
φ	20 Stub	20 Stub	20 Stub	20 Stub
V.R	4	4	4	4
R.P.M	400	1600	400	100
Type	Precision cut	Precision cut	Precision cut	Precision cut

	steel			
Ss (MN/m ²)	40	40	40	40
RPM	1600	1600	400	100
Diameter (mm)	29 mm	27 mm	47 mm	d _i = 71 mm d _o = 91 mm
Length (mm)	333.5 mm	515.5 mm	377.5 mm	865 mm

Table. 3 Strength Check in Gear Design

	b	m	(1/m ² y) _{all}	(1/m ² y) _{in du}	No. of teeth	
					Pinion	Gear
1 st gear (A,B)	28 mm	3	1.245 MN/m ²	0.926 MN/m ²	36	50
2 nd gear (B,C)	28 mm	3	1.245 MN/m ²	0.926 MN/m ²	36	36
3 rd gear (D,E)	16 mm	3	2.114 MN/m ²	0.887 MN/m ²	42	42
4 th gear (H,I)	37 mm	3	0.974 MN/m ²	0.949 MN/m ²	17	68
5 th gear (L,N)	47 mm	4	0.555 MN/m ²	0.521 MN/m ²	18	72

Table.4 Dynamic Check in Gear Design

	F _o	F _w	F _d
1 st gear	4433.416 N	9115.059 N	2048.560
2 nd gear	4433.416 N	9115.059 N	2048.560
3 rd gear	2638.938 N	5225.026 N	1780.833 N
4 th gear	5711.981 N	7825.099 N	3863.798 N
5 th gear	9922.406 N	14032.92 N	8490.313 N

Table.5 Results of Shafts Design

Type of Shaft	2 nd Shaft	3 rd Shaft	4 th Shaft	Spindle shaft
Material	Commerci al	Comm ercial steel	Comm ercial steel	Commer cial steel

IV.CONCLUSION

The main aim of this paper is to help in reassembling from conventional lathe machine to CNC lathe Machine. The modified CNC Lathe was fabricated by using 2.5 meter local conventional lathe machine. The modified machine is made of parts, such as ballscrew, servomotor and computer. In this paper, my portion is Design Calculation of Gear that is arranged to transfer the ranges of spindle. There were 18 ranges in the lathe deal with. But in CNC Lathe, there are only three wide ranges. The three speed ranges in CNC are low speed position 0-100 rpm and, middle speed position 0-500 rpm and high speed position 0-1500 rpm. In figure (1), it is the gear arrangement of Head Stock in Conventional Lathe Machine and in figure (2), it is transferring for Gear Arrangement of CNC Lathe Machine. In this paper, the calculation on appropriate diameter of Shafts and Gears design has been made.

The required design calculation of Spur Gears can be calculated through both Strength and Dynamic check and it involves many steps. In design calculation of shaft, it requires rotational speed of shaft must be known. The ASME Code Equation is used to calculate the design of shafts. In this paper, design calculation results for gear and shaft are satisfied machine design. The results of gears and shafts are described with tables.

ACKNOWLEDGMENT

We would like to sincerely acknowledge the encourageous efforts of our department of mechanical engineering, Technological University (Mawlamyine). I wish to express my sincere thanks to all my friends for their goodwill and constructive ideas.

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Plant Shaded Area: A Nice Place To Stay?

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DOI: 10.29322/IJSRP.9.08.2019.p9260

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9260>

Abstract- Plants have evolved on the earth' surface together with human beings, and then they depend on each other like a friend. Plants produce many different types of sunscreens. Some of these are physical sunscreens (trichomes) to reflect UV-B and some are chemical sunscreens (anthocyanins) to absorb UV-B. The high level UV radiation can increase trichome density and anthocyanin content. On the other hand, plants' leaves in the high level UV radiation have high concentration of absorbing pigments. In this work, the absorbance spectra and the light harvesting efficiency (LHE%) of absorbing pigments extracted from the leaves of pink-flowered rain tree (*Samanea saman*) at sea level and at 1200 m above sea level, have been studied by UV-VIS spectroscopy to protect the effects of UV attack. According to the absorbance spectra, two plants can absorb nearly 100% of UV-A and UV-B, and the absorbing species in higher elevation plants are more concentrated than that in lower elevation plants.

Index Terms- absorbance, LHE%, sinapoyl malate, sunscreen, UVR8

1. INTRODUCTION

Plants need to protect themselves from damaging ultraviolet rays because they bask in the sun for several hours in a day. While they absorb light for photosynthesis, many plants use a group of chemicals called sinapate esters to defend against the sun. These aromatic compounds sit in the upper cell layers of the plants' leaves. One type of these compounds is sinapoyl malate which provides the bulk of the UV protection. On the other hand, they filter out the entire spectrum of ultraviolet-B radiation, known to damage plants and human DNA. The range of UV wavelengths blocked by sinapoyl malate is the same as those that

damage human tissues. And then there is the relation between leaf thickness and UV-B absorbing pigments of plants with an elevation gradient. Terrestrial plant species vary widely in their adaptation to solar UV-B radiation. The various responses of plants in higher position to enhanced UV-B protection are increasing leaf thickness and increasing concentrations of UV-B absorbing compounds^[4].

Electromagnetic radiation is broadly divided into infrared radiation (IR), visible light (VIS), and ultraviolet radiation (UV). Heat is part of IR radiation, which is not visible to the human eye. VIS is the wavelength range of general illumination. UV radiation is also divided into three distinct bands in order of decreasing wavelength and increasing energy: UV-A (315~400 nm), UV-B (280~315 nm), and UV-C (100~280 nm). Different wavelengths and energies associated with UV subdivision correspond to distinctly different effects on living tissue. The wavelengths and the photon energies of UV-A, UV-B and UV-C are listed in Table 1.1.

Table 1.1 Wavelength and Energy of UV spectra

Spectrum	Wavelength(nm)	Energy(eV)
UV-A	400~315	3~3.9
UV-B	315~280	3.9~4.4
UV-C	280~100	4.4~12.3

The amount of solar UV-A and UV-B reaching the earth's surface is affected by latitude, altitude, season, time of the day, cloudiness, and ozone layer. The highest irradiance is at the higher elevations and the equator. UV radiation is strongest between 10 am and 4 pm. During a sunny day, the UV spectrum

that reaches the earth's surface consists of 3.5% UV-B and 96.5% of UV-A. UVB is primarily associated with erythema and sunburn. It can cause immunosuppression and photocarcinogenesis^[3].

The unfiltered UV radiations have been prevented by ozone layer (O₃) for living things and non-living things. The thickness of ozone layer (about 3 mm at STP) varies seasonally and geographically. Every 0.01 mm thickness of the layer is equal to one Dobson Unit (1 DU). The average amount of ozone in the stratosphere layer across the globe is about 300 DU or thickness of only 3 mm at STP. Ozone layer cannot absolutely absorb UV-A, but it can absorb all of UV-C and most of UV-B. So, most UV-A and less UV-B can reach on the earth's surface, shown in Fig 1.1. The decrease of thickness of ozone layer or its depletion can cause the problems for human beings and living things due to the falling of the intense unfiltered UV radiation. UV-B can cause the burn of the skin, the skin cancer and the damage of cornea. The ozone layer is now still being damaged by the CFC emission. CFC is man-made chemical that contains chlorine, fluorine and carbon. When the chlorine and bromine react with ozone layer, the fission of O₃ causes ozone layer depletion. The substances that decrease the thickness of ozone layer are called Ozone Depleting Substances (ODS): Chlorofluoro carbon (CFC). So, everybody should avoid outdoor exposure from 10 am to 4 pm. World Health Organization and World Meteorological Organization provide the UV Index, shown in Table 1.2, for every day to the public. UV Index reading of 0 to 2 means low danger from the sun's UV rays for the average person. Index of 3 to 5 causes moderate risk of harm from unprotected sun exposure and 6 to 7 of UV Index is high risk of harm. At this time, protection against skin and eye damage is needed. UV Index of 8 to 10 means very high risk of harm. People need to take extra precautions because unprotected skin and eyes will be damaged and can burn quickly. 11 or more means extreme risk of harm from unprotected sun exposure. All precautions must be done because unprotected skin and eyes can burn within a few minutes^[6].

According to the literature, plants' leaves can prevent the UV attack although the ozone layer is still damaged by CFC emission. Plants sense UV light through specific UV photo-receptors called UV Resistance Locus 8 (UVR8). It is important for a plant to be able to sense UV wavelengths because they can cause damage to DNA. Upon sensing UV light, UVR8 photo-receptors send signals to other parts of the plant that causes changes in growth and development. The plant will begin to make DNA repair enzymes for fixing damaged DNA and "sunscreen" for preventing more damage. Together, these protective mechanisms prevent further damage to plant cells.

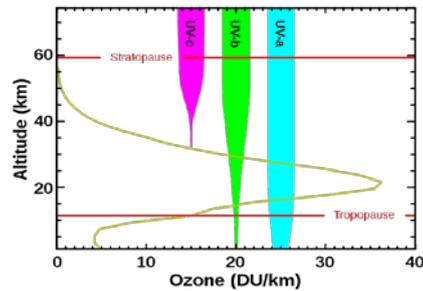


Fig 1.1 UV protection of ozone layer

There are many UV photo-receptors in the plants' leaves such as UVR8 for UV-B and cryptochrome for UV-A. The absorption of these rays by UVR8 induces physiological responses that enable the plant to acclimatize and survive. Indeed, plants produce enzymes that repair damage caused to DNA during sun exposure, as well as powerful antioxidants that neutralize free radicals produced by the action of UV. UVR8 receptors accumulate within the cell nucleus and participate in a cascade of biochemical reactions. UVR8 receptors are ultrafast photoprotecting sunscreens in natural plants. The response of UVR8 with UV-B by trans-cis photoisomerization is shown in Fig 1.2^[5].

Table 1.2 UV Index

UV INDEX	DANGER CATEGORY
11+	Extreme
8 to 10	Very High
6 to 7	High
3 to 5	Moderate
1 to 2	Low

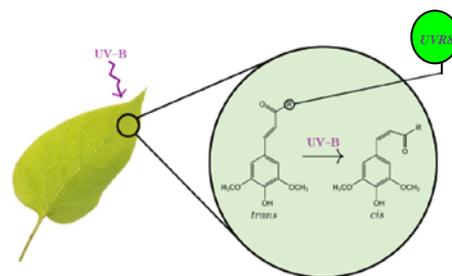


Fig 1.2 Response of UVR8 in plants'

In this work, the comparative study of optical properties of light absorbing pigments extracted from pink-flowered rain tree leaves at sea level and at 1200 m above sea level in Rakhine state, Myanmar, have been analyzed spectrophotometrically for the protection of UV attack. Fig 1.3 shows the electromagnetic spectrum of solar radiation with UV-A and UV-B^[7].

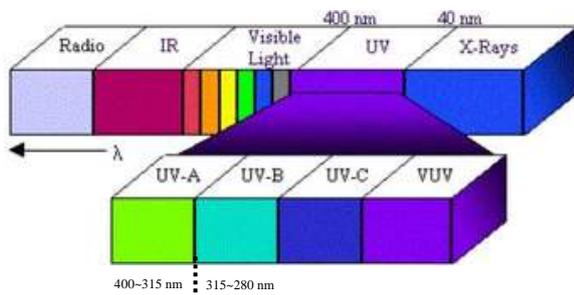


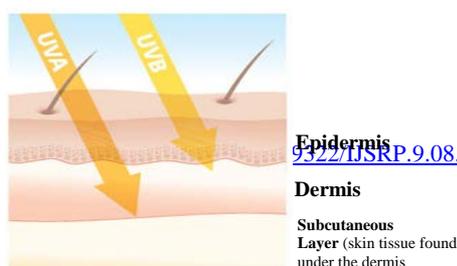
Fig 1.3 Electromagnetic spectrum

II. BACKGROUND THEORY

2.1. Classification of the Effects of Ultraviolet (UV) Radiation and UV-VIS spectroscopy

Ultraviolet (UV) radiation are classified into three groups according to their wavelength. They differ in their biological activity and the extent to which they can penetrate the skin. The shorter the wavelength, the more harmful the UV radiation. However, the shorter wavelength of UV radiation is less able to penetrate the skin. UV-C with the shortest wavelength is the most damaging type of UV radiation. But it is completely filtered by ozone layer and does not reach the earth's surface. UV-B is very biologically active but cannot penetrate beyond the superficial skin layers, shown in Fig 2.1. It is responsible for delayed tanning and burning. In addition to these short-term effects, it enhances skin ageing and significantly promotes the development of skin cancer. But most of UV-B are filtered by ozone layer.

As shown in Fig 2.1, UV-A can penetrate into the deeper layers of the skin and is responsible for the immediate tanning effect. Furthermore, it also contributes to skin ageing and wrinkling. For a long time it was thought that UV-A could not cause any lasting damage. Recent studies strongly suggest that it may also enhance the development of skin cancers^[1].



To protect UV attack, the materials used in UV protection have to be analyzed for the optical properties of these materials. The absorbance of a material is directly proportional to the path length of material and the concentration of the absorbing species in material. So, UV-VIS spectroscopy is also called the absorption spectroscopy in UV-VIS spectral region.

$$A = \epsilon c L = \log_{10} \frac{I_0}{I}$$

A = absorbance

ϵ = molar absorptivity or extinction coefficient

c = concentration of the absorbing species

L = path-length

I_0 = intensity of light before passing through the sample

I = intensity of light after passing through the sample

This is Beer-Lambert law for absorption spectroscopy. The light harvesting efficiency (LHE%) of absorbing pigments can be calculated by the below formula.

$$\%LHE = (1 - 10^{-A}) \times 100\%$$

LHE = light harvesting efficiency

A = absorbance

The materials with high energy UV photons absorption and broader absorption band should be selected as UV protectors. And then they need to have non-toxicity, good adhesion and stability to use in sunscreen.

III. EXPERIMENTAL SET-UP

3.1. Preparation and Characterization of Light Absorbing Pigments

The pink-flowered rain tree leaves, shown in Fig 3.1, were dried in air at first and cut into small pieces. And then they were pounded with motor and pestle. After that, the powder was mixed with ethanol for 24 h, in Fig 3.2(a). Before the UV measurement, the solution was made by using VOTEX-MIXER for more pigments extraction, in Fig 3.2(b) and was created to filter by TABLE TOP CENTRIFUGE, in Fig 3.2(c)^[2].



Fig 3.1 Leaves of pink-flowered rain tree

Fig 3.2 shows the pigment extracting process and the photograph of UV-1800 spectrophotometer, in Fig 3.2(d).

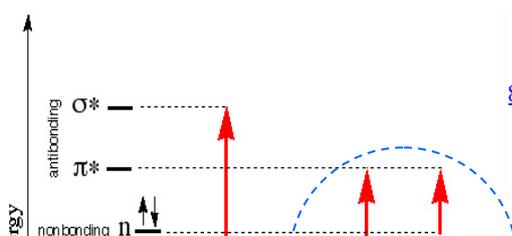


Fig 3.2 Preparation and characterization of UV-VIS spectrophotometry

3.2. Analysis of UV-VIS Spectroscopy

UV-1800 spectrophotometer is a double-beam instrument in which the light is split into two beams before it reaches the sample. One beam is used as the reference while other beam passes through the sample. The reference beam intensity is taken as 100% Transmittance (or 0 Absorbance), and the measurement is displayed in the ratio of the two beam intensities.

UV-VIS radiation interacts with the sample which causes electronic transitions (promotion of electrons from the ground state to the high energy excited state). The following electronic transitions are possible, shown in Fig 3.3: (i) $\pi \rightarrow \pi^*$, (ii) $n \rightarrow \pi^*$, (iii) $\sigma \rightarrow \sigma^*$, (iv) $n \rightarrow \sigma^*$. Among them, σ to σ^* transition requires an absorption of a photon with a wavelength less than 200 nm and n to σ^* is initiated by light whose wavelength is in the range 150 ~ 250 nm. The two are not in the UV-VIS range. Thus, only π to π^* and n to π^* transitions in the region of the spectrum (200 ~ 700 nm) are observed. Many inorganic species show charge-transfer absorption.



IV. RESULTS AND DISCUSSION

4.1 Absorbance and Light Harvesting Efficiency of Pigments Extracted from Rain Tree Leaves

For the protection against UV attack, the high energy UV photon absorption is important. The broader absorption gives the high performance for UV protection. In this work, absorbance data are grouped into three regions such as UV region, visible region and IR region for the UV protection and the production of sunscreen. And then light harvesting efficiencies of pigments extracted from rain tree leaves at sea level and at 1200 m above sea level have also studied by UV-VIS spectroscopy. Absorbance spectra and light harvesting efficiency of pigments are shown in Fig 4.1 and Fig 4.2 respectively.

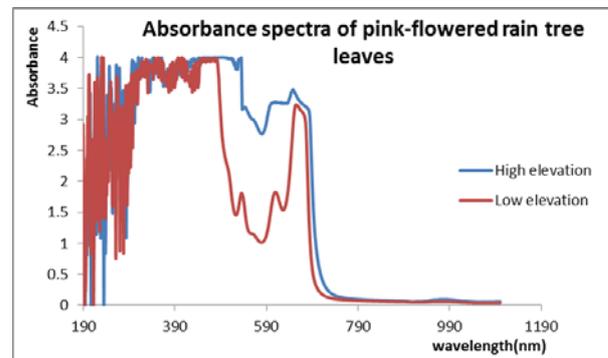


Fig 4.1 Absorbance spectra of two pigments

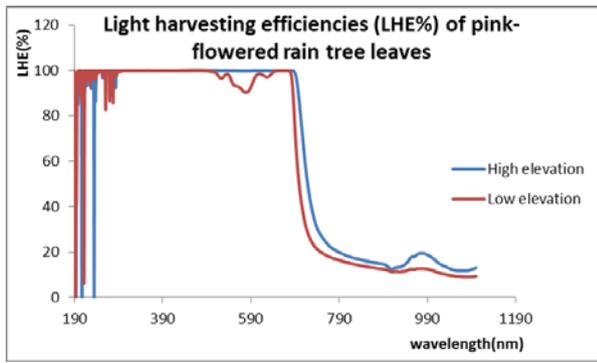


Fig 4.2 Light harvesting efficiencies of two pigments

The absorbance spectra and the light harvesting efficiencies of two pigments extracted from rain tree leaves at different elevations show that they can absolutely absorb UV-A and UV-B. Fig 4.3 and Fig 4.4 show UV-A & B absorbance and their LHEs. As shown in these figures, high elevation plant has more absorbing species than low elevation plant. Because there is more pigment concentration in high plant. But the sample preparation of two pigments should be carefully made for equal solvent and equal leaves' powder.

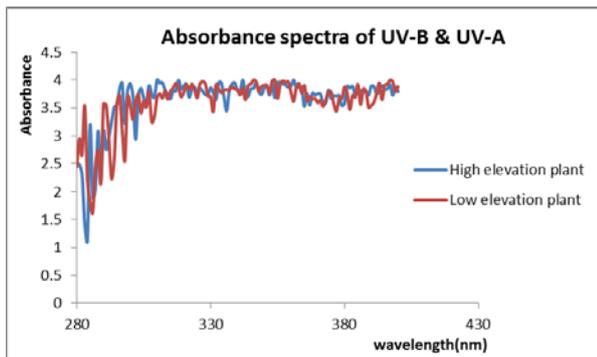


Fig 4.3 Absorbance spectra of UV-B & UV-A

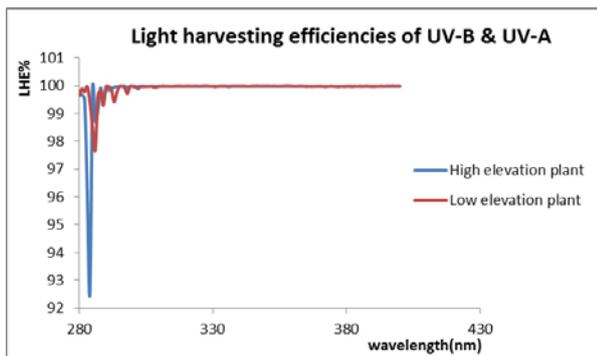


Fig 4.4 Light harvesting efficiencies of UV-B & UV-

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According to light harvesting efficiency of UV-A & B regions, the leaves of pink-flowered rain tree have more than 90% between the wavelength of 280 nm and 315 nm, and 99% of LHE between the wavelength of 315 nm and 400 nm. So pink-flowered rain tree leaves can protect UV-A and UV-B attack.

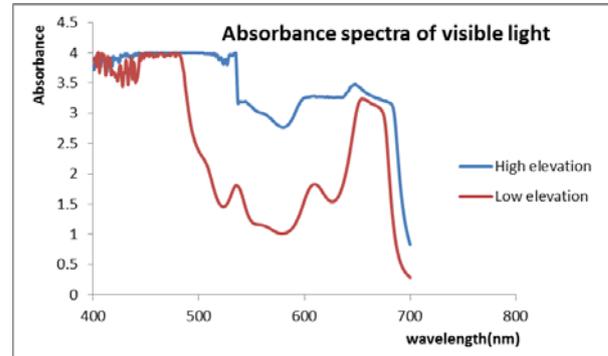


Fig 4.5 Absorbance spectra of visible light

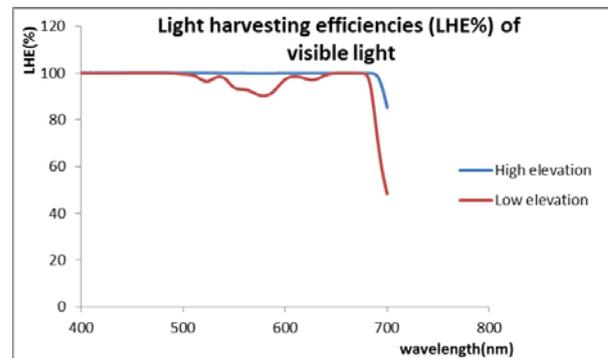


Fig 4.6 Light harvesting efficiencies of visible light

The pigment extracted from high elevation rain tree leaves has more absorbance than low elevation tree, shown in Fig 4.5. And then 100% LHE of high plant exists in the visible region.

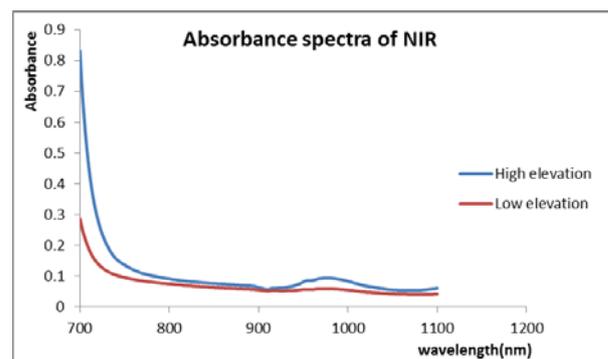


Fig 4.7 Absorbance spectra of NIR

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ACKNOWLEDGEMENT

I would like to thank Mr. Htay Win for helping with this research work.

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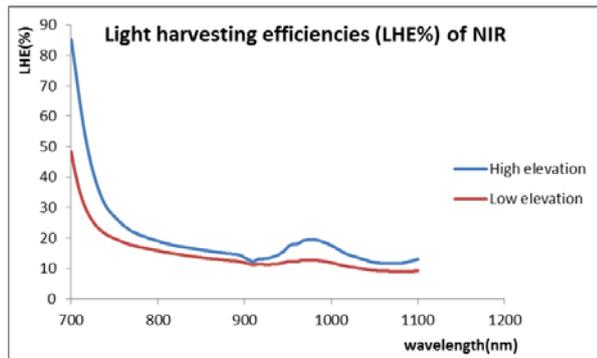


Fig 4.8 Light harvesting efficiencies of NIR

Pink-flowered rain tree has the broader absorption band up-to the wavelength of 1100 nm. On the other hand, the leaves can absorb both UV-VIS photons and NIR photons. The band-gap energy is 1.7 eV because the strong cut-off point is at the wavelength of 735 nm.

V. CONCLUSION

Ozone layer is the essential part of the earth's atmosphere to prevent the danger of unfiltered UV radiation for living things and non-living things. Due to the activities of human beings, the depletion of ozone layer has been caused by the large amount of chlorofluorocarbon (CFC) emission in the earth's atmosphere. So the uses of ODS must be reduced all over the world. To avoid the outdoor exposure of UV radiation, World Health Organization and World Meteorological Organization announce UV-Index and many cosmetic companies produce the products of UV protection.

In this work, the absorbance properties and the light harvesting efficiencies of pink-flowered rain tree leaves at sea level and at 1200 m above sea level, have been studied by UV-VIS spectroscopy for UV protection and for the use in sunscreen cosmetic products. Both of plants can absolutely absorb UV-A and UV-B. Furthermore, high elevation plant has high concentration. On the other hand, pigments in high elevation plant can more absorb UV-VIS photons than that of low one. According to Fig 4.4, both the plants have nearly 100% light harvesting efficiency of UV-A and UV-B. And then the plants' leaves in the more higher elevation, greater than 1200 m above sea level, should be analyzed for the concentration of absorbing species which give the sensitizers of DSSCs. Therefore, the shaded areas under the pink-flowered rain tree are regarded as a nice place to stay, especially in summer.

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Image Classification Using Convolutional Neural Networks

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DOI: 10.29322/IJSRP.9.08.2019.p9261

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9261>

Abstract— Convolutional neural networks (CNNs), consist of multiple processing layers to learn the representations of data with multiple abstract levels. They are the most successful machine learning models in recent years. Within this paper, we will know the usage of a trained deep convolutional neural network model to extract the features of the images, and then classify the images. We will study image processing and understand image classification. It has good application prospects.

Keywords— Convolutional Neural Networks, Deep Learning, Image Pre-processing, Image Classification, Overfitting.

I. INTRODUCTION

The rise of big data and the rapid popularization of high-performance computing devices in recent years have contributed to the unprecedented development of machine learning. Regarding image classification, this study intends to artificially extract features, and convert the features of an original image into useful features characterized by lower dimension and less noise. Machine learning has been gaining momentum over last decades. It is a class of artificial intelligence methods, which allows the computer to operate in a self-learning mode, without being explicitly programmed. Neural network is a machine learning algorithm. It is a system of number of interconnected artificial “neurons” which exchange messages between each other. This network consists of numerous layers of feature-detecting neurons. Each layer consists of several neurons that respond to different combinations of inputs derived from the previous layers. Convolutional Neural Network is a specialized context of the neural network which was proposed by Yann LeCun in 1988. It comprises of one or more convolutional layers, often combined with a subsampling layer, which are succeeded by one or more fully connected layers as in a basic neural network. The design of a CNN is triggered by the discovery of a visual mechanism, called the visual cortex, inside the brain. Each feature of a layer receives numerous inputs from a group of features located in a small neighbourhood which again reside in the previous layers called as local receptive fields. With these local receptive fields, features can extract primitive visual features, such as core, oriented edges, corners, end-points, etc.,

which are later combined by the higher layers. One of the most important uses of this architecture is Image Classification. In many cases, features derived from the top layer of the CNN are resorted for classification; however, those top layered features may not contain enough or required useful information to predict an image appropriately. In some instances, features acquired from the lower layers carry more distinctive power than those derived from the top. Hence, applying features from a particular layer only for classification seems to be a process which does not utilize deep CNN’s potential discrete power to full of its extent. This innate property leads to the demand for fusion of several features from multiple layers.

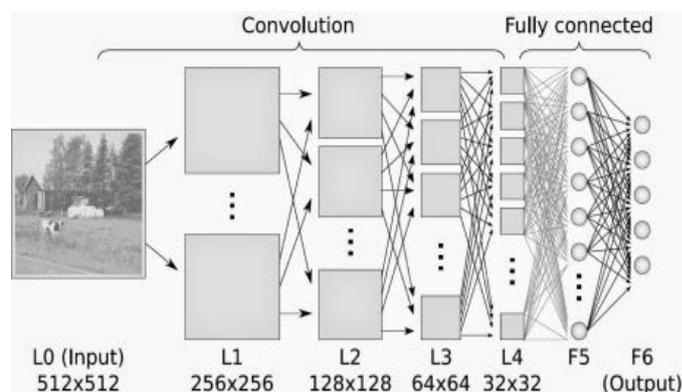


Fig. 1. Convolutional Neural Networks

While neural networks and various other pattern detection methods have been prevalent, there is a significant development in the field of convolutional neural networks. This is because of its ruggedness to shifts and distortions in the image, fewer memory requirements, easier and better training. The image input is passed through a series of convolutional, pooling, flattening and dense fully connected layers, and then the output is generated. In this paper we will be studying about layers of convolutional neural networks and its implementation in real-time.

II. RELATED WORK on IMAGE CLASSIFICATION using CNNs

Convolutional Neural Network has become the most successful deep learning model in the computer vision industry. In recent years, deep learning has been quickly promoted in the machine learning industry, and remarkable theoretical and practical achievements have been continually attained. The development of deep learning can be divided into three stages. From the 1940s to the 1960s, deep learning was called the control theory. While the theoretical development of biological learning and the establishment of the perceptron triggered the first wave of interest in artificial neural networks, as the perceptron could not be used to learn linearly inseparable data, it was resisted by many researchers, which resulted in the low ebb of the first stage. The second wave started with connectionism in 1980 and ended in 1995. In 1974, Paul Werbos proposed the back-propagation algorithm, and solved the problem of linear inseparability in the neural network model. However, as the quantity of training data was small, and the performance of the computers was poor at that time, there was a serious problem in most of the deep learning models - overfitting. At the same time, great progress was made in other machine learning fields. Consequently, deep learning was neglected by most people, which marked the low ebb of the second stage. In 2006, Hinton and Salakhutdinov displayed a neural network model called the autoencoder in the magazine Science. By adopting an unsupervised learning algorithm to initialize networks layer by layer, they efficiently improved the generalization of the deep network. Since then, many researchers have used the same method to revitalize a large number of the deep learning models, which were challenged in the 1980s. This marked the entry into the third wave of deep learning. Based on the visual system, the convolutional neural network (CNN) is a neural network used exclusively to process data with a lattice structure. In 1959, Hubel and Wiesel discovered the visual cortex cells of mammals and proposed the concept of a partial receptive field. Inspired by this, Fukushima and Kunihiko put forward Neocognitron in 1984, which can be regarded as the prototype of the modern convolutional network. In the 1990s, LeCun published relevant papers to define the modern structure of CNN and improved it afterwards. LeNet-5 is the first convolutional network that could be applied in reality. With little pre-processing, the network can directly learn the number image classifications in the original pixels. However, the training data were inadequate, and the computation ability of the computer was weak; thus, LeNet-5 was not effective in handling complicated problems. In 2009, Le integrated the convolutional neural network with the deep belief network to form the Convolutional Deep Belief Network (CDBN). In 2012, Krizhevsky adopted AlexNet to bring the error rate of image classification down from 26.3% to 15.2% in ILSVRC-2012. In 2014, a Google team used GoogLeNet to achieve a lower error rate (6.67%) in ILSVRC-2014. In 2015, the convolutional network of Microsoft MSRA brought the error rate of the ImageNet 2012 data concentration down to 4.94%, thus, surpassing humans in terms of recognition.

III. SYSTEM MODEL

Python Code is used for this project. As a framework we implemented Keras, which is a high-level neural network API written in Python. It can't work by itself, it needs a backend for flow-level operations. Thus, we installed a dedicated software library called Google's TensorFlow. As a development environment we used Jupyter Notebook and Matplotlib for visualization. For network training and testing we can download the dataset of images. This is done by creating an environment using Anaconda software. We can also enhance it by using Object Detection packages supported by python i.e., ImageAI object detection class.

IV. PROBLEM STATEMENT

The human visual system perceives the world in a different manner than digital detectors imposing various additional noise and bandwidth restrictions. Human optical illusions distort and fabricate features due to fundamental properties of human visual perception. Moreover, the memory of humans might be huge but ability to use it might lack. If there are hundreds and thousands of pictures that are to be studied, then it can be digitally possible at ease while it can be a very difficult task manually. The underlying features of the images, distortions, shifts, noise, etc., cannot be easily recognizable by humans. Thus, image classification has been introduced on a digital platform.

V. SOLUTION

Digital image classification utilizes computer-aided enhancement to turn subjective features of an image into data that can be measured, quantified and evaluated. Image processing must be proposed in a manner wherein it must be consistent with the scientific methodologies so that others may use or reproduce, and validate, one's results. To study image processing and understand image classification we will be using convolutional neural networks. The image input is passed as a dataset through a series of convolutional, pooling, flattening and dense fully connected layers, and then the output is generated.

A. Convolution Layer

It is always the first. The image matrix with pixel values is entered into it. Imagine that the reading of the input matrix begins at the top left of image. Next the software selects a smaller matrix there, which is called a filter. Then the filter produces convolution, i.e. moves along the input image. The filter's task is to multiply its values by the original pixel values. All these multiplications are summed up. One number is obtained in the end. Since the filter has read the image only in the upper left corner, it moves further and further right by one unit performing a similar operation. After passing the filter across all positions, a matrix is obtained, but smaller than the input matrix. Whenever the image passes through a convolution layer, the output generated by the first layer becomes the input taken by the second layer. And this happens with every further convolutional layer.

$$T(f(x) \otimes g(x)) = T\left(\int_{-\infty}^{\infty} f(x)g(u-x)dx\right)$$

$$= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} f(x)g(u-x)dx \exp(2\pi i s u) du$$

Fig. 2. Convolutional Theorem

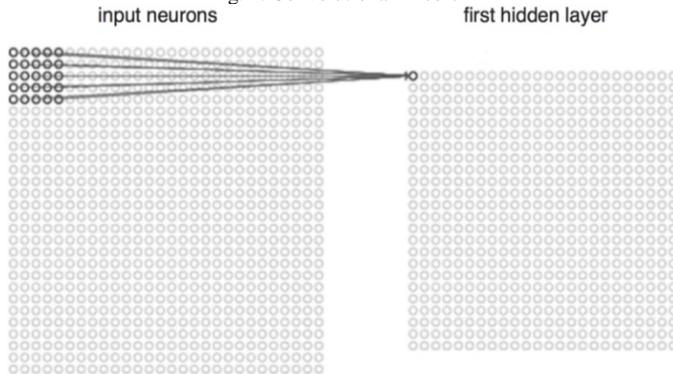


Fig. 3. Convolutional Layer

B. Pooling Layer

It follows the convolutional layer. It works with width and height of the image and performs a down sampling operation on them. As a result, the image volume is reduced. This means that if some features have already been identified in the previous convolution operation, then a detailed image is no longer needed for further processing, and it is compressed to less detailed pictures.

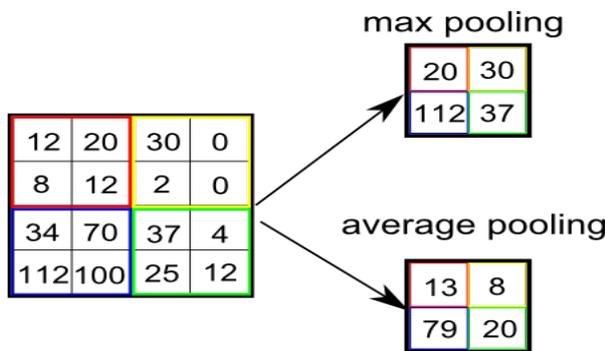


Fig. 4. Pooling Layer

C. Flattening Layer

After the convolution and pooling layers, our classification part consists of dense fully connected layers. However, these fully connected layers can only accept One Dimensional data. To convert our 3D data to 1D, we use the flattening layer.

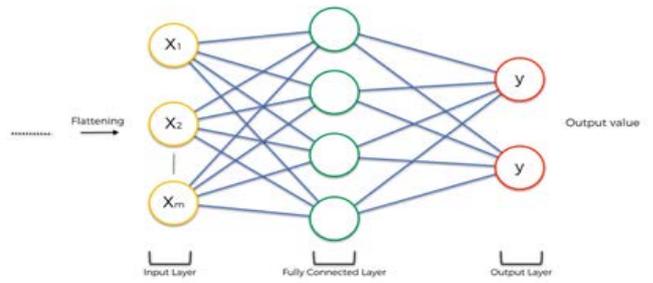


Fig. 5. Flattening Layer

D. Dense Fully Connected Layer

After completion of the mentioned series of layers, it is necessary to attach a dense fully connected layer. By appending a fully connected layer at the end of the network will result in an N-Dimensional Vector, where N represents the number of classes from which the model opts the desired class. Neurons which are in a fully connected layer will have full connections to all the activations occurred in the previous layer.

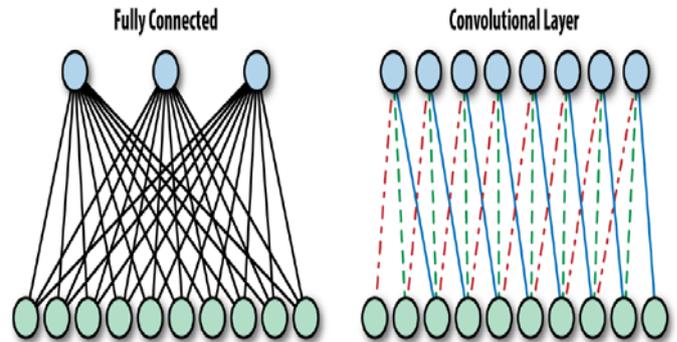


Fig. 6. Dense Fully Connected Layer

VI. ANALYSIS

The basis of the model is Supervised Machine Learning. It is one of the ways of machine learning where the model is trained by input data and expected output data. It is tested and evaluated. To create such model, it is necessary to go through the following phases: model construction, model training, model testing and model evaluation. Model Construction depends on machine learning algorithms. In this project's case, it is convolutional neural networks. Before model training it is important to scale data for the further use. After model construction it is time for Model Training. In this phase, the model is trained using training data and expected output for this data. Progress is visible on the console when the script runs. At the end it will report the final accuracy of the model. Once the model has been trained it is possible to carry out Model Testing. During this phase a second set of data is loaded. This data set has never been seen by the model and therefore it's true accuracy will be verified. Finally, the saved model can be used in the real world. The name of this phase is Model Evaluation. This means that the model can be used to evaluate new data.

The datasets of cats and dogs were considered. The aim was to classify the images of cats and dogs. The Training Set has 800 pictures of cats and dogs. The Test Set has 200 pictures of cats and dogs. Given any image we must classify whether it is a cat or a dog. As a result of testing the model, we got a very good accuracy: 93.8% of correct classification samples after 32 epochs. The only drawback was that we had to wait about 30 minutes until 32 epochs come to the end. If the training data accuracy (acc) keeps improving while the validation data accuracy (val_acc) gets worse, we are likely in an overfitting situation, i.e. your model starts to basically just memorize the data. Consequently, this model is sufficient to train on 10 epochs. The model can still be optimized to get 100% accuracy by introducing new techniques into the model.

for a successful training of the model. The scope can be extended to try this model on more data sets and apply it to practical tasks in order to see how a higher efficiency can be achieved in various problems.

ACKNOWLEDGMENT

This project work was supported by Information Technology Department and encouraged by our Institution VNR Vignana Jyothi Institute of Engineering and Technology.

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```

Size of:
- Training-set:      800
- Test-set:         200
- Validation-set:   200
Epoch 1 --- Training Accuracy: 56.2%, Validation Accuracy: 75.0%, Validation Loss: 0.615
Epoch 2 --- Training Accuracy: 56.2%, Validation Accuracy: 56.2%, Validation Loss: 0.679
Epoch 3 --- Training Accuracy: 56.2%, Validation Accuracy: 43.8%, Validation Loss: 0.712
Epoch 4 --- Training Accuracy: 68.8%, Validation Accuracy: 31.2%, Validation Loss: 0.713
Epoch 5 --- Training Accuracy: 68.8%, Validation Accuracy: 68.8%, Validation Loss: 0.645
Epoch 6 --- Training Accuracy: 75.0%, Validation Accuracy: 56.2%, Validation Loss: 0.697
Epoch 7 --- Training Accuracy: 81.2%, Validation Accuracy: 68.8%, Validation Loss: 0.623
Epoch 8 --- Training Accuracy: 75.0%, Validation Accuracy: 58.0%, Validation Loss: 0.678
Epoch 9 --- Training Accuracy: 75.0%, Validation Accuracy: 43.8%, Validation Loss: 0.753
Epoch 10 --- Training Accuracy: 75.0%, Validation Accuracy: 43.8%, Validation Loss: 0.781
Epoch 11 --- Training Accuracy: 75.0%, Validation Accuracy: 62.5%, Validation Loss: 0.605
Epoch 12 --- Training Accuracy: 75.0%, Validation Accuracy: 58.0%, Validation Loss: 0.735
Epoch 13 --- Training Accuracy: 75.0%, Validation Accuracy: 81.2%, Validation Loss: 0.441
Epoch 14 --- Training Accuracy: 75.0%, Validation Accuracy: 62.5%, Validation Loss: 0.484
Epoch 15 --- Training Accuracy: 75.0%, Validation Accuracy: 43.8%, Validation Loss: 0.813
Epoch 16 --- Training Accuracy: 75.0%, Validation Accuracy: 43.8%, Validation Loss: 0.910
Epoch 17 --- Training Accuracy: 87.5%, Validation Accuracy: 62.5%, Validation Loss: 0.629
Epoch 18 --- Training Accuracy: 87.5%, Validation Accuracy: 56.2%, Validation Loss: 0.799
Epoch 19 --- Training Accuracy: 87.5%, Validation Accuracy: 93.8%, Validation Loss: 0.296
Epoch 20 --- Training Accuracy: 87.5%, Validation Accuracy: 81.2%, Validation Loss: 0.446
Epoch 21 --- Training Accuracy: 87.5%, Validation Accuracy: 58.0%, Validation Loss: 1.008
Epoch 22 --- Training Accuracy: 87.5%, Validation Accuracy: 56.2%, Validation Loss: 0.914
Epoch 23 --- Training Accuracy: 87.5%, Validation Accuracy: 68.8%, Validation Loss: 0.771
Epoch 24 --- Training Accuracy: 87.5%, Validation Accuracy: 56.2%, Validation Loss: 0.964
Epoch 25 --- Training Accuracy: 93.8%, Validation Accuracy: 93.8%, Validation Loss: 0.259
Epoch 26 --- Training Accuracy: 93.8%, Validation Accuracy: 81.2%, Validation Loss: 0.368
Epoch 27 --- Training Accuracy: 93.8%, Validation Accuracy: 58.0%, Validation Loss: 1.379
Epoch 28 --- Training Accuracy: 93.8%, Validation Accuracy: 58.0%, Validation Loss: 1.811
Epoch 29 --- Training Accuracy: 93.8%, Validation Accuracy: 62.5%, Validation Loss: 0.997
Epoch 30 --- Training Accuracy: 93.8%, Validation Accuracy: 58.0%, Validation Loss: 1.423
Epoch 31 --- Training Accuracy: 93.8%, Validation Accuracy: 93.8%, Validation Loss: 0.225
Epoch 32 --- Training Accuracy: 93.8%, Validation Accuracy: 81.2%, Validation Loss: 0.316
    
```

Fig. 7. Output of the code execution

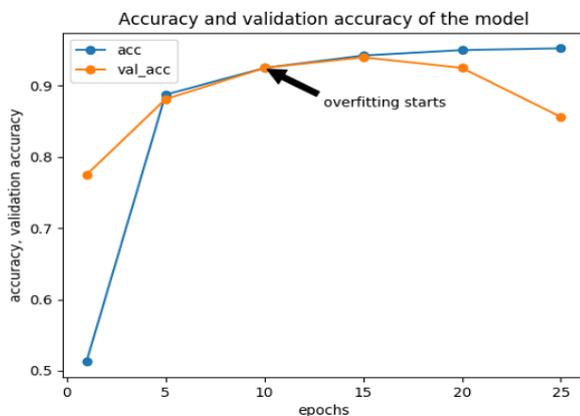


Fig. 8. Overfitting by Plotting

VII. CONCLUSION

From this project, we can figure out what deep learning is. We can construct, assemble, train, test and evaluate the Convolutional Neural Networks Model to classify images of cats and dogs or any image. This model works well with small number of images and we can measure how the accuracy depends on the number of epochs in order to detect potential overfitting problem. It is determined that 10 epochs are enough

Impact of Employees' Training and Development on Organizational Performance: A Case of the National Bank of Commerce (NBC) Mwanza City

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DOI: 10.29322/IJSRP.9.08.2019.p9262

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9262>

Abstract- The success of an organization is dependent on its human resources. Employees' training plays an important role as it enhances efficiency of an organization and helps employees to boost their performance and that of the organization. The purpose of this research was to investigate the impact of employees' training and development (T&D) practices on organizational performance in Tanzania banking industry, a case of NBC bank in Mwanza city. It was further guided by four specific research objectives: (i) To identify how training needs analysis is conducted at NBC bank in Mwanza city, (ii) To determine the T&D practices and procedures at NBC bank in Mwanza city, (iii) To determine the T&D methods used on employees at NBC bank in Mwanza city, and (iv) To determine the effect of T&D programs towards employees' and organizational performance at NBC bank in Mwanza city.

The research surveyed 75 employees from three NBC bank branches in Mwanza city using a self-administered structured questionnaire. Personal interviews were also held with some management and ordinary staff of the bank. The results from the study indicate that NBC bank conduct TNA before running T&D programs. Most of the training facilitations for non-managerial employees were on job-training, while management mostly off job training.

The findings reveal that training practices and methods were reasonably planned and systematic in nature and followed although some employees were not satisfied with some of the training methods used such as lecture type and role play techniques. Nevertheless, most of the employees were of the view that T&D programs are effective tools at individual and organizational level. The study also found that although employees are trained on-job training with different methods, they prefer mentoring and coaching as well as job rotation because these methods help them in acquiring skills and knowledge to effectively and efficiently perform their specific daily tasks. Employees indicated that T & D programs have improved their skills and capabilities. Overall, the T&D programs resulted in to improved employees' job performance as well as overall organizational performance. The study recommends among other things, that a more systematic process in training be followed, NBC bank incorporate outcomes of yearly performance appraisal into employees training programs and initiate a motivation policy attached to training.

Index Terms- Training is a learning experience in that it seeks a relatively permanent change in an individual that will improve his or her ability to perform on the job. Training can involve the changing of skills, knowledge, attitudes, or social behaviour (Decenzo and Robbins, 2002).

Development is a learning process that is not often related to the current role of an employee in an organization, it rather prepares employees for other positions in organizations by improving their abilities and responsibilities of the current job (London et al., 1989).

Performance management refers to the process of ensuring that employees' activities and outputs match the organization's goals (Armstrong 2014)

Performance is the act of performing or doing something successfully, using knowledge or skills as opposed to just possessing it (Armstrong 2014).

On-the-job training (OJT) is an employees' training at a place of work, while he or she is in the actual job (Gomez-Mejia et al, 2001). Armstrong (2014) further defines OJT as teaching the skills, the knowledge and competencies that are needed by employees to perform a specific job within the workplace and work environment. OJT is usually for jobs that do require large amount of pre-existing knowledge.

Off-the-job training is a method of training, which is organized at a site, far from the original work environment for a specific period (Armstrong 2014).

I. BACKGROUND OF THE STUDY

Training and development ought to be part and parcel of organization's strategic plan. It is an indispensable strategic tool for enhancing employees' and organizational performance. Companies that aim at competitive advantage have realized the importance of training, improving employees' performance (Becker 1999; Afroz 2018). Indeed, among the most important functions of human resource management, the crucial function is employees' development through proper training and development programs.

Training can be defined as a systematic process of acquiring knowledge, skills, abilities and the right attitudes and behaviors to meet job requirements (Gomez-Mejia et al 2007). Training has been reckoned to help employees do their current jobs or help them

meet current performance requirements by focusing on specific skills required for the current organizational needs. The benefits of training employees may extend throughout a person's career and help that person's future responsibilities. This training therefore ought to look at both current and future needs of the organization.

Researchers as Swart et al, (2005) indicate that an individual's improvement will be contingent on the quality of the training program, the motivation of the individual and the individual's needs. The model of improved organizational performance in general assumes that employees' knowledge, skills and attitudes will change by the adoption of a training program. If the employee believes there is an improvement in their knowledge and skills, there will be an increase in the person individual's performance, which subsequently leads to improved organizational performance.

Furthermore, Cole (2004) attributes employees' training and development as prerequisite for the organizational performance. When an employee is performing poorly, it is not purely individual's fault but rather because that person lacks necessary skills, knowledge, and commitment to do the job well. However, the employee is not the sole factor but rather there are other myriad factors that attribute to one's performance, such as psychological factors and motivational factors just to mention a few, though from skills perspective, training is the major attribute towards individual performance. Thus, the issue of well trained and competent personnel is paramount for any organization to realize full potential of labour force at work, which ultimately impact on organizational performance.

In the banking industry, human resources knowledge, skills and expertise are crucial assets that drive productivity and performance. This is because, as a service industry, the service provided by the bank is delivered through its personnel while it is being consumed sometime by its customers. Thus the bank personnel stand for the service and display to the customers the value and quality of the bank's service. Consequently, Aryee (2009) argues that banks need exceptional human resources to present their service to customers in a manner that will win more customers, keep them, and sustain its profitability. Therefore, training is crucial to any bank in Tanzania that seeks to improve its performance and competence of its employees.

In spite of these stated advantages of training and development, into some organizations have failed to integrate training and development into the organization systems. As a result, training and development seem to have less significant on the organizational performance. Some organizations meet their needs for training in an ad hoc and haphazard manner, which results into employees' failing to apply their best efforts to achieve organizational goals, and show high performance on job. Training and development is very important for an organization to compete especially in today's challenging and changing world.

Statement of Research Problem

This study starts from the realization of the need to effectively administer the impact of job and training and development (T&D) on organizational performance. It is well known that training enhances knowledge, skills and ultimately improves workers' and organizational performance and productivity (Cole 2002). According to KCM (2014),

ineffectiveness of training and development reduces the organizational productivity. Hence it matters how T& D is carried in the organization. Many organizations in Tanzania especially in private sector engage in training of their staff and have departments or units in charge of training. NBC bank is one of such organizations that train their employees. However, it is not clear whether training at NBC is haphazard and whether several employees have not qualified for any form of training nor is there any systematic process of staff development in place for their training. Little is known as to whether T&D program/practice at NBC bank has contributed to the organizational performance (productivity and portability). It is in this regard that the researcher set out to conduct this study.

Specific Objectives

The study was guided by the following specific objectives; to identify how training needs assessment is conducted at NBC bank in Mwanza City, to determine the training and development (T & D) practices and procedures at NBC bank in Mwanza City, to determine the training and development methods used on employees' at NBC in Mwanza City and to examine the effect of training and development programs toward employees' and organizational performance at NBC bank in Mwanza City.

II. LITERATURE REVIEW

Training Purpose, Process and Outcomes

Cole (2002) states that training is more of a learning activity to acquire better skills and knowledge needed to perform a task. Cole further argues that the idea of training is the need for a greater productivity and safety in the operation of specific equipment or the need for an effective sales force, to mention a few. Therefore, to come up with the desired knowledge, skills and abilities from employees to perform well at their job side, it requires proper training programme that may likewise have an impact on employees' motivation and commitment to their job as further Cole points out given that employees are the most important asset of the organization, they can either build or break their company's reputation as well as profitability. Additionally, employees oversee most of the activities which can influence customer fulfillment, the nature of the product and event. It is with this understanding that any organization ought to look at training as investment strategy.

Why Training ?

According to Nunvi (2006), training programs are directed towards maintaining and improving current job performance while development seeks to improve skills for future jobs. Considering the progress in the technology, certain jobs become redundant with the replacement of machines in modern days. In that vein, further education and competence become necessary for those employees in current positions and those wishing to be promoted in the future. Expressing an understanding of training, Armstrong (1996) emphasizes that training should be developed and practiced within the organization by appreciating learning theories and approaches, if training is to be well understood.

Training Process

According to Infante (2015), training in an organization generally involves a systematic approach, followed by a sequence of activities or process which is based on three to four blocks:

(1) Identifying Training Needs

Identifying training needs is an analysis that is necessary to determine the training needs of the employees or a specific job. What are the practical needs? Why an employee needs training? Every training begins with the need analysis and establishing a need analysis is and should always be the first step in the training process (Infante, 2015). There are four procedures that managers can use to determine the training needs of employees in their organizations:

- i. Job requirements analysis. The skills and knowledge specified in the appropriate job description are examined. The employees without the skills needed are candidates for a training program
 - ii. Organizational analysis. The effectiveness and successes of an organization are analyzed to determine where differences exist. For instance, members of a department with a high turnover rate or a low performance record might require additional training.
 - iii. Performance appraisals. Here, each employees work is measured against objectives established for his or her job.
- i v . Human resource survey. In here Human resource policies, procedures, guidelines and practices such as performance, turnover, employee satisfaction and many other.

Managers as well as non-managers are expected to describe what problems they are experiencing at their workplaces and what actions they believe can be taken to solve the problems. Immediately the training needs are identified, the human resources department must initiate the appropriate training efforts to close the gap between expected and actual results. This may also depend on circumstances such as developing a training plan, designing a training lesson, selecting trainees and preparing the trainers.

(2) Training Plans and Implementation

This area of the training process emphasizes on the techniques and methods by which training is carried out. The objectives of training, budgets and the duration are allocated.

(3) Training Evaluation and Feedback

Often, training evaluation and feedback turns to be the most critical part of the training process, focusing on the results achieved after training. The main idea is to analyze the effects of training and determine whether the set goals have been achieved. Reactions such as the participant's feedback, trainer's feedback, learning behavior and results of the training are being measured.

To measure the impact of training, Kirkpatrick (1959) outlined four levels of evaluation, and each of which is a prerequisite for the next level:

Reaction and Planned Action: These are measured reactions or evaluations of how the employees feel concerning the learning experience.

Learning and confidence evaluation: This is the measurement of the increase in knowledge after training.

Behavioral impact: This is the degree of applied learning back at work – are the members really doing anything diverse after the training program than before?

Results: It is important to know what results are achieved, in relation to the previous training objectives that were being set. For instance, has there been any decline in the number of costumers' complaints? Reactions, behaviour and learning are of great importance, but if the training program cannot produce measurable performance – related results, then it has not achieved its goals accordingly.

Benefits of Training and Development to Employees

Several paper works have been presented on the topic of training and development; it is evident that there is a positive effect of training and development activities on employees' performance. Other effects that can be geared by training may be motivation, behavioural and many others.

Arthur et al. (2003) performed a meta-analysis and from the study training had a positive impact on job related attitudes. Further it is obvious that the effectiveness of training depends on the training delivery methods and the skills to be trained. For instance the effective training programs include interpersonal skills and cognitive theory then followed by tasks related skills

Methods of Training and Development

A variety of training methods are used in different organizations today to train different individuals of different levels and positions. DeCouza et al (1996) explain that the most popular training and development methods used by organizations can be broadly classified as either On-the-job or Off-the-job training.

On- the- Job Training

On-the-job training (OTJ) is a method of giving training to employees when they are at work in their working environment. The purpose of this training is to make the employees get familiar with the normal working circumstances; that is during the training time frame, the workers direct involvement to practice or use machinery, equipment, devices, materials, and so forth in which they are being trained. Additionally, it helps the employees to figure out how to address the difficulties that may occur during the execution of the job, with the new skill or competence. The main idea of this training is learning by doing where the supervisors or the more experienced employees show the trainees how to perform a specific task. The learners (trainees) take on the instructions/directions of the supervisor and perform out the task. In other words, the trainees get the opportunity to practice on the spot.

This training method is highly used by companies to train current and future workers due to its simplicity. On-the-job training includes apprenticeship, coaching, internship, job rotation, job instruction, and few others.

Gomez-Mejia et al (2001) define on-the-job training (OJT) as an employees' training at a place of work while he or she is performing the actual job. Armstrong (2014) defines OJT as

teaching the skills, the knowledge and competencies that are needed by employees to perform a specific job within the workplace and work environment. OJT is usually for jobs that do require large amount of pre-existing knowledge.

OJT is mostly one-to-one although it might involve several trainers to many trainees as a team, an environment in which the trainees will need to practice the knowledge and skills being taught on job training. In most cases, a professional trainer or sometimes an experienced employee within the organization or supervisor or manager serves as the trainer/course instructor.

The purpose of this OJT training is to make the employees get familiar with the normal working circumstances, that is during the training time frame, the workers get direct involvement to practice the skill or use machinery, equipment, devices, materials and so forth, in which they are being trained.

Banks such as NBC bank utilizes these approaches especially to train its operational staff such as tellers, loan officers and customer service personnel.

There are three common methods that are used in on-the-job training; namely, learning by doing, mentoring/coaching, job rotation/shadowing, and job instruction

(i) Learning by Doing

Learning by doing is a very popular method of teaching new skills and methods to employees who have just been hired or are moving to different position. Under this method, an employee observes a senior experienced worker and learns what to do. The advantage here is that this method is tried and tested and fits the requirements of the organization. The disadvantages are that the senior worker is not usually trained in the skills and methods of training; therefore, it can be a process that may be time consuming as a new comer struggles to cope with the senior worker's explanations. To increase its success, it is recommended to use a senior or experienced worker who has been trained in instruction or training method and whose teaching skills are coordinated with a developed program linked to off-the-job courses.

(ii) Mentoring/Coaching

According to Anthony et al (1993), mentoring is a technique that assigns a guide or knowledgeable person high up in the organization to help a new employee "learn the ropes" of the organization and to provide other advice. In line with that, Beardwell and Holdern (1994) state that, this is another version of the system whereby a senior or experienced employee takes charge of the training and development of a new employee. Schuler and Huber (1993) point out that mentoring as a method of training is a regular part of the supervisor's job. It includes day-to-day coaching, counseling, and mentoring of workers on how to do the job and how to get along in the organisation. The effectiveness of coaching, counseling and monitoring as techniques for training and development depends in part on whether the supervisor creates feelings of mutual confidence, provides opportunities for growth to employees and effectively delegates' tasks. Mentoring programmes, in which an established employee guides the development of a less-experienced worker or 'protégé,' can increase employees' skills, achievement, and understanding of the organization.

(iii) Job Rotation/Shadowing

As indicated by Cherrington (1995), job rotations are learning techniques that are usually reserved for managerial and

technical occupations. Movement from one position to another provides managers with exposure to a number of different job functions and a broad grasp of the overall purpose of an organization. Job rotation programmes are used to train and expose employees to a variety of jobs and decision making situations. Although job rotation provides employee exposure, the extent of training and long-run benefits it provides may be overstated (Schuler and Huber, 1993).

(iv) Job Instruction Training

Schuler and Huber (1993) assert that job instruction training was developed to provide a guide for giving on-the-job skills training to white and blue-collar employees as well as technicians. It provides such systematic technique which rather makes it flexible for both off-the-job and on- the-job programmes. It has been the most popular method of training for blue-collar and white-collar employees since it was first described by the war manpower board during World War II. Before the actual learning occurs, job-instruction training requires a careful analysis of the job to be performed, an assessment of what the trainees knows about the job, and a training schedule. Training begins with introductory explanation of the purpose of the job and a step-by-step demonstration by the trainer of the operations. After the trainer has demonstrated the job enough times for the trainee to comprehend the steps, the trainee is given the opportunity to try it alone (Cherrington, 1995).

Off-the-Job Training

Off-the-job training is another method of training, which is organized at a site, far from the original work environment for a specific period (Armstrong 2014). The purpose of this method of training at a place other than the job area is to give a peaceful domain to the employees where they can focus just on learning. Learning material is provided to the trainees for a complete theoretical knowledge. The trainees can express their perspectives and opinions during these training sessions. Additionally, the trainees can investigate new and innovative ideas. The methods in the off-the-job training are case studies, conferences, audiovisuals, seminars, simulations, role play exercises, and lectures in classroom settings.

One advantage of off-job-training is that it gives employees extended uninterrupted periods of study. Another advantage is that a classroom may be more conducive to learning and retention because it avoids the distractions and interruptions that commonly occur in an OJT environment. However, off-job-training has also disadvantages. One big disadvantage is that what is learnt in a classroom is not the workplace and the situation simulated in the training may not closely match those encountered on the job. Also, if employees view the off-the job training as an opportunity to enjoy some time away from work, not much learning is likely to take place. Furthermore, off-the-job training is one of the costly training methods and care has to be taken as who goes for training and level of competences desired to be acquired in line with organization training and development policy (Armstrong, 2004). In general, Banks such as NBC bank utilizes off-job-training to train its technical lower and middle management; most training are designed behavior change and managing changes in the organization.

In brief, off-the-job training generally focuses more on long-term development and general education than on the skills

and information needed to perform a specific job. In this context, Beardwell and Holden (1994) argue that off-the-job training is sometimes necessary to get people away from the work environment to a place where the frustrations and hustle of work are eliminated. This enables the trainee to study theoretical information or new and innovative ideas without interruption. There are different methods used at off-the-job-training and these include vestibule training, behavior modeling, Understudy Training, and case study

(i) Vestibule Training

According to Cherrington (1995), vestibule training is similar to on-the-job training except that it occurs in a separate training area equipped like the actual production area. The training that occurs in a vestibule is usually some form of job-instruction training. In vestibule training, however, the emphasis is on learning as opposed to the emphasis on production in job-instruction training. Vestibule training is typically used for teaching specific job skills and is conducted out of the job in an area separate from the work place under the supervision of a skilled instructor. In being consistent with the above, Decenzo and Robbins (2002) state that vestibule training helps employees learn their job on the equipment they will be using, but the training is conducted away from the actual work floor. Vestibule training allows employees to get full feel for doing task without “real-world” pressures. Additionally, it minimizes the problem of transferring learning to the job, since vestibule training uses the same equipment the trainee will use on the job. Furthermore, after going through the vestibule training for a specified time period, the trainees are expected to apply their newly acquired skills when they are assigned to their real job.

(ii) Behavior Modeling

The use of behavior modeling is based on social theory, and it is in particular an effective method for interpersonal or social skills training. This method of training incorporates the use of videos to clearly demonstrate the way things ought to be done, and what behaviors are to be avoided (Babbie, 1998).

Behavior modeling is often based on the demonstration of the right and effective way to behave and as a result, trainees are provided with facilities to practice this. Bryn (1990, p.17) puts it this way, that behavior modeling is where target behaviors are selected and videos on each of the behaviors produced, showing competent persons achieving success by following specific guidelines. Key points are displayed on screen and are backed by trainer-led discussions. Learning here is trainer enforced through role play.

(iii) Understudy Training

An understudy is a person who is being trained to assume a particular position on a future date, the duties and responsibilities of the position currently occupied by the person himself or herself in understudying. In this method, an individual or group is assigned to assist a superior officer in the performance of his/her duties related to the position and at times left to grapple with the day-to-day problems which confront the superior in the performance of duty. The trainees are allowed to solve them with or without the help of the superior. When the understudy shows promise of talent, he/she takes over when the superior is transferred, retired or is promoted to a higher position (Decouza et al, 1996, 70).

(iv) Case Study

Cherrington (1995) declares that case studies are used extensively in many business classes. They are designed to promote trainee’s discovery of underlying principles. Most cases do not have single correct solution. Instead a trainee is expected to analyze the problem and consider alternative solutions or give an opinion. Case studies may be of real or imagined events in organization which to study. After analyzing several cases under the guidance of instructors, the trainees are exposed to certain concepts, problems, techniques and experiences, which they will later face on the job. The object of this method is to help the trainees think logically and develop the ability to analyze alternative courses of action systematically and objectively.

(v) Business Exercise/Simulation/Role Play

Under this type of training exercise, the work situation is simulated and the trainees are presented with reports, correspondences and memoranda, as in a real work situation, to handle. Business exercise training helps employees to develop decision-making, time management, planning and communication skills. It also helps the trainees to develop a “feel” for the work situation before they take on the real job (Laing, 2009)). Simulation is very similar to vestibule training and is used extensively for learning technical and motor skills. The essence of role-playing is to create a realistic situation as in the case of discussion method, and then have trainees assume the parts of specific personalities in situation.

(vi) Conference /Group Discussion

A method of individualized instruction frequently used where the training involves primarily the communication of ideas, procedures, and standards in the conference or discussion method. This conference/group discussion method allows for considerable flexibility in the amount of employee participation (Bohlander and Sherman, 1992). Again, Anthony et al (1993) argue that all training programmes, particularly outside programmes, utilize this technique. It has the advantage of being spontaneous and allows the participants to become involved in exploring concepts and in seeking clarification.

Cherrington (1995) states that conference and group discussions, used extensively for making decisions, can also be used as a form of training because they provide forums where individuals are able to learn from one another. Many studies have shown that individual are much more inclined to change their attitudes if they participate in a group discussion and at a group consensus regarding a topic than if they listen to lecture. An example of group discussion that can be an effective means of training is one in which supervisors discuss the performance evaluation procedure and develop common criteria for evaluation performance.

(vii) Sensitivity Training

As stated by Decenzo and Robbins (2002), sensitivity training in “encounter group” became quite popular during the 1950s as a method of changing behaviour through group processes. Often referred to as laboratory training, it influences the participants through unstructured group interaction. Members are brought together in a free and open environment in which participants discuss themselves and their interactive process, loosely facilitated by a professional behaviour scientist. This professional then creates the opportunity for the participants to express their ideas, beliefs, and attitudes. In the same instance, this type of training consists of unstructured group discussion in which

the participants talk about their personal feelings and reactions towards each other. The length of a laboratory training session may vary from as little as a couple of hours to as much as two or three weeks of all day sessions. The training is designed to create greater self-awareness and increased sensitivity to the attitudes and emotions of others and to group processes (Cherrington, 1995). Similarly, Schuler and Huber (1993) state that individuals in an unstructured group discussion exchange thoughts and feelings on the "here and now" rather than the "there and then". The experience of being in sensitivity group often gives individuals insights into how and why they and others feel and act the way they do.

(ix) Lecture

The lecture is an efficient means of transmitting large amount of factual information to a relatively large number of people at the same time. It is the traditional method of teaching and is used by organizations in many training programmes. A skilled lecturer can organize material and present it in a clear and understanding way. If the trainees are ready to receive it, a well prepared lecture may succeed in transferring conceptual knowledge. However, a lecture does not allow active participation by the learners. It provides no practice, no feedback, no knowledge of results, and it may inhibit the transfer of learning (Cherrington, 1995).

Anthony et al (1993) underscore that lecture method is very useful for large groups. It requires a training leader who is dynamic and who can organize and present materials in an effective fashion. For best use, it should be supplement with additional types of training techniques.

According to Decenzo and Robbins (2002), the lecture approach is well adopted to conveying specific information, rules, procedures, or methods. The use of audio visual can often make a formal classroom presentation more interesting while increasing retention and offering a vehicle for clarifying more difficult points.

Comparison of on-the-Job and Off-the-Job Training

A critical comparison of various methods for training and development of staff, on-the job training method, and the emphasis is more on the acquisition of specific, local knowledge in a real situation. In contrast, off-the-job method emphasizes developing an understanding of general principles, providing background knowledge, and generating an awareness of comparative ideas and practices. There is no best method of training. The choice of the method whether on the job or off the job training depends on several factors including the objective of training, length of training, employees position and allocated budget.

Training and Development Experiences from Tanzania

Training and Development of employees ought to be part and parcel of an organization's strategic plan because employees are the most important asset of any organization. Some countries take T & D seriously and it is from this mindset they have been able to achieve employees' sustainable high productivity and excellent good organizational performance. In Tanzania, there are mixed experiences and few studies have been conducted on the topic in public sector and next are experiences about training and development and their linkage to employees' and organizational performance.

Kihongo (2011) from Institute of Social Work (ISW), Dar es Salaam conducted a study on Factors Inhibiting Effective Staff Training in Tanzania. He identified various factors which undermine staff training in Tanzania's local authorities. These stumbling blocks include lack of funds due to inadequate budgets set aside for staff training, malpractices such as favoritisms, poor top management support because some managers do not treat staff training as a matter of priority, the absence of viable training policies and training programmes initiated by the local authorities, and the fragmented nature of the staff training.

Dominic and Kessy (2010) undertook a study on Effectiveness of Training and Development Programs in Public and Private Sectors. They found that training as a human resource development function was not being implemented well in Tanzania and most organizations lacked guidelines for effective employees' training. In addition, the review paper found that there was still a need to change the methods of training that are not effective and provide more methods of practical nature, since some organizations did not have comprehensive policy to guide an appropriate implementation of training programme nor adequate efforts to make them aware of its function; then the HR department should strive to design an effective policy and involve all respective employees in its implementation. The question raised is how the organization realizes the contribution and/or returns of training on its overall performance when it does not have clear training and development policy or programs.

The study further revealed the comparison between the real and ideal T&D program, minimal effort has been put out to bring the T & D program to standard. To enhance effective improvement of the training programmes, it is important to: (i) Develop a more uniform TNA exercise that aims to improve the level of efficiency of training function and eventually have clarity in scope and objectives, (ii) Conduct evaluation after every training session and give feedback to the trainees, (iii) Prioritize the issue of increasing employee capacity by allocating adequate training budget, (iv) Implement training function openly and involve every individual in determining the kind of training they need, and (v) Follow the criteria of sponsoring employees to training programs.

Mwaibako (2013) in his research on training and development and organizational performance in Tanzanian Commission for AIDS focused on perception of employees in terms of training and development programs at TACAIDS, effects of employees' training on performance of the organization and the challenges facing TACAIDS in providing training to its employees. The study revealed that training and development has improved organizational performance through new ideas and skills that have been introduced to the organization after the training. However, training and development at TACAIDS faces various challenges including financial resources and lack of clear policies to promptly promote training and development opportunities. Furthermore, the study revealed that there was no training needs assessment and that led to unsystematic and unplanned training of employees implying lack of clear focus on the value of its employees in enhancing organizational performance.

Hardly any study has been documented or conducted on the relationship between T & D and employees' performance or between T & D and organizational performance in

Tanzania and yet many organization especially commercial banks and telecommunications companies take their employees on various training sessions. So it is fitting that this proposed study being the first in Tanzanian private organizations, might shed light on what extent T & D contributes to employees' productivity and overall organizational performance.

Organizational Performance

According to Chen and Silverthorne (2008), there are three types of performance measurements. Firstly, measurement of output rates e.g. sales volume over a given period of time. Secondly, rating of individuals by another person other than the person whose performance is being measured. Thirdly, self-appraisal and self-rating. Self-appraisal and self-rating techniques are useful in organizations because they encourage employees to set their own targets that are used to measure their performance. Therefore, job performance measures the degree of achievement of organizational and social objectives from the perspective of the judging party (Hersey and Blanchard, 1993).

Companies such as banks use various criteria or performance standards to measure and report performance, such as profitability, market share and sales volume. Also, financial ratio such as current ratio, acid test ratio, gearing ratio and profitability ratios are used to measure the firm's financial performance. Kaplan and Norton (2011), American scholars, have introduced the Balanced Score Card as a more realistic tool for measuring organizational performance.

Given that this research was about the effect of training and Development on both employees' and organizational performance in the banking sector, the researcher adopted two sets of performance measurements (i) employees' performance was measured in terms of efficiency of service delivery and quality of customer services, (ii) organizational performance was measured in terms of deposits growth, loan recovery, and increase in profitability as well as non-financial indicators such as improvement of service delivery and customer satisfaction.

Empirical Literature Review

A number of empirical studies have been carried out on training and development and their effects on organizational performance in various countries and industries. Next is a review of some of the recent studies on the same topic.

The Laing (2009) carried out a study on training and its impact on organizational performance in Ghana. Specifically, the study sought to investigate the impact of Training and Development in public sector organizations using Ghana Ports and Harbors Authority (GPHA) as a case study. The research was intended to determine the role and impact of training on employees, with emphasis on the lower, middle level staff and the administrators of GPHA. A questionnaire was used on a sample of 80 employees of

GPHA. Personal interviews were held with some management staff of the organization. The results indicated that GPHA's employees were not well informed about training and development programmes in the organization. The results of the study indicated that most of the employees were of the view that training and development were effective tools for both personal and organizational success. The findings further revealed that

training practices, methods and activities at GPHA were not in line with the best practices regarding the planned and systematic nature of the training process as is generally known. It was recommended among other things, that the processes involved in training be duly followed, GPHA should assist its staff identify their career paths and guide them in the pursuit of higher education.

Ng'ang'a et al (2013) conducted an empirical study in Kenya on training and development. The purpose of their study was to investigate the relationship between Training and Development (T&D) as a Human Resource Practice and the organizational performance (OP) of the Kenyan state corporations. The study hypothesized that there is a positive relationship between T&D and OP, and therefore the need to investigate how specific the two variables relate. The study adopted an explanatory research design and surveyed a sample of 142 respondents using self-administered questionnaire which constituted structured or closed ended items, unstructured or open ended items and like. The data was subjected to descriptive statistics with the aid of SPSS and correlation coefficients were calculated for initial exploration of the relationships between variables. Furthermore, qualitative data were operationalized by arranging the data according to emerging themes or patterns with assigned numbers to make them measurable. The findings established a positive correlation between training and development and Organizational Performance. From that the study recommended to the authorities of the Corporations studied to put focus onto T&D function to enhance Organizational performance.

Mwaibako (2013) researched on the relationship between training and development and organizational performance in Tanzanian public sector. The aim of this study was to assess the impact of employee training and development on improving organizational performance, Tanzania Commission for AIDS. The study specifically focused on getting the perceptions of employees in terms of training and development programs at TACAIDS, effects of employees' training on performance of the organization, and the challenges facing TACAIDS in providing training to its employees. Purposive sampling was used to obtain 35 respondents. Questionnaires and interviews were used as instruments of data collection.

The study findings showed that there is relatively high level of awareness of the training activities provided by the organization as noted by 81% of the respondents. The training and development has improved organizational performance through new ideas and skills that have been introduced to the organization after the training. However, training and development at TACAIDS faces various challenges including financial resources and lack of clear policies to promptly promote training and development opportunities. Furthermore, the study revealed that there was no training needs assessment and that led to unsystematic and unplanned training of employees. The study recommended that the organization should conduct training needs assessment and gap identification and sponsoring of all training programs should be done through setting aside a budget for employees' training and development and searching for alternative sources of funds instead of being dependent on government sources only.

Maina and Waithaka (2017) were concerned with whether training and development of workers resulted in improved performance in public sector organizations in Kenya. The researchers conducted a study on that topic and the purpose of the

study was to investigate the influence of on-the-job training on performance of police officers in Kenya Police Service. A sample of 85 serving police officers in Imenti South Police Division and a sample of 100 households were used in the study. Two semi-structured questionnaires were used for collection of data (that is, one for police officers and another for households). Collected data were analyzed using Statistical Package for Social Sciences (SPSS) to generate descriptive and inferential statistics which were presented using tables. The influence of on-the-job training on performance of police officers in the Kenya Police Service was analyzed using multiple regression analysis. The findings indicated that on-the-job training has positive but statistically insignificant effect on performance of police officers in the Kenya Police Service and that reduction of the crime in the county could not be attributed only on police training as it is a joint effort by various stakeholders, and besides there are factors such as change of behavior of citizens and increase in economic activities that keep youth occupied.

Athar and Shah (2015) conducted a study on employees' training in commercial banks of Karachi, Pakistan. The purpose of the research was to determine factors that impact training in banks of Karachi, Pakistan and how they affect employees' performance. Data was collected from 100 employees from commercial banks in Karachi city through self-administered questionnaire and employees were selected through random sampling technique. Data analysis was done by regression and correlation techniques that utilized descriptive and inferential statistics. The study found that banks which provide training to their employees in a proper way were able to gain substantial improvement in performance and productivity and resulted into more customers' satisfaction. The study also indicated that for banks where training was compulsory, employees were able to enhance their knowledge, skills and abilities which resulted in provision of extensive support to increase the performance of banks of Karachi. The key findings of the study were stress level and motivation, technical knowledge, training program method, knowledge and employees' performance and motivation had a strong positive relationship with employees' performance. The study recommended that training should be given to all employees to enable them cope with rapid changes in technology, and that banks should launch effective training programs for their employees so that they can easily tackle the challenging situation of working environments.

Oghomhe et al (2016) conducted a study in Nigeria on the relationship between training and employees' performance in banking sector in Edo North Senatorial District. The research specifically examined the impact of training and development on employees' performance in organizations. It adopted a survey research design using a structured questionnaire with a five-point likert scale and surveyed 30 respondents drawn from 5 banks in Edo North. Descriptive statistics was used to analyze the collected data. The findings showed that appropriate training and development of banking staff can result in efficient performance of their functions. Based on the findings, the study recommended that management should define an appropriate training and development programmes for each category of staff who need to be trained and developed.

The study recommended that staff in the banking sector should be helped to grow into more responsibilities by offering them systematic training and development so that they will be

confident enough to carry out the responsibilities of the job. It also recommended that banks should provide performance feedback which will allow staff to be informed of changes to both their work goals and the overall goals of the organization.

Enga (2017) conducted a research on training and development with National Financial Bank, Kumba state, Cameroon. The purpose of the study was to examine the impact of training and development afforded to its workers on organizational performance. The study also emphasized on various training methods designed and their implementation around the world during the training and development programs. The data were collected from a sample of 30 respondents (tellers, customer call centre personnel, loan officers, supervisors and internal control officer) using questionnaire, observation and interview. The research revealed that training and development is a necessity in every company particularly for those who are unskilled or the less experienced employees'. Generally, employees' work contribution was found to be greatly improved due to the training methods and tools used by the company. As a result, it led to a positive impact on employees' performance and an improvement in their skills and job efficiency.

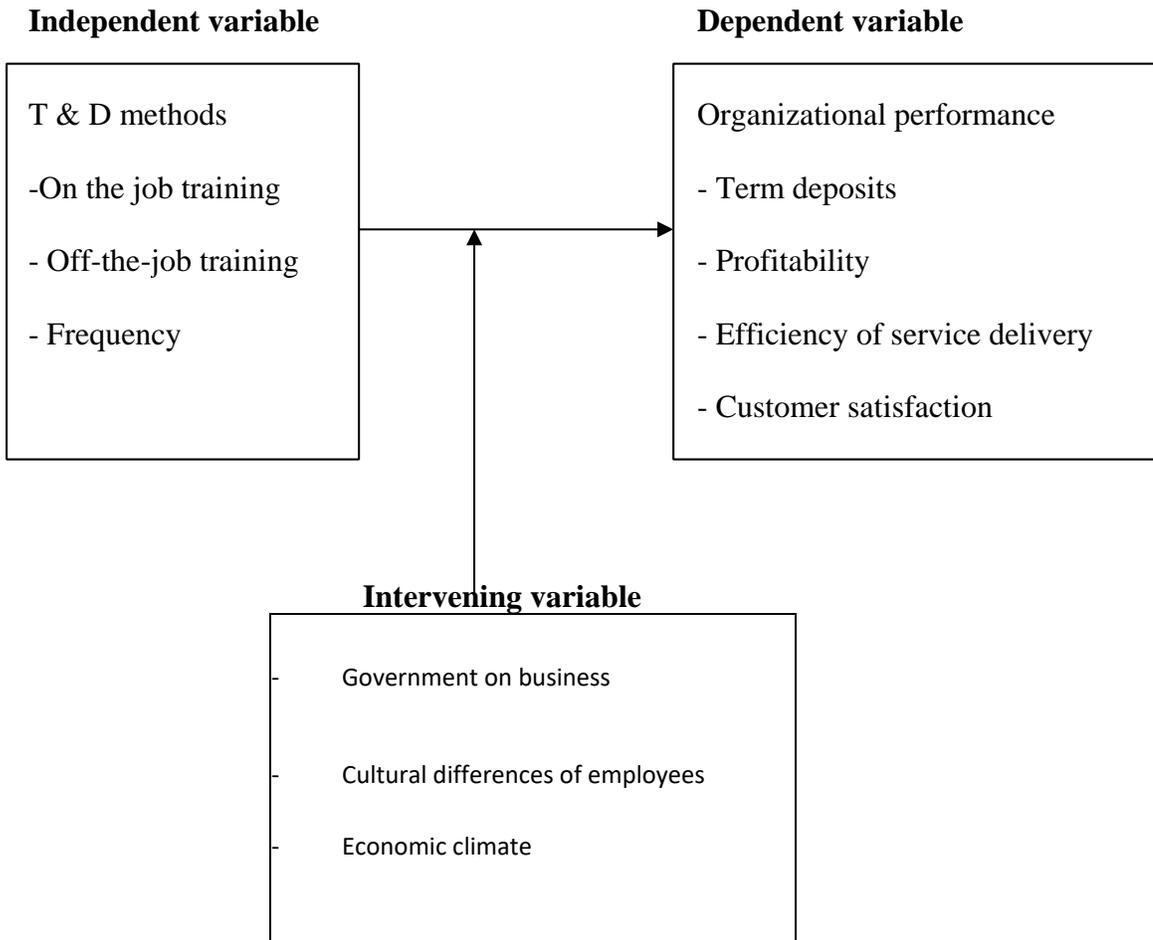
More recently, Afroz (2018) conducted a research in banking industry in Bangladesh. The research aimed at finding out the effects of training on employees' performance in banking sector, Tangail district, Bangladesh. The study surveyed 150 employees of 14 banks using self-administered questionnaire. Data were analyzed using descriptive and inferential statistics. The finding of the study showed that general training enhances employees' engagement, employee motivation and job satisfaction. A strong relationship exists between employee training and employees' performance. The results further revealed that the more the employee gets training, the more efficient their level of performance would be. This research however never related employees' training to organizational performance unlike the present study.

Study Gap

The studies reviewed in literature and revealed that most of the researches on training and development (T&D) in the banking industry focused on its impact on employees' performance (Athar & Shah, 2015; Oghomhe, 2016; Afroz, 2018) except that by Enga (2017) in Cameroon. Furthermore, those studies that link T&D to organizational performance were in public sector organizations (Laing, 2009; Ng'ang'a, 2013; Maina & Waithaka, 2017). The two Tanzanian studies of Kibibi (2011) and Mwaibako (2013) that looked at the relationship between T&D and organizational performance were in public sector organizations, which operate differently from private sector organization. Furthermore, almost all of the studies mentioned looked at training and development and its impact on employees' organizational performance. They did not look at training policy and training methods as their independent variables as is this research. Therefore this study fills in this knowledge gap and examined the impact of employees' training and development practices on organizational performance in Tanzanian banking industry, a case of NBC bank in Mwanza City.

Conceptual Framework

Conceptual framework shows the relationship between independent and dependent variables as well as intervening variables as shown in the following figure.



Source: Researcher (2019)

The independent variables were conceptualized as T&D practices such as training policy and methods of T&D. In contrast, the dependent variables of organizational performance were measured in terms of deposits growth, loan recovery, and increase in profitability as well as financial indicators such as improvement of service delivery and .bank image.

The independent variables of T&D practices such as training policy and methods of T&D were noted in literature to have impact on the dependent variables of organizational performance (Laing, 2009; Ng'ang'a et al 2013; Maina and Waithaka, 2017; Enga, 2017). Other factors (variables) such as government business policy on T & D, cultural differences of employees, and prevailing economic conditions have been taken into consideration because of their moderating effect on the dependent variables. However, these intervening variables were not specifically examined in the study due to their complexity and uncontrollable nature. Besides, this research was not concerned with the impact of moderating variables.

Research design is defined as an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2008). The research design contains an outline on how the research will be performed; that is to say, it includes the plan on measurement, collection and analysis of data (Creswell 2014). In social science research, there are generally three types of research design that a researcher can adopt; namely exploratory, descriptive and causal research design (Burns and Grove 2003, p. 237). This study adopted a descriptive research design which is concerned with finding out what, where and how of a phenomenon in the study area. This research design was considered appropriate because this study sought to describe how training and development (T & D) of employees contribute to organizational performance at NBC bank in Mwanza city.

Further, this research used primary data that involved questionnaires which entailed both quantitative and qualitative research approaches for better understanding of the phenomenon as has been recommended by other researchers (Creswell, 2014).

III. METHODOLOGY

Research Design

Geographical Area of the Study

The study was conducted in Mwanza city where NBC bank has three branches. Mwanza city is located on the southern shores of Lake Victoria in Northwest Tanzania. It covers an area of 1,325 Km² of which 425 is dry land and 900 Km² is covered by water. Mwanza city has two districts, Ilemela and Nyamagana with a total population of 476,646 (Mwanza City Profile report 2008). The study area was selected due to the fact that NBC being among the performing organizations in Mwanza the researcher thought that the data collected will give a pattern or behaviour of other banks on training and development.

Targeted Population

Target population is the total collection of elements or people, records and so on to which reference can be made (Cooper

and Schindler 2003). That is, it is whole well-defined population or group of objects/ individuals from which the researcher is interested in obtaining information which will be analyzed and from which conclusions will be drawn (Kathori 2008). The specific nature of the target population depends on the purpose of investigation” (Finn et al., 2000, p.108). The target population for this study was 120 staff, which includes three broad categories of respondents: Branch Managers and Section Managers, middle management and bank officers. Details of the specific designation are shown in Table 3.1. From the selected study area the target population was 120 staff and they were classified into two groups; namely, management and no management staff.

Table 3.1 Target Population of the Study

S/N	Categories of Population by bank branch	Population size
1	Management -Bank Branch 1	2
2	Management -Bank Branch 2	2
3	Management-Bank Branch 3	1
4	Non-Managerial Employees-Bank Branch 1	38
5	Non-Management Employees- Bank Branch 2	38
6	Non-Management Employees- Bank Branch 3	38
	Total	120

Source: NBC Bank HRM Report (March 2019)

Sample Size

Kothari (2008) defines sample size as the number of items to be selected from the universe to constitute a sample. So, in order for the results to be reliable, the sample should represent a small miniature of the population and it is recommended that the sample size should neither be very small nor too large but preferably the one that fulfills the efficiency, reliability, flexibility as well as representativeness of the study.

Although there are several ways of obtaining a sample size such as formula methods and other like 40% rule by Huysamen

(1991), this study opted a statistical table methods of the Krejcie & Morgan (1970) which with a population of 120 staff, a sample size of 92 staff is appropriate and when divided equally (3) approximately 31 (2 management and 29 non-managerial) staff from each NBC bank branch. Table 3.2 shows distribution of sample size from each bank branch

Table 3.2 Population and sample size in the target population

S/N	Categories of respondents by bank branch	Population size	Target size
1	Management -Bank Branch 1	2	2
2	Management -Bank Branch 2	2	2
3	Management-Bank Branch 3	1	1

4	Non-Managerial Employees-Bank Branch 1	38	29
5	Non-Management Employees- Bank Branch 2	38	29
6	Non-Management Employees- Bank Branch 3	38	29
	Total	120	92

Source: Researcher (2019)

Sampling Techniques

Sampling is that part of statistical practice concerned with selection of individual observations intended to yield some knowledge about the population of concern, especially for the purpose of statistical inferences (Kothari 2008). There are many sampling techniques that a researcher can choose and use. This research used two techniques: stratified sampling and purposive sampling techniques to obtain participants/respondents from the target population.

(i) Stratified Probability Sampling

The study used stratified probability random sampling in the selection of respondents for the quantitative data collection because the target population was composed of heterogeneous employees in each of the three NBC bank branches in Mwanza city. That is, bank branch for the purpose of this study was considered as non-homogenous and was a different stratum (Kothari 2008). The sample from each stratum was 31 respondents (2 managers and 29 non-managerial employees).

This stratified random sampling technique was implemented as follows: first, organizing the population in Mwanza city into bank branches and then drawing appropriate sample (31 participants) from each bank branch using the NBC bank HRM data base as the sampling frame by taking every second next person from a list of employees regardless of their position and type of work they do until the desired sample size was reached. This study opted to adopt stratified random sampling because it reduces sampling error (Bell & Waters 2014).

(ii) Purposive Sampling

The researcher further used purposive sampling technique to purposively select a sample of employees/management for in-depth interview. The criteria for selection were focused on the employees who were considered to be information resourceful and were willing to discuss various aspects of T & D and organizational performance in relation to this study. This involved using personal judgment by the researcher's perception that the selected interviewee was in the better position to provide information for the study. This approach is in line with Kombo and Tromp (2006) who suggest that purposive sampling procedure can be used with both qualitative and quantitative researches where the intention of the study is to understand the audience and its behavior.

Data Sources and Collection Methods

Data Sources

The data for this study came from primary and secondary sources. Kothari (2008) defines primary data as data collected afresh and for the first time and thus happen to be original in character. In this study, various methods were used to collect primary data and these included self-administered questionnaires and in-depth interviews (Babbie 2008; Creswell 2014).

Secondary data are the data that already exist in published reports, company reports, books and internet (Saunders et al, 2009). The study also used secondary data in collecting information. The secondary data, which constitutes other sources of data were gathered from the NBC bank corporate plan, its Human Resource Management policy, industry magazines/statistics, bulletins, in-house newsletters, annual reports on training, books and journals on Human Resource Management, training and development (Kothari 2008). This helped to identify how others have defined and measured key concepts, and to assess how this research project is related to other studies.

Data Collection Methods

(i) Questionnaires

The first primary data collection method used in this study was questionnaire and was used to collect data of quantitative nature. The researcher formulated questionnaire which focused on employees' characteristics as well as providing respondents with an opportunity to indicate the level of agreement/disagreement on different aspects of training and Development (T&D) practices employed by the three NBC bank branches in Mwanza City and their contributions towards organizational performance. The questionnaires included two types of questions of multiple choice/close-ended and a few open ended questions. In closed ended questions, respondents were restricted to a series of pre-determined answers from which to choose. In open ended questions, the respondents were encouraged to express themselves more freely about some aspects of T & D and organizational performance.

The questionnaire used a 5-point Likert rating scale to secure the degree of the presence or prevalence of the variables of interest in the study population as well as a level of importance or agreement (1-5) based on their experience with T & D and organizational performance. The final question sought comments and suggestions for improvement of T & D.

Given that some of the employees of the target population were not conversant with English language, the researcher

developed the Kiswahili version (Dodoso) of questionnaire after pilot-pre-testing. However, the responses were translated back into English prior to data analysis.

The researcher decided to use questionnaires as the major data collection instrument in this study because they are cheap and participants felt free to use questionnaires, they had standardized answers and hence made it easier to compile the data; they guarantee respondent's anonymity and they avoid interviewers bias (Creswell 2014).

The researcher distributed questionnaires personally to each respondent and collected them back within 48 hours to ensure all respondents were answering the questionnaire under about the same conditions.

(ii) In-depth Interview

The second primary data collection method the researcher used was personal in-depth interviews. That is, the study also adopted qualitative research method using semi-structured in-depth interviews with few selected managerial and non-managerial employees from NBC bank branch. The guiding questions were prepared basing on each research objective/question prepared in advance as indicated in the interview guide.

Pre-testing Pilot Study

The researcher planned to use several primary data collection methods in order to collect data from different sources. However, to obtain valid and reliable data, a pre-testing pilot study of data collection methods was conducted with employees at the target NBC bank branches in Mwanza city. Both questionnaire and interview guide were tested for their clarity, completeness and appropriateness to the research problem (Bryman and Bell, 2011). The participants' comments, concerns encountered in answering questions and suggestions they made regarding different areas of data collection methods were noted and where appropriate incorporated into the final versions of these research instruments.

However, with interview guide further refining of the research instruments was made during field data collection period whenever it was deemed necessary due to divergence of different opinions from interview. As a result of the pilot study, the researcher ensured that the appropriate and final research instruments were administered with participants who have not been involved in the pilot study and met the criteria of validity and reliability (Creswell 2014).

Data Analysis

Cooper and Schindler (2000) described data analysis as the process of editing and reducing accumulated data to a manageable size, developing summaries, seeking for patterns and using statistical methods. [Data analysis is defined as a critical examination of the assembled and grouped data for studying the characteristics of the object under study and for determining the patterns of the relationships among the variables relating to the study topic (Manyilizu, 2008)]. According to Kothari (2008, p. 122), the data after being collected must be processed and analyzed in accordance with the outlines laid down at the time of developing the research plan. This study obtained its primary data in form of quantitative data through questionnaires with respondent's as well qualitative data through in-depth personal

interviews with selected interviewees. Each type of data requires a different method of analysis.

For quantitative data obtained from questionnaires with NBC bank employees (management and non-managerial employees), they were first edited and debugged, coded, entered into Statistical Package for Social Science (SPSS) prior to analysis (Pallant, 2005). The data was then analysed using descriptive statistics and output was presented as frequency distribution tables, and pie chart and percentages. In contrast, for the qualitative data obtained from in-depth interview in form of written notes and scripts with selected employees, were analyzed by identification and categorization of text information in themes, patterns and meanings. These outputs were then linked to the relevant research objectives to generate better meaning and explanation about impact of T & D on organizational performance at NBC bank in Mwanza City.

Reliability and Validity of Research Design

Patton (2001) states that validity and reliability are two factors which any researcher should be concerned about while designing analyzing and judging the quality of the study. Furthermore, Easwaran and Singh (2010, pp.214-217) indicate that there are two criteria used to judge the quality of research design and empirical research; and these are reliability and validity.

(i) Reliability

Reliability refers to the consistency with which repeated measures produce the same result across time and across observers (Patton, 2002). Moreover, Edwards and Talbot (1994) assert that reliability requires that the measures or data collection methods should not be influenced by changes in context. To ensure reliability of the data, all the questionnaires used in the research were uniform in terms of layout and number of questions to all respondents. In addition, the reliability of the questionnaires was achieved through pre-testing pilot study with respondents in the target study areas NBC bank branches in Mwanza city and ensured that, respondents understood the questions in the same way. Adding to that, all the data collected for the research were uniformly processed to ensure consistency and stability of the research results and conclusions drawn from the study could be reproduced if the research would be conducted again using other researchers with similar data collection instruments.

(ii) Validity

Validity is defined as the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure (Neumann 2003, p.123). Thus, the researcher ought to be concerned with external, internal and construct validity.

External validity relates to the generalizability of research findings from survey research to entire population (Thomas & Nelson 2001, p.30). Since this research is not a statistical study and the aim was to sample widely, external validity was attained by analytical generalization whereby the researcher compared research evidence from previous studies on the same topic.

Internal validity refers to the extent to which the differences that is found for the dependent variables directly relate to the independent variables (Mackey and Gass 2005). In this present study, internal validity was attained through specifying the units

of analysis and developing the conceptual framework that depicted the relationship between variables as indicated in figure 1.1

Construct validity: According to Mackey (2005), construct validity is a degree to which the research instrument adequately captures the construct of the interest. To ensure construct validity, the researcher took several measures. Firstly, the conceptual framework was based on the constructs/practices identified in the empirical literature reviewed in this study. Secondly, the evidence from the phenomenon under study (T & D and organizational performance) were gathered from multiple sources (questionnaires, in-depth interviews) for data triangulation.

IV. DATA PRESENTATION, ANALYSIS AND DISCUSSION

Background of Respondents

(a) Response Rate

In this study 92 questionnaires were distributed to employees at the three NBC bank branches in Mwanza City and a total of 75 questionnaire were returned complete and usable for data analysis. This represents a response rate of 85.9%. As noted by Mugenda and Mugenda (2003), a minimum response rate for good empirical research should be at least 60%. So this research response rate far exceeded the recommended minimum, and therefore the researcher collected sufficient data for the study and hence allowed valid data analysis.

(b) Background of Respondents

(i) Respondents' Gender

Table 4.1 Respondents' gender

Gender	Frequency	Percent
Male	35	46.7
Female	40	53.3
Total	75	100.0

Source: Field data (2019)

Table 4.1 shows that 46.7% of the respondents were male and 53.3% female. This is fairly representative as these days more women are the majority of employees in the banking industry in Tanzania.

(ii) Respondents' Age

Table 4.2 Respondents' Age

Age	Frequency	Percent
22 - 25 years	4	5.3
26 - 35 years	36	48.0
36 - 45 years	25	33.3
>45 years	10	13.3
Total	75	100.0

Source: Field data (2019)

Table 4.2 indicates that 5.3% of the respondents (employees) were 22-25 years of age, 48% 26-35 years, 33.3% were 36-45 years and 13.3% are over 45 years. These results imply that the majority (53.3%) of the employees at NBC bank are youth followed by middle aged group (33.3%) and only small percentage are in senior age. Hence it would be expected that when trained in new skills and knowledge, this young group of workers could be able to improve organizational performance.

(iii) Education Level of Respondents

Table 4.3 Respondents' Education Level

Education level	Frequency	Percent
Secondary/high school	6	8.0
Diploma	11	14.7
Bachelor degree	44	58.7
Post graduate	11	14.7
Post graduate qualification	3	4.0
Total	75	100.0

Source: Field data (2019)

Table 4.3 depicts that the majority (80.4%) of the respondents (employees) at NBC bank have at least a bachelor degree, 14.7% have diploma and 8.0% are secondary/high school level. These results suggest that NBC bank is run by well-educated employees and hence it is expected that their level of performance would increase following training and development programs.

(iv) Respondents' Position Title

(a) Non-managerial Employees

Table 4.4 Employee's Title/position at NBC

Title/Position	Frequency	Percent
Teller	25	33.3
Operations Officer	8	10.7
Customer service officer	26	34.7
Loan officer	12	16.0
Relationship officer	4	5.3
Total	75	100.0

Source: Field data (2019)

Table 4.4 illustrates that 33.3% of non-managerial employees are classified as tellers, 10.7% as operations officer, 34.7% as customer service officer, 16.0% as loan officer and 5.3% as relationship officers. The results suggest that the majority (69.3%) employees at NBC bank are in service delivery role and small percentage are in surveillance role (30.7%).

(b) Management

Table 4.5 is indicative that 60.0% of the respondents were section managers, 20.0% was supervisor and 20% was bank branch manager. The results suggest that organizational structure at NBC bank branches is flat with more persons in service delivery and few in supervisory role. The results indicate that the ratio of manager to non-managerial employees is 1.15 further implying that these bank employees if were trained, they would not need many supervisors.

Table 4.5 Management Position/Title at NBC Bank

Position	Frequency	Percent
Section manager	3	60.0
Supervisor	1	20.0
Branch manager	1	20.0
Total	5	100.0

Source: Field data (2019)

(vi) Duration of Employees at NBC bank
(a) Non- managerial Employees

Table 4.6 Period with NBC bank

Period with NBC bank	Frequency	Percent
<1 year	8	10.7
3 - 5 years	28	37.3
> 5 years	39	52.0
Total	75	100.0

Source: Field data (2019)

Table 4.6 shows that 10.7% of the respondents (employees) at the time of the study had been with NBC bank for less than a year, 37.3% for 3-5 years, and 52.0% for over five years. These results suggest the majority (52.0%) of the non-managerial employees at NBC bank are reasonably well experienced in their roles and so would be their performance at their jobs.

(b) Managerial Employees

Table 4.7 shows that 20% of the respondents have been with NBC bank for 4-6 years and 80% for over 6 years. These results suggest that for employees to be in a management position at NBC bank, they should have worked with the bank for at least 4 years and those who are appointed to the level of branch manager should have been with NBC bank for a minimum of 6 years.

Table 4.7 Duration on the Position

Duration/period with NBC bank	Frequency	Percent
4 - 6 years	1	20.0
> 6 years	4	80.0

Total	5	100.0
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Source: Field data (2019)

Research Objectives

The study had four research objectives. Next is a discussion of the study results based on each objective.

Research Objective 1: To identify how training needs assessment is conducted at NBC bank in Mwanza City

(i) Training Needs Assessment (TNA)

Table 4.8 shows different aspects of training needs assessment (TNA). In row (i), Table 4.8 shows that 98.7% of the respondents (employees) agreed /strongly agreed that training is compulsory at NBC bank and 1.3% were neutral to that statement.

Table 4.8 Training Needs Assessment

Statement	Strongly agree		Agree		Unsure		Disagree		Strongly disagree	
	Count	%	Count	%	Count	%	Count	%	Count	%
	Training is compulsory for employee	62	82.7	12	16.0	1	1.3	0	0.0	0
I have attended a training	26	34.7	41	54.7	3	4.0	5	6.7	0	0.0
My training needs are determined through AAP	17	22.7	26	34.7	16	21.3	15	20.0	1	1.3
Training needs are directly related to objectives	44	58.7	30	40.0	0	0.0	0	0.0	1	1.3
Basic skills/capabilities are identified during TNA	19	25.3	26	34.7	16	21.3	13	17.3	1	1.3
TNA are determined by management	35	46.7	33	44.0	0	0.0	6	8.0	1	1.3
TN are identified by the employee concerned	10	13.3	37	49.3	8	10.7	18	24.0	2	2.7
TN are identified by the immediate supervisor	9	12.0	38	50.7	13	17.3	13	17.3	2	2.7
TN are conducted by immediate supervisor	11	14.7	36	48.0	7	9.3	18	24.0	3	4.0

Source: Field data (2019)

In row (i), Table 4.8 shows that 98.7% of the respondents (employees) had said that it is compulsory for an employee and 1.3% were not sure. In row (ii), Table 4.8 shows that 89.4% of the respondents (employees) had attended training and development programs; 6.7% had not and 4.0% were not sure. The results suggest that the majority of the employees have attended training organized by NBC bank.

In row (iii), Table 4.8 shows 80% of the respondents (employees) agreed/strongly agreed that TNA is determined through performance appraisal, 20.0% disagreed with that statement and 21.3% were neutral. In row (v), Table 4.8 shows that 98.7% of the respondents (employees) agreed/strongly agreed that training at NBC bank is directly related to the organizational goals.

In row (iv), Table 4.8 shows that 60% of the respondents (employees) agreed/strongly agreed that basic skills/ capabilities that employees should be trained in are identified through TNA, 19% disagreed/ strongly disagreed with that statement and 21.3% were neutral. In row (vi), Table 4.8 shows that 90.7% of the respondents (employees) agreed/strongly agreed that TNA is determined by management, 9.3% disagreed /strongly disagreed with that statement.

In row (vii), Table 4.8 shows that 62.7% of the respondents (employees) agreed /strongly agreed that TNA is identified by immediate supervisors 20% disagreed /strongly disagreed with that statement and 17.3% were neutral.

In row (viii), Table 4.8 shows that 62.6% of the respondents (employees) agreed/ strongly agreed that TNA is identified by employees concerned, 26.7% disagreed/strongly disagreed with that statement and 10.7% were neutral.

In row (ix), Table 4.8 shows that 62.7% of the respondents (employees) agreed/strongly agreed that TNA is conducted by

immediate supervisor while 28.0% disagreed/strongly disagreed with that statement and 9.3% neutral.

These results in Table 4.8 suggest that NBC bank conducts TNA prior to designing and running training and development programs and that TNA is conducted by employees' supervisors, mostly those in top management positions at the bank branch. So NBC bank is following best practices of having TNA as a basic requirement prior to conducting any training and development programs. Hence it can be argued that training and development programs at NBC bank are tailored towards improving skills, knowledge and capabilities of its employees that are identified through TNA. This is similar to the findings from Mwaibako (2013) that indicated if there is no existence of training needs assessment we expect to have unsystematic and unplanned training of employees.

Research Objective 2: To determine the training and development (T & D) policies, practices and procedures at NBC bank in Mwanza City.

(a) Employees Perspective

Table 4.9 shows different aspects of T&D policies and procedures at NBC employees according to employees' experiences.

In this section the researcher's intention was to identify the training and development policies, practices and procedures that are carried out at NBC bank in Mwanza city, therefore the following were noted from data collected:-

In row (i), Table 4.9 shows that 1.3% of the respondents (employees) strongly disagreed that NBC bank has T&D policies and procedures while 86.7% agreed/strongly agreed with that statement and 4.0% were neutral.

Table 4.9 T & D policies and procedures at NBC bank

Statement	Strongly agree		Agree		Unsure		Disagree		Strongly disagree	
	Count	%	Count t	%	Count t	%	Count t	%	Count t	%
Bank has T&D policies and procedures	50	66.7	21	28.0	3	4.0	0	0.0	1	1.3
T&D policy document is available to staff members	45	60.0	14	18.7	9	12.0	4	5.3	3	4.0
Provisions in T&D policy document to rise up in rank	14	18.7	34	45.3	22	29.3	3	4.0	2	2.7
T in NBC is planned and is systematic	35	46.7	29	38.7	8	10.7	1	1.3	2	2.7

T organised by the NBC is motivational to employees	35	46.7	30	40.0	6	8.0	3	4.0	1	1.3
Every staff member at NBC has opportunity to be trained	40	53.3	25	33.3	7	9.3	2	2.7	1	1.3
I have been sponsored for further studies	1	1.3	5	6.7	5	6.7	35	46.7	29	38.7
I have sponsored myself for further studies	5	6.7	21	28.0	7	9.3	35	46.7	7	9.3
NBC grants study leave to staff to develop themselves	38	50.7	18	24.0	14	18.7	4	5.3	1	1.3
I have been sponsored by NBC to attend training	1	1.3	4	5.3	3	4.0	32	42.7	35	46.7

Source: Field data (2019)

In row (ii), Table 4.9 shows that 78.7% of the respondents (employees) agreed/strongly agreed that T&D policy document at NBC bank is available to staff members while 9.3% disagreed/strongly disagreed with that statement, and 12.0% were neutral.

In row (iii), Table 4.9 shows that 64% of the respondents (employees) agreed/strongly agreed that the provision in the T&D policy document rise up to employees' expectations, 6.7% disagreed/strongly disagreed with that statement and 29.3% were neutral.

In row (iv), Table 4.9 shows that 85.4% of the respondents (employees) agreed/strongly agreed that T&D at NBC bank is planned and systematic, 4.0% disagreed/strongly disagreed with that statement, and 10.7% were neutral.

In row (v), Table 4.9 shows that 86.7% of the respondents (employees) agreed/strongly agreed that T&D programs organized by NBC bank is motivational to employees, 5.3% disagreed/strongly disagreed with that statement and 8.0% were neutral.

In row (vi), Table 4.9 shows that 86.6% of the respondents (employees) agreed/strongly agreed that every staff members at NBC bank has had an opportunity to be trained while 4.0% disagreed /strongly disagreed with that statement and 9.3% were neutral.

In row (vii) Table 4.9 indicates that 8.0% of the respondents (employees) agreed/strongly agreed that they had been sponsored by the bank for further studies, while 85.4% disagreed/strongly disagreed, and 18.7% were neutral. These results suggest NBC

bank may not be ready to sponsor workers for long term training and development opportunities.

In row (viii) Table 4.9 shows that 34.7% of the respondents (employees) agreed/strongly agreed that they have sponsored themselves for further studies, while 57% disagreed/strongly disagreed with that statement and 9.3% were neutral.

In row (ix) Table 4.9 shows that 74.0% of the respondents (employees) agreed/strongly agreed that NBC grants study leave to its staff to develop themselves, 8.0% disagreed/strongly disagreed with that statement and 18.7% were neutral.

In row (x) Table 4.9 shows that 6.6% of the respondents (employees) agreed/strongly agreed that they have been sponsored by NBC bank to attend other non-bank training, while 87.4% disagreed/strongly disagreed with that statement and 4.0% were neutral.

These results in Table 4.9 suggest NBC bank has a T&D policy and that T&D policy is available to employees; T&D at NBC bank is planned and systematic, and offers motivation to employees. However, the results suggest that NBC bank does not sponsor its employees for further studies but the bank grants workers study leave to attend their self-sponsored studies. The results also mean that NBC bank pays for employees to go for short term training and development programs that are relevant to employees' job and organizational goals. A similarity was identified from a study conducted by Liang (2009) and it was vivid that training and development is an effective tool for both personal and organizational success and on the other hand it was obvious that if training practices were not line we don't expect to have a systematic and planned training and development process.

(b) Management Perspective

Table 4.10 T & D policies and procedures at NBC bank – Management perspective

Statement	Agree		Strongly agree	
	Count	%	Count	%
There is T & D Policy	3	60.0	2	40.0
T & D policy at bank is strictly adhered	3	60.0	2	40.0
All employees are given opportunity for T & D activities	3	60.0	2	40.0
T needs are identified through formal process	3	60.0	2	40.0
Training needs based on employee's and organizational needs	4	80.0	1	20.0
Training is planned and systematic	4	80.0	1	20.0
The bank links T & D to its business strategy	2	40.0	3	60.0

Source: Field data (2019)

Table 4.10 shows that 100% of the respondents (management) agreed/strongly agreed that there is a T&D policy; T &D policy is strictly adhered to, all employees are given opportunity for T&D, training needs are identified through a formal process and T & D programs are based on employees and organizational needs. Also, all the management agreed/strongly agreed that training at NBC bank is planned and systematic and the bank links the T&D to its business strategy.

Both Tables 4.9 and 4.10 suggest that overall, both employees and management agreed that T & D policy exists, employees are given opportunity for T & D; T & D programs are planned and systematic and they are also linked to NBC bank business strategy. With that, one would expect T & D, when given to employers, should improve the skills and knowledge of employees which should be manifested in improved job performance and overall organizational performance.

Research Objective 3: To determine the training and development methods used on employees at NBC bank in Mwanza City.

(i) Employees' attended of T & D Programs

Table 4.11 shows that all non-managerial employees have attended at least two T & D programs each year.

Table 4.11 Have you attended any T&D program sponsored by NBC

Response	Frequency	Percent
Yes	75	100.0

Source: Field data (2019)

(ii) On-the-Job Training Methods

Table 4.12 On-the-Job Training Methods

On-the-job training methods	Yes	
	Frequency	%
Mentoring & coaching were used for facilitation	59	19.4
Job rotation was used for facilitation	53	17.4
Under study training was used for facilitation	32	10.5
Conference/Group discussion was used	61	20.1
Lecture was used for facilitation	64	21.1
Role play was used for facilitation	31	10.2
Other methods was used for facilitation	4	1.3
Total	304	100.0

Source: Field data (2019)

(iii) Ranking in order of importance of on job training methods on effectiveness

Table 4.13 Ranking of on-the-job training methods in terms of effectiveness

Ranking of on-the-job training methods	Most effective		Second most effective		Third most effective		Fourth most effective		Fifth most effective		Least effective	
	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
Ranking of mentoring/Coaching method	23	30.7	29	38.7	10	13.3	8	10.7	4	5.3	1	1.3

Ranking of job rotation method	30	40.0	21	28.0	12	16.0	9	12.0	3	4.0	0	0.0
Ranking of Under study training method	1	1.3	2	2.7	8	10.7	11	14.7	33	44.0	20	26.7
Ranking of Conference/Group discussion method	2	2.7	12	16.0	28	37.3	21	28.0	10	13.3	2	2.7
Ranking of lecture method	8	10.7	5	6.7	16	21.3	24	32.0	16	21.3	6	8.0
Ranking of role play method	9	12.0	8	10.7	1	1.3	2	2.7	9	12.0	46	61.3

Source: Field data (2019)

Table 4.13 shows that respondents (employees) ranked job rotation as the most effective method of training (84.0%), followed by mentoring and coaching (83.7%) and group discussion (56.0%). These results suggest that the management of NBC bank should spend most time designing and running T & D programs for its employees, which involve job rotation, and mentoring and coaching because with these methods, employees learn by doing their tasks on the job.

(iv) Effectiveness of Training Methods used at NBC bank

Table 4.14 Effectiveness of training methods used at NBC bank

Method	Most	Effective	Unsure	Ineffective	Most
Mentoring/Coaching	effective (68.1%)	15 (20.%)	7 (9.3%)	2 (2.7%)	ineffective (0.0%)
Job rotation	54 (72.0%)	12 (16.0%)	5 (6.7%)	3 (4.0%)	1 (1.5%)
Group discussion	32 (42.7%)	20 (26.7%)	7 (9.3%)	12 (16.4%)	4 (5.3%)
Lecture	20 (26.7%)	17 (22.7%)	17 (27.7%)	12 (16.0%)	9 (12.0%)
Understudy	8 (10.7%)	7 (9.3%)	9 (12.0%)	15 (20.0%)	36 (48.0%)
Role Play	12 (16.0%)	16 (21.3%)	9 (12.0%)	15 (20.0%)	23 (50.7%)

Source: Field data (2019)

Table 4.14 shows how respondents viewed training methods used by NBC bank in terms of their effectiveness in equipping them with skills and knowledge they required for performing their tasks at work.

In row (i), Table 4.14 shows that 68% of the respondents found mentoring/coaching most effective, 20.5% found it effective, 2.7% ineffective and 9.3% were unsure.

In row (ii), Table 4.14 shows that 72% of the respondents found job rotation most effective, 16.0% found it effective, 5.5% ineffective and 6.7% were unsure.

In row (iii), Table 4.14 shows that 42% of the respondents found group discussion most effective, 26.7% found it effective, 2.7% ineffective and 9.3% were unsure.

In row (iv), Table 4.14 shows that 26% of the respondents found lectures most effective,

22.7% found them effective, 26.0% ineffective and 27.7% were unsure.

In row (v), Table 4.14 shows that 10.7% of the respondents found understudy most effective, 9.3% found it effective, 68% ineffective and 12.0% were unsure.

In row (vi), Table 4.14 shows that 16% of the respondents found role play most effective, 21.1% found it effective, 70.7% ineffective and 12.0% were unsure.

These results in Table 4.14 (rows i to vi) further suggest that job rotation is the most effective method of on-the-job training method followed by mentoring/coaching and then group

discussion. Other training methods are not that effective. The results agree with those results in Table 4.13

(iv) Effect of T & D on Improving Employees' Skills and Knowledge

Table 4.15 shows that 81.3% of the respondents (employees) said "Yes" that T & D programs have improved their skills and knowledge to do their jobs, and 18.7% were of the view that T & D programs did improve their skills and knowledge to some extent.

Overall, T & D programs have improved skills and knowledge of most employees (81.3%) at NBC bank in Mwanza city.

Table 4.15 Training has improved skills and capabilities

Response	Frequency	Percent
Definitely Yes	61	81.3
Yes but to some extent	14	18.7
Total	75	100.0

Source: Field data (2019)

(v) Employees' Satisfaction with T & D Methods

Table 4.16 Satisfaction with training methods used by NBC bank

Response	Frequency	Percent
Yes	27	36.0
No	48	64.0
Total	75	100.0

Source: Field data (2019)

Table 4.16 indicates that only 36.0% of the employees were completely satisfied with training methods used by NBC bank while the majority (64.0%) were not satisfied. These results suggest, the mostly used methods on T & D programs by NBC bank need to be reviewed and evaluated to improve their effectiveness. One interviewee commented.

"Sometimes we are given these groups discussion and lecture type of training, but most of the time they are not relevant to our specific job activities. They are wastage of time we need more on task related training and job rotation type of training multi skill and break the boredom of being in one job for long time" (Interview 4).

This comment demonstrates that job rotation and job mentoring and coaching are not commonly used at NBC bank although they have been ranked as the most effective methods for T & D programs (Tables 4.13 and 4.14).

Research Objective 4: To determine the effect of training and development programs toward employee and organizational performance at NBC bank in Mwanza City

(i) Effect of T & D Programs on Employees Performance (employees perspective)

Table 4.17 Effect of T & D programs on employees’ performance (employee perspective)

Statement	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	Count	%	Count	%	Count	%	Count	%	Count	%
T&D sessions of NBC helped me acquire new skills	4	5.3	0	0.0	2	2.7	33	44.0	36	48.0
T&D helped me perform my tasks efficiently & effectively	2	2.7	0	0.0	2	2.7	35	46.7	36	48.0
T&D helped me serve customers better and faster	2	2.7	0	0.0	4	5.3	33	44.0	36	48.0
Training motivates workers to work hard	2	2.7	2	2.7	7	9.3	33	44.0	31	41.3
T&D increase job satisfaction and morale	3	4.0	1	1.3	5	6.7	35	46.7	31	41.3
T&D improves effective management of complaints	3	4.0	0	0.0	5	6.7	35	46.7	32	42.7
T&D have helped me work well	2	2.7	1	1.3	3	4.0	39	52.0	30	40.0
When I arrive from training I am encouraged to share my experience	2	2.7	1	1.3	3	4.0	34	45.3	35	46.7

Source: Field data (2019)

Table 4.17 shows the effect of T & D programs on employees’ performance from employees’ perspective. That is, self-evaluation by employees according to their experience.

In row (i), Table 4.17 shows that 92.7% of the respondents (employees) agreed/strongly agreed that T & D programs have helped them to acquire new skills while 5.3% strongly disagreed with that statement and 2.7% were neutral.

In row (ii), Table 4.17 indicates that 94.7% of the respondents (employees) agreed/strongly agreed that T & D programs have helped them perform their tasks effectively and efficiently, while 2.7%, strongly disagreed with that statement and 2.7% were neutral.

In row (iii), Table 4.17 shows that 92.0% of the respondents (employees) agreed/strongly agreed that T & D programs has helped them to serve customers better and faster, while

2.7% strongly disagreed with that statement and 5.3% were neutral.

In row (iv), Table 4.17 shows that 85.3% of the respondents (employees) agreed/strongly agreed that T & D programs motivates them to work harder at their jobs while 5.4% disagreed/strongly disagreed with that statement and 9.3% were neutral.

In row (v), Table 4.17 shows that 88.0% of the respondents (employees) agreed/strongly agreed that T & D programs increase job satisfaction and morale, 5.3% disagreed /strongly disagreed with that statement and 6.7% were neutral.

In row (vi), Table 4.17 shows that 87.4% of the respondents (employees) agreed/strongly agreed that T & D programs improve their ability to manage customers complaints, 4.0% strongly disagreed with that statement and 6.7% were neutral.

In row (vii), Table 4.17 shows that 92% of the respondents (employees) agreed/strongly agreed that T & D programs have helped them to work well at their jobs, while 4.0% disagreed /strongly disagreed with that statement and 4.0% were neutral.

In row (viii), Table 4.17 shows that 92.0% of the respondents (employees) agreed/strongly agreed that T & D programs encouraged them to share their experience with fellow workers and gives some kind of excitement at work, while 4.0% disagreed /strongly disagreed with that statement and 4.0 % were neutral.

These results in Table 4.17 suggest that T & D programs have a positive and significant effect on employees’ performances. These results agree with previous studies by Oghomhe et al (2016) in their Nigerian study, that T & D programs offered to bank staff resulted in efficient performance of their functions. The results further concur with research by Athar and Shah (2015) in their study of banks in Karachi (Pakistan) that T & D programs motivate employees, and that motivation had a strong positive relationship with employees’ performance.

Thus, T & D programs of every organization such as commercial banks are designed to improve employees’ skills and knowledge that lead to improved job performance. This observation was equally summed by a comment from one employee.

“I enjoy going for training because /go there to learn things that will help me to perform my job better than before. Most importantly after that training I am motivated to put into practice what I have learnt for example providing better customer service and time management. This in long-run also improves organizational reputation and overall performance which is the ultimate goal of employee training” (Respondents 17).

These comments further confirms that T & D programs should part and parcel of organization strategic plan for human resource is the engine and drivers of organization performance.

(ii) Effect of T & D programs on employees’ performance (management perspective)

Table 4.18 Effect of T & D programs on employees’ performance (management perspective)

Statement	Neutral		Agree		Strongly agree	
	Count	%	Count	%	Count	%
T & D motivates employees to work hard	0	0.0	5	100.0	0	0.0
T & D increases efficiency and quality of work output	0	0.0	3	60.0	2	40.0
T & D increases job satisfaction and morale	0	0.0	5	100.0	0	0.0
T & D promote working relationship	1	20.0	2	40.0	2	40.0
T & D contributes to improvement of staff skills	0	0.0	4	80.0	1	20.0
Training leads to a better understanding of bank mandate	0	0.0	3	60.0	2	40.0
Overall, T & D has positive influence on performance	0	0.0	3	60.0	2	40.0

Source: Field data (2019)

Table 4.18 shows the effect of T & D programs on employees’ performance from management perspective.

In rows (i), (ii), (iii), (iv), (v), (vi), and (vii), table 4.18 shows that 100.0% of the management agreed/strongly agreed that T & D programs motivate employees to work harder, increases their efficiency at work and quality work output, increase job satisfaction and work morale, contribute to improvement of skills, lead to better understanding of bank mandate and overall it influences work performance.

However, in row (iv), Table 4.18 shows that 80.0% of the management agreed/strongly agreed that T & D programs promote strong working relationship and 20% were neutral with that statement. This implies that this area concerning building a working relationship between workers, needs some improvement since working relationship is an essential part of the bank activities as each section of the bank has some bearing on another section.

Overall, the results of both Tables 4.17 and 4.18 suggest that both employees and management agree that T & D programs have a positive impact on staff performance. This recognition is vital as

both groups see this HR activity as an important part of internal marketing, which is about developing people (staff) to deliver service quality.

One manager commented:

“We take T & D programs of our staff seriously because if these workers are not skilled and have adequate knowledge of our product, it is difficult to deliver superior service to our clients. The employees are the bank so to speak. They need to be trained on technical and interactive skills which empowers them and this helps to promote teamwork in the bank”

This comment drives the point home that T & D programs are dispensable activity of an organization especially in a competitive industry such as that of banking. This importance was also emphasized and demonstrated by a recent study by Afrox (2018) in Bangladesh banking industry that there is a strong relationship between employees training and employees’

performance. It further illustrated that the more the employee gets training, the more efficient their level of performance will be.

(ii) Effect of T & D Programs on Organizational Performance

Table 4.19 shows that the effects of T & D programs on organization performance. In particular in rows (i), (iii), (iv) all the respondents (management) unanimously agree/strongly agreed that T & D programs have a strong influence on employees’ performance, strong influence on customer satisfaction and strong influence on quality of service delivery all of which are the indicators of organizational performance. These results agree with previous studies by Ng’ang’a et al (2013) in their Kenyan study of commercial banks which established that there is a positive correlation between T & D programs and organizational performance.

Table 4.19 Effect of T & D Programs on Organizational Performance

Statement	Neutral		Agree		Strongly agree	
	Count	%	Count	%	Count	%
T & D programs have strong influence on employees’ performance	0	0.0	4	80.0	1	20.0
T & D programs have strong influence on organizational performance	1	20.0	3	60.0	1	20.0
T & D programs have strong influence on customer satisfaction	0	0.0	4	80.0	1	20.0
T & D programs have strong influence on quality of service delivery	0	0.0	2	40.0	3	60.0

Source: Field data (2019)

In row (ii) Table 4.19 shows that 80% of the respondents (management) agreed /strongly agreed that T & D programs have a strong influence on organizational performance while 20% were neutral to that statement. These results suggest that there are other factors such as motivation, customer service and use of modern technologies besides T & D programs, which contribute to organizational performance. Nevertheless, T & D is one of the major contributors to organizational performance.

Other Issues Raised in the study

Several extra issues were raised by employees during the interview. Some employees commented that the e-training which was implemented at NBC bank was not well understood and would have preferred to do off job training for new technology related training.

Other employees were concerned that most of the T & D programs offered at NBC bank are not planned according to the market requirements. That is, some training programs offered by

NBC bank were not relevant to employees’ job requirements. Even some members of the management concurred with this employees’ observation. Some also suggested that NBC bank should increase the time that employees are on training as most of the information in the current training programs are rushed through during training and employees do not have time to digest the material which is contrary to best practices in employees’ training programs. However, the management thought their T&D system is very systematic and aligned well with achievement of the organizational goals.

Besides, some employees and management suggested that even their customers ought to be trained especially with the self-service technology such as e-banking and mobile phone banking. Doing so would minimize the number of customers’ complaints and save desk service time.

The employees as well as management further indicated that motivation should be attached to training programs because it is part and parcel of other factors that go hand-in-hand with

enhancing employees' performance. At the moment that linkage is absent in NBC bank training programs. The management further suggested that future TNA should also look at technical analysis as it appears to be over looked in the current training programs. Overall, both employees and management emphasized that T & D programs offered by NBC bank should be geared towards meeting the needs of their customers, which is the central piece for the long-term existence of the bank.

V. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

Research Objective 1: To identify how Training Needs Assessment is conducted at

NBC bank in Mwanza City

NBC bank has over the past year has been involved in T & D activities for its employees. The data collected from questionnaires and some interviews indicate that every employee at NBC bank is given an opportunity to go for training and TNA is done prior to designing and running T & D programs. The purpose of the training and development programs are to equip employees with new skills and capabilities identified in TNA for different workers in each department; most of the TNA at NBC bank is done by employees' supervisors, and during the annual appraisal process. The research findings also reveal that employees' training needs are related to the organizational goals and are part of the bank mandate.

Research Objective 2: To determine the Training and Development (T & D) policies, practices and procedures at NBC bank in Mwanza City.

The study reveals that NBC bank has T & D policies and procedures which are also available to staff. In those policies, there is a provision that T & D programs should allow workers to rise through ranks of NBC bank. The research has also found that T & D programs are considered by the majority of employees to be planned and systematic. The management also concurred with the views expressed by employees on T & D policy and taking T & D as part of NBC bank business strategy. However, their T & D programs do not sponsor their staff for further studies although the bank grants workers leave to do examinations in their privately sponsored studies.

Research Objective 3: To determine the Training and Development Methods used on Employees at NBC bank in Mwanza City.

The study indicates that every employee surveyed in this research has attended T & D programs sponsored by NBC bank. The employees indicated that although they were trained on-job training with different methods, they preferred mentoring and coaching and job rotation because they benefited most in terms of acquiring skills and knowledge to effectively and efficiently perform their specific daily tasks. Overall, employees indicated that T & D programs have improved their skills and capabilities. However, they expressed dissatisfaction with some training methods such as group discussion classroom type and role play type of training because most of the activities did not relate directly to their work situation

Research Objective 4: To determine the effect of Training and Development

Programs toward Employee and Organizational Performance at NBC bank in Mwanza. City

The research findings reveal that T & D programs sponsored by NBC bank have helped employees to acquire new skills, improved their ability to serve customers better and faster, motivated employees, and has generally improved workers' morale and job satisfaction, all being indicators of employees' performance. These findings are broadly in consistence with prior HR literature on training and development. Furthermore, the results of this study reveal that T & D programs have a strong influence on employees' performance, customer satisfaction and quality of service delivery. The study also establishes that T & D programs have a strong influence on overall organizational performance but also notes that T & D programs are one of the factors contributing to organizational performance. Other factors such as employees' motivation, use of modern technologies and marketing also contribute to the organizational performance.

Clearly the overwhelming majority of management (over 80%) do believe that T & D programs have a positive and significant effect on both employees' performance and overall organizational performance. The study further establishes that T & D programs are relevant and consistent with the organizational business strategy or policy setting and it is compulsory practice on training. However, it also establishes that the employees are dissatisfied that NBC bank has not offered them opportunity to go for further studies as part of their development and career progression.

Conclusion

The study sought to investigate the effect of employees' training and development practices on organizational performance in Tanzanian banking industry, a case of NBC in Mwanza city.

The findings in this research indicated that NBC does TNA before its T&D programs, uses different methods to train non-managerial employees such as mentoring, lecture style, role play and job rotation such T&D have improved employees' skills and knowledge to perform better at their work. The finding from the study also indicates that NBC bank organizes training programs from time to time for its employees for the purpose of equipping them with and updating their knowledge and skills to ensure high level of efficiency. The employees were generally satisfied with the training methods used. Overall, T & D has positively affected employees' performance and consequently organizational performance. From the results of the study, it can be concluded that NBC bank has a well-established policy that has guided them to invest in training and development of its employees; however, the processes involved are being not duly followed at branch level.

Recommendations

T&D interventions/programs at the NBC bank was found to be effective in impacting its employees with skills and knowledge relevant to their work. However, the influence of T&D on employees' job performance was found to be moderate, indicating that other factors can impact employees' job performance. Therefore, any organization such as NBC bank that wishes to be productive should make T & D part of its strategic business plan.

Training and development is only one of the human resources activities that HR department ought to do to improve organizational performance. Without incorporating other practices such as motivation, its impact may be limited. Therefore, NBC bank HRM department should strategically and methodologically develop human resource bundles packages that are designed to achieve the desired organizational performance.

The study reveals that the NBC did not seem to have training objectives well-articulated to employees according to organization, goals. The HRM department at head office in conjunction with HR at each branch, should clearly state the results of each employee, what change is required in terms of employees' knowledge, skills, attitude and behaviours. The training goals should be specific, tangible verifiable, timely and measurable and such objectives should be made clear to both the branch manager and employees because they can be used to evaluate their success.

It was also noted from interview that NBC bank has a performance system. The performance appraisal information which is used yearly at NBC bank to assess employees' performance should identify their performance problems and ways they can improve their performance through training and development programs.

Motivation seeks to enhance employees' morale to work hard and thus increase organizational productivity. It is with premise that NBC bank should initiate a policy for motivation attached to training programs.

Finally, it is critical that NBC bank should evaluate the T&D programs they offer to their employees in order to assess their effectiveness in producing the specific learning outcomes specified in the training programs and to indicate where improvement or changes are required to make training even more effective.

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A Quasi Experimental Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge regarding Prevention and Warning Signs of Cervical Cancer among Women in Selected Areas of Jalandhar, Punjab, 2019.

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DOI: 10.29322/IJSRP.9.08.2019.p9263

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9263>

ABSTRACT:- Cervical cancer is the second most common cancer in women worldwide & is most common cancer causing death in the developing countries.¹ Sexually transmitted human papilloma virus (HPV) infection is the important cause of cervix intraepithelial neoplasia and invasive cervix cancer. Women have little awareness about cervical cancer that contribute significantly for prevalence of disease. Cervical cancer screening using Pap smear provides an appropriate way for early detection & prevention of cervical cancer.

So, Investigator planned to check the Effectiveness of Structured Teaching Programme on Knowledge regarding Prevention and Warning Signs of Cervical Cancer among Women in Selected Areas of Jalandhar, Punjab, 2019.

Aim Of The Study :- To enhance the knowledge regarding prevention and warning signs of cervical cancer among women through structured teaching programme. **Method and material:-** quasi experimental research design was used. The study was conducted on 100 women and was selected through convenient sampling technique, women of above 35 years of age in selected areas of Jalandhar. Data was collected by using socio demographic variables sheet and structured knowledge questionnaire. **Statistical analysis:-** Collected data was analyzed by descriptive and inferential statistics.

Result:- revealed that in experimental group there was significant ($t_{cal} 30.012 > t_{tab} 1.96$ at $p < 0.05$) difference between pretest (12.48 ± 2.150) and posttest (24.80 ± 1.959) knowledge of women. Whereas in control group there was no significant ($t_{cal} 1.426 < t_{tab} 1.96$ at $p < 0.05$) difference between pretest (13.060 ± 1.910) and posttest (13.34 ± 1.858) knowledge of women. There was association of menstrual status of women in experimental group with post test knowledge and whereas in control group association of occupation, qualification and residential area with post test knowledge regarding prevention and warning signs of cervical cancer among women.

Conclusion:- The structured teaching programme was effective in providing knowledge regarding prevention and warning signs of cervical cancer among women in experimental group.

Key Words: Knowledge, Structured Teaching Programme, Prevention, Warning Signs, Cervical Cancer.

INTRODUCTION

“Cancer is only going to be a chapter in your life, not the whole story”.

Human body is made up of cells which are the structural and functional unit of the body.² When abnormal proliferation and mutation occur in normal cell growth then it leads to cancer.³

There are different types of cancers among men and women that affect their health status. Most common cancer among men is: esophageal cancer, stomach cancer, lung cancer, prostate cancer, and urethral cancer. Common cancers among women are breast cancer, ovarian cancer, and most common cancer that is leading to death is cervical cancer.⁴

Cervical cancer begins when healthy cells on the surface of the cervix change and grow out of control, forming a mass called a tumor.⁵ A tumor can be cancerous or benign. A cancerous tumor is malignant, meaning it can spread to other parts of the body. A benign tumor means the tumor will not spread.⁶

Cervical cancer is the commonest cancer cause of death among women in developing countries. Mortality due to cervical cancer is also an indicator of health inequities, as 86% of all deaths due to cervical cancer are in developing, low- and middle-income countries.⁷ Cervical cancer is both preventable and treatable disease. Racial and ethnic minorities and those of low socio-economic status tend to experience the greatest morbidity and mortality due to cervical cancer. Cervical cancer is the cancer that starts in the cervix, the lower part of the uterus that opens at the top of the vagina. It usually develops very slowly. It starts as a precancerous condition called dysplasia. The precancerous condition can be detected by Pap smear and is 100% treatable. The American cancer society estimated that in 2017, approximately 12,820 American women will be diagnosed with cervical cancer and 4,210 will die from the disease. Most instances will be diagnosed in women who are between the age 20 and 50.⁸

Cervical cancer comes next only to breast cancer in terms of mortality rate which is high in Indian women. Cancer of cervix is the third most common cancer with estimated 1 lakh new cases in 2016 and about 1.04 lakh during 2020. Cancers

associated with the use of tobacco account for about 30 percent of all cancers in males and females, the ICMR said.⁹

The two preventive strategies for cervical cancer include screening and vaccination. In India 3.1% get screened, leaving a large population vulnerable to death from the disease.¹⁰ If cervical abnormalities are detected at an early stage the abnormal tissue can be excised using day care and minimally invasive surgical procedures. Regular screening and follow up care can prevent most deaths from cervical cancer. The health care reform act covers cervical cancer screenings, part of a “well-women visit.” Because it usually takes several years for normal cells in the cervix to turn into cells, it’s imperative to get regular screenings, either with a Pap smear test or HPV DNA test. And other diagnostic tests are colposcopy, chest X-ray, CT-scan, MRI and pelvic ultrasound.¹⁰

Almost all cervical cancers are caused by the sexually transmitted human papilloma virus. Human Papilloma Virus is associated with 50,000 new cases of cervical cancer and 250,000 associated cervical cancer deaths worldwide each year.² It also causes vulvar, vaginal, anal, and penile cancers as well as precancerous lesions of vulva/vagina, genital warts, and respiratory papillomatosis. HPV infections are asymptomatic, and generally, individuals are not aware of being infected, thus facilitating the spread easily and unknowingly.¹¹

The human papilloma virus (HPV), which spreads through sexual contact, causes cervical cancer. Most women's bodies can fight the HPV infection before it leads to cancer. At least 50% of men and women acquire genital HPV infection during their lifetime. All sexually active women are infected with HPV at least once during their lifetime, and the highest prevalence is seen soon after the onset of sexual activities.¹²

There are two types of HPV, 16 and 18 accounting for approximately 60 to 70% of cervical cancer cases. HPV are higher among adolescents, young adults and population with low-economic status. More common risk factors for cervical cancer are having sex at an early age, multiple sexual partners,

and poor socio-economic status, smoking, weakened immune system, several pregnancies, long term use of the contraceptive pills, family history.¹²

Cervical cancer may spread within the pelvis, to the lymph nodes and elsewhere in body. Signs of cervical cancer are weight loss, fatigue, back pain, leg pain, leakage of urine or feces from the vagina, bone fractures and symptoms are: vaginal bleeding, unusual vaginal bleeding and pelvic pain. Cervical cancer is treated with radiation, chemotherapy and also with hysterectomy or partial removal of affected part of uterus and cervix.¹³

Cervical cancer is prevented by maintaining good personal hygiene, Avoiding smoking and alcohol consumption, avoidance of multiple sexual relationships, by giving knowledge on sex education and use of cervical cancer vaccination before marriage and sexual relationship. A vaccine to prevent cervical cancer is now available. "The United States Food and Drug Administration" approved the vaccine for cervical cancer i.e. Gardasil and cervarix which cost around Rs.10000 for 3 shots, which prevents infection against two types of HPV responsible for most cervical cancer cases.¹⁴

Most of the people were not aware about the warning signs of cervical cancer, which may not cause any symptoms at first (when they are pre-cancers or early cancers), but later on, may affect with pelvic pain or vaginal bleeding. warning signs of cervical cancer are Bleeding after intercourse, Bleeding after menopause, Bleeding between periods, Bleeding after douching, Bleeding following a pelvic examination, Having heavier menstrual periods than usual or ones that last longer than usual, Unusual vaginal discharge, Pain during sex, Pelvic pain.¹⁵

Singh V, Sehgal A et-al (2012) An exploratory study was conducted among public aged between 25-54 years of age to explore the knowledge, attitudes and behaviors of people regarding warning signs of cancer and prevention of cancer in midlife. A questionnaire was administered to a representative sample of population listing 17 warning signs of cancer. The objective of the study was to assess the

sensitivity and specificity of visual inspection of cervix for detection of precancerous and early cancerous lesions of cervix. In this study 402 women underwent a detailed pelvic examination, visual inspection of cervix after 5% acetic acid application cytology (Pap smear), colposcopic examination and colposcopic directed biopsy when indicated. The result showed that the sensitivity of cytology (75.3%) was higher compared to that of acetic acid application (52.6%). This study recommended that screening for cervical precancerous and cancerous lesions using visual inspection aided by acetic may be a suitable low-cost and a feasible alternative modality for control of cervical cancer in a resource poor setting. For the treatment of cervical cancer, 80 to 90% of women with stage I cancer and 50 to 65% of those with stage II cancer are alive 5 years after diagnosis. Only 25 to 35% of women with stage III cancer and 15% or fewer of those with stage IV cancer are alive after 5 years.¹⁶

MATERIAL AND METHOD:-

Study Design and sample: A Quasi experimental research design was used for study. Sample was women from selected areas of Jalandhar, Punjab. Non probability i.e. convenient sampling technique was used. So, in present study the effectiveness of structured teaching programme was assessed on knowledge regarding prevention and warning signs of cervical cancer among women in selected areas of jalandhar, punjab, 2019.

Data collection and study tool: Prior to commencing the task of data collection formal permission was taken from the concerned authority and data was collected from 100 women in selected areas of Jalandhar. Data was collected by structured knowledge questionnaire related to prevention and warning signs of cervical cancer. Written informed consent was taken from each study sample. On the first day pre test was taken from control and experimental group and structured teaching programme was administered to experimental group and on the seventh day post test was taken from control and experimental group.

Result section:-

socio demographic characteristics of sample

There was association between post test level of knowledge of women regarding prevention and warning signs of cervical cancer and their socio demographic variables was significant between menstrual status of women in experimental group and occupation, qualification and residential area of women in control group.

9. Family history of cervical cancer

a. Yes	00	0%	00	0%
b. No	50	100%	50	100%

10. Source of information related to cervical cancer

a. Family	1	2%	02	4%
b. Friends	04	8%	06	12%
c. Mass media	10	20%	11	22%
d. Health personnel	35	70%	31	62%

Variables	Experimental group		control group	
	n=50		n=50	
	f	%	f	%

1. Age (in years)

a) 35-40	23	46%	21	42%
b) 40-45	19	38%	16	32%
c) 45-50	07	14%	11	22%
d) ≥ 50	01	02%	02	04%

2. Occupation

a) Homemaker	32	64%	37	74%
b) Self- Employed	09	18%	09	18%
c) Private Job	04	08%	02	04%
d) Government Job	05	10%	02	04%

3. Qualification

a. No formal Education	14	28%	21	42%
b. Primary	19	38%	20	40%
c. Secondary	10	20%	08	16%
d. Graduate and above	07	14%	01	02%

4. Marital status

a. Married	48	96%	48	96%
b. Unmarried	00	0%	00	00%
c. Divorce	01	2%	00	00%
d. Widow	01	2%	02	04%

5. Monthly Family income (in rupees)

a. ≤10,000	08	16%	17	34%
b. 10,001-20,000	24	48%	20	40%
c. 20,001-30,000	12	24%	09	18%
d. ≥30,000	06	12%	04	8%

6. Residential Area

a. Rural	25	50%	25	50%
b. Urban	25	50%	25	50%

7. Total number of pregnancies

a. 1	14	28%	20	40%
b. 2	30	60%	26	52%
c. 3	06	12%	03	6%
d. 4 or more	00	0%	01	2%

8. Menstrual status of women

a. Menstruating	48	96%	45	90%
b. Menopause	02	4%	05	10%

frequency and percentage distribution of [pretest knowledge on prevention and warning signs of cervical cancer.

Level of knowledge	Score	Experimental group		Control Group	
		f	%	f	%
Good	21-30	00	00	00	00
Average	11-20	40	80	44	88
Poor	0-10	10	20	6	12

frequency and percentage distribution of [pretest knowledge on prevention and warning signs of cervical cancer.

Level of knowledge	Score	Experimental group		Control Group	
		f	%	f	%
Good	21-30	49	98	00	00
Average	11-20	01	02	46	92
Poor	0-10	00	00	04	08

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Observance of Results-based Performance Management System (RPMS) Guidelines and Calamba East District Teachers' Performance

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DOI: 10.29322/IJSRP.9.08.2019.p9264

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9264>

Abstract

This study mainly focused on the observance of RPMS guidelines and the Calamba East District teachers' performance and the development of an action plan that can enrich the utilization of RPMS and eventually improve the performance of the teachers. The descriptive research was utilized wherein a survey questionnaire was the primary source of data provided by seven school heads and the 162 teachers of Calamba East District for School Year 2015 – 2016 using the simple random sampling technique.

The findings revealed that the guidelines of the RPMS in its first phase which is performance planning and commitment are highly observed while in the latter phases which are performance monitoring and coaching; performance review and evaluation; and performance rewarding and development planning are only observed. The results showed that the assessments of the two groups of respondents on the observance of the guidelines of RPMS are not significantly different in the four phases/stages of RPMS. The teachers of Calamba East District obtain very satisfactory in their performance rating for S.Y 2014-2015. The study also revealed that the observance of the RPMS guidelines is not directly helpful in improving the performance of teachers of Calamba East District.

The implementation of the RPMS in Calamba East District is still ineffective since the observance of its guidelines is still vague for some school heads and teachers; Calamba East District teachers have done their best to earn a very satisfactory rating in teaching performance but still lack certain competencies to perform more expertly; and school heads and teachers both agree that the implementation of RPMS still needs improvement and a series of orientations are still needed in order to appreciate the entire system are the conclusions drawn based on the findings of the study.

Keywords: *performance management system, results-based performance, teachers' performance*

Introduction

Education plays an important role not only in individuals' life but in the entire community or society. It is through education that people gain knowledge and broaden their understanding about the world. It is also through this that people get respect and recognition. Education also helps in generating an advanced community. However, this can only be possible depending on the kind and level of education being provided by schools, with the help of the

teachers. For this reason, teachers' performance must be properly evaluated in order to assure the effectiveness of the teachers. Using the appropriate performance management system is very important.

The Department of Education is using the Results-based Performance Management System in evaluating the performance of the teachers. It is aligned with the strategic Performance Management System (SPMS) which has 4 phases/stages: Performance Planning and Commitment, Performance Monitoring and Coaching, Performance Review and Evaluation and Performance Rewarding and Development Planning. Despite the clear objectives of the use of Results-Based Performance Management System in evaluating the teachers in order to determine their effectiveness, still it encounters challenges and problems. In this regard, there is really a need for a study that will determine the relationship between Results-Based Performance Management System and the teachers' performance.

Objectives of the Study

The main objectives of the study were as follows.

1. To assess the observance of the guidelines of the RPMS with regard to its four phases or stages of implementation.
2. To recognize the performance rating of teachers for school year 2014-2015.
3. To determine the perception of the teachers and school heads on the observance of the guidelines of the RPMS.
4. To point out the relationship of the observance of RPMS and teachers' performance.
5. To develop an action plan can be offered to enrich the utilization of RPMS and to improve teachers' performance.

Methodology

Sample and Data Collection

The respondents of the study were the public secondary school heads and teachers of the selected secondary public schools in Calamba East District. Calamba East District has seven (7) public secondary schools, namely: Calamba Bayside National High School-TechVoc, Calamba Bayside National High School-SPA, Calamba City Science High School, Calamba National High School-Main, Calamba National High School-Annex, Barretto National High School, and Lecheria National High School. The total number of respondents was identified using stratified sampling technique. The teacher-respondents were selected using the simple random sampling technique. Thus, it is necessary to first ask permission from the school that will undergo the survey. The researcher sought permission from the Schools' Division Superintendent of Calamba City through a formal request to in order to distribute and retrieve questionnaires from the respondents. The request letter was signed and approved by the said authority prior to the schedule of data gathering. Moreover, a permission letter was also obtained to retrieve copies of teachers' performance ratings covering school year 2014 – 2015. Afterwards, two hundred questionnaires were sent out. After eliminating invalid questionnaires, 169 (84.5%) were retained for analysis.

Measures

A one-part questionnaire was used in the study which assessed the observance of the RPMS guidelines of school head and teachers in Calamba East District based on its four phases

or stages. The mean scores of respondent groups on the observance of RPMS guidelines are used to test learning performance of students. Items in all scales were rated using a four-point Likert Scale, ranging from 1 (not observed) to 4 (highly observed).

To evaluate the performance of teacher respondents the researcher used the previous result of the performance evaluation using the CB-PAST index of performance, if the summative rating is 3.51 or higher and no performance index of below proficient in any of the standards it means that the teachers' performance is **outstanding**; if the summative rating is 2.51 or higher and no performance index of below basic in any of the standards therefore the performance is **very satisfactory**; and if it is 1.51 or higher and no performance index of below basic in any of the standards then the teachers; performance is **satisfactory**, while if the summative rating is 1.00 or above with at least one performance index value below basic in any of the standards therefore the performance is **below basic**.

Proceedings

The questionnaire was developed based on the RPMS guidelines given by the Department of Education (DepEd). All the indicators presented in the researcher-made questionnaire was also aligned and followed the four-phase cycle of the RPMS consistent with the Civil Service Commission SPMS that provided the most important aspects to be evaluated, which were later reflected in the different items. The survey questionnaire was evaluated by the three experts. Two experts were from the Department of Education since RPMS was the focus of the study and which was the primary evaluation tool being used by the department to evaluate the teachers, and the other one was from the private sector which the researcher believes can give a suggestion to better improve the instrument. After getting the suggestions from them, the three agreed that the first part of the survey questionnaire which was about the profile of the respondents be removed since it was not part of the researchers' Statement of the Problem. Then, they recommended that the instrument be used for collecting the needed data.

Data Analysis

Raw data was converted into meaningful data through SPSS. The data needs to be edited, classified and tabulated so that it may become worthwhile for the required purposes. In order to draw conclusions, the collected data was analyzed and presented in the form of tables. Collected data was analyzed by using Pearson product-moment correlation.

Results

1. Observance of RPMS Guidelines

1.1. Performance Planning and Commitment

In terms of Performance Planning and Commitment, the school heads and teachers of Calamba East District assessed that the observance of RPMS guidelines is highly observed with a general assessment of 3.56.

1.2. Performance Monitoring and Coaching

The general composite assessment of 3.36 expressed that as a whole the guidelines are observed only in the implementation of RPMS in terms of monitoring and coaching with a general assessment of 3.36.

1.3. Performance Review and Evaluation

In terms of performance review and evaluation, this phase garnered a general assessment of 3.44 stating that the guidelines are observed.

1.4. Performance Rewarding and Developmental Planning

The general assessment yielded that guidelines are observed in terms of performance rewarding and developmental planning with a mean of 3.44.

2. Calamba East District Teachers’ Performance Rating for School Year 2014-2015

The mean average of 3.17 reveals that the performance of the teachers of Calamba East District is very satisfactory.

3. Difference between the Assessments of the Two Groups of Respondents on the Observance of the RPMS Guidelines

Table 1 revealed that there is no difference between the assessments of the two groups of respondents on the observance of the guidelines of Results-based Performance Management System.

Table 1 Comparison of Assessments of School Heads and Teachers on the Observance of RPMS Guidelines

AREAS	RESPONDENTS	GENERAL ASSESSMENT	T-VALUE	P-VALUE	DECISION	REMARKS
Performance Planning and Commitment	School heads	3.62	-.825	0.411	Accept Ho	NO Significant Difference
	Teachers	3.50				
Performance Monitoring and Coaching	School heads	3.34	.209	0.835	Accept Ho	NO Significant Difference
	Teachers	3.37				
Performance Review and Evaluation	School heads	3.47	-.377	0.707	Accept Ho	NO Significant Difference
	Teachers	3.41				
Performance Rewarding and Development Planning	School heads	3.51	-.858	0.392	Accept Ho	NO Significant Difference
	Teachers	3.46				

Test Used: t-Test @ 0.05 level of significance

4. Relationship between the Assessed Observance of RPMS and the Teachers’ Performance Rating

Table 2 showed that there is no significant relationship between the assessed observance of RPMS and the teachers’ performance rating in all the aspects.

Table 2
Correlation between Teachers’ Performance Rating and Assessed Observance of RPMS Guidelines

Variable 1: Performance Rating	Variable 2: Guidelines of the RPMS			
	Performance Planning and Commitment	Performance Monitoring and Coaching	Performance Review and Evaluation	Performance Rewarding and Development Planning
Pearson Correlation	-.015	-.002	.091	-.002
Degree of Correlation	Very small	Very small	Very small	Very small
P-value	.851	.977	.251	.984
Decision	Accept Null hypothesis	Accept Null hypothesis	Accept Null hypothesis	Accept Null hypothesis
Remarks	No Significant Relationship	No Significant Relationship	No Significant Relationship	No Significant Relationship

Test Used: Pearson Correlation @ 0.05 level of significance

5. The Proposed Action Plan

The study necessitates an action plan based on the findings of the study focusing on the key areas: *performance planning and commitment*– to discuss education competencies and Position Competency Profile; *performance monitoring and coaching*– to conduct coaching and mentoring programs for the teachers; *performance review and coaching*– to evaluate, identify the strengths and development needs of the teachers; and *performance rewarding and developmental planning*- to create and implement action plan to achieve developmental needs.

Conclusions

Analysis of the data and findings of the study led the following conclusions:

1. That the implementation of the RPMS is still ineffective since the observance of its guidelines is still vague for some school heads and teachers. This can be attributed to the unclear view about the whole process- the sense of being fair and beneficial. The process could be failing because teachers fail to appreciate the system as there are no tangible benefits attached to it.
2. That Calamba East District teacher have done their best to earn a very satisfactory rating in teaching performance but still lack certain competencies to perform more expertly.
3. That school heads and teachers both agree that the implementation of RPMS still needs improvement and a series of orientations are still needed in order to appreciate the entire system.
4. That the observance of the RPMS guidelines is not directly helpful in improving the performance of teachers of Calamba East District.
5. That an action plan is necessary since it can be a way to enrich the utilization of RPMS and definitely improve the performance of teachers.

Recommendations

On the basis of findings following recommendations are made.

1. The Department of Education must conduct a series of seminars not only for the school heads being the raters, but as well as for the teachers since they are the ones who are being evaluated using the RPMS so that there will be no confusion in the observance of the guidelines of RPMS and proper implementation will be conducted.
2. The teachers must use varied ways in teaching in order to gain outstanding rating during performance evaluation. However, the school heads must also initiate some programs in order to support teachers in their professional development.
3. The school head and the teachers must have proper coordination in order to avoid problems and miscommunication when it comes to performance evaluation.
4. The result of the performance evaluation must not only be the basis in evaluating the teachers' performance since it has a very little association with teachers' effectiveness, instead thorough training of all levels of teachers is critical so that the system could be understood and appreciated by teachers. Adherence to the tenets of the Results-Based Management System could go a long way in addressing some of the performance issues raised by teachers.
5. After establishing facts and details on the observance of the guidelines on the implementation of Results-Based Performance Management System, the offered action plan highlighting key results areas should be taken into consideration by Calamba East District to enrich the utilization of RPMS and eventually improve the performance of teachers.
6. Future researchers may conduct further studies that will focus on the other aspects of Results-Based Performance Management System and its relationship to other facets of teaching.

The Determinants of Rural-Urban Migration: Malaysia Case Study

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DOI: 10.29322/IJSRP.9.08.2019.p9265

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9265>

Abstract - The purpose of this study is to determine the determinants of rural-urban migration in Malaysia. The annual data has obtained from 1988-2017 in Malaysia. There are various empirical approaches that have been employed in this study which are Augmented Dickey Fuller unit root test, Johansen-Jesulius Cointegration test, Vector Error Correction Model and Granger Causality test. The result shows there is absence of short run relationship between the population, household income, unemployment and poverty however the long run relationship between the variables are presence in rural while the urban has a short run and unidirectional causal relationship which is from the population to household income and the long run relationship between the variables also presence.

Keywords - Rural-Urban Migration; Malaysia; Time Series Analysis; Poverty; Population.

I. INTRODUCTION

The migration of migrants from rural areas to urban areas is an important process of the urbanization in developing countries. According to Purnomo (2009), the rural-urban migration is a process which will indirectly affect the urbanization and development of a country. This process is a natural process and it will deliver to the workforce destination. Due to this process, it impacts on the population movement flows and result in the rapidly growing population of the development of major cities. The overall data from The World Bank (2018) showed the total urban population in Malaysia has rose about from 48.2% or 8.21 million in 1988 to 76% or 24.03 million in 2017.

According to Yaakob and Masron (2010), the pull factors had an impact on migration process from rural areas to urban especially to cities or towns with the attraction of employment, education, social services etc. Other than that, other push factors from rural areas such as living environments, working conditions and environments, development opportunities and etc. also impact on this process (Lehmann et al., 2008). Urbanization is continuously occurring in a country which means that people migrate to cities or towns for a better standard of living. In other words, people migrate to urban areas because of people desire to find a better employment opportunities, educational opportunities and so on and this will result in development of a country (UNFPA, 2005). In addition, migration also is the way for people to get out from poverty trap and this will causing rapidly growing population of urban areas (Sari, 2009).

Internal migration able help migrants to increase their income level, enhance work experiences and also improve the life satisfaction level (Chamrathirong, 2007; Chowdury et al, 2012). However, Todaro (1980) argued that the rapid migration is not a best solution to solve the problem of labor demand in urban areas. According ro Chamrathirong (2007) and Todaro (1980), the rapid internal migration bring the rapid growth of population especially in urban areas and this phenomenon will motivate the people from rural areas migrate to urban areas in a short period of time. This will cause worsens in structural imbalances in terms of supply in urban and rural areas and also the growth of job seekers in urban areas imbalances.

Most migrants are more likely come from the former residents of poorest rural areas or from larger centers which with highest education level. There have many determinants affecting the movement of migrants from rural areas to urban, from between urban, from between rural areas and from urban to rural areas in Malaysia. Household income is the one of the factor on affecting the migrants move from the rural areas. It can be proven from the data of Department of Statistics (2018). For the mean monthly gross household income, household income for urban and rural areas, the household income gap between the two regions is very significant although total of household income for the two regions is seen to increase from year to year. In the year 1988, the mean of monthly gross income for urban household is RM 1,547 while the mean of monthly gross income for rural household is RM 919. For the year 2017, the average of monthly urban gross household income is RM 7,980 while the average of monthly rural gross household income is RM 4,660. Thus, it can be concluded that the household income gap for rural and urban areas is significant from 1988 until 2017. Other than that, unemployment rate and poverty rate also plays a role on the direction of migration.

II. LITERATURE REVIEW

Dahlan and Abdullah (1977) examined a study on trends of rural-urban migration in Peninsular Malaysia and its effects on migrant families. They used descriptive analysis to explain their observation on the trends of rural-urban migration in Peninsular Malaysia and its effects on migrant families. In this study, they concluded a proper and conducive home environment was the main factor affected the direction and patterns of rural-urban migration in Peninsular Malaysia because everything begins in the home. Thus, family plays an important role in community resource and they suggest government to have proper concern and develop family health development of migrants especially the poverty migrants.

A study conducted by Menon (1987) on job transfer as a determinant of migration in Malaysia. The researcher analyzed the migrants have to migrate most probably due to their jobs and careers depend on it. The jobs of most migrants are public servants, with managerial positions and with higher education. In other words, this means that forced employment are the main factor of migration in Malaysia.

Siwar and Yusof Kasim (1997) claimed that Malaysian urban poverty is lower than the rural poverty. However, this might be because of the way poverty is measured. Using income alone may not be sufficient enough. The living cost in rural and urban areas is different. Using a standard income measure will result in a lower poverty rate in urban areas than in rural areas. Using other socio-economic variables such as housing conditions, amenities and so on in measuring the incidence of poverty, might find higher poverty proportion in urban areas.

Rostam (2006) investigated on the patterns of population migration towards Klang Valley metropolitan peripheral areas in 1991 and 2000. Klang Valley experienced rapid growth of population due to Klang Valley expansion in the manufacturing and service activities. From the data, it can be seen that most migrants of Klang Valley were from Federal Territory Kuala Lumpur. In this study, the researcher analyzed the key factors affected the migrants migrate towards Klang Valley were the densely populated central areas of the metropolitan city, the high rent and price of houses in the central areas and the government decentralize policy which relocating the metropolitan city's functions to the peripheries.

Jali (2009) investigated on the movement of population in Malaysia in 1991 and 2000. He analyzed the movement of population categorized by three different levels which are the state level, the district level and the rural-urban level. The results showed that the short distance migration in Malaysia has decreased in recent years while the long-distance migration has increased most probably due to the higher living standard and better transportation infrastructures and facilities. He also found that the population of rural to rural migration higher than the population of rural to urban migration. He concluded that the rural to urban migration was no longer dominant in Malaysia but was the urban to urban migration. On the other hand, Yaakob, Masron and Masami (2010) examined the trends of urban migration in Malaysia from 1911 to 2000. From results of this study, he found that rapid population growth in urban areas of Malaysia occurred last nine decades especially during the 1980s and 1990s because the urbanization level in Malaysia rose about 18.4 percent from 1911 to 1970 and rose again

about 33.4 percent from 1970 to 2000. The rapid growth of urban population caused many problems to the basic needs of people such as housing, health, education, and sanitation facilities but the most serious problems were urban poverty and housing for the lower income group.

Hussain, Abdullah, and Abdullah (2014) studied on the relationship between rural and urban migration, household income and unemployment in Malaysia by using time series data from 1980 to 2011. The data used by the researchers showed that migration is positively affected by the household income level and negatively affected by unemployment rate for rural and urban migration in Malaysia. The methods they applied to analyze the data of the research are Augmented Dickey–Fuller (ADF) Test, Johansen Co-integration, Vector Error Correction Model (VECM) and Granger causality test to analyze the data of the research. For the unit root test result, all variables are significant at 5% and 10% significant level based on ADF test. The cointegration test result showed that at least one variable has a long run relationship with migration and the VECM showed that at least one variable has a short run relationship. For the Granger causality test, the results showed that migration is granger cause to household income and unemployment for the urban area while household income and migration are granger cause to unemployment and only household income is granger cause to migration for the rural area.

Malik (2015) examined the trends of rural-urban migration in Pakistan and its impacts on the social and cultural dimensions of the destination place. From the results of the study, he found that the trends of rural-urban migration in Pakistan rose largely and continuously from 2001 to 2011. This phenomenon caused the crowdedness in the urban centers and decreased the per capita resources available in the cities. This was due to government Pakistan was only focused on the development of developed cities and ignored the decline in the available facilities and resources are a major reason for the continuous development of urban.

III. DATA DESCRIPTION

The time period of this study is from year 1988 until year 2017 implicates 30 years which consist of 30 observations, used to examine the determinants of rural-urban migration in Malaysia. The data were drawn from the Department of Statistics. In this study, annually data is being selected to find the variables in term of percentage (%) for population, unemployment, poverty and Ringgit Malaysia (RM) for household income. The independent variables are household income, unemployment and poverty while the dependent variable is population in both urban and rural areas (as a proxy of rural-urban migration).

IV. MODEL SPECIFICATION

The theoretical model for this study is modified based on the model used by Hussain, Abdullah, and Abdullah (2014). From their studies, they have used certain variables for their empirical testing such as the household income and unemployment. However, this study will add on variable such as poverty, in order to investigate the relationship towards migration. In this study, the equation can be express as following:

$$POP_{it} = \alpha + \beta_1 HHI_t + \beta_2 UNEM_t + \beta_3 POV_t + \varepsilon$$

Where,

POP_{it} is the population for rural-urban of i and period of t ,

α is the constant term,

β denoted as coefficients,

$\beta_1, \beta_2, \beta_3$ and β_4 are parameters,

ε is the error term.

The set of independent variables include:

HHI_t = household income for period of t

UNEM_t= unemployment for period of t
 POV_t= poverty for period of t

V. METHODOLOGY

A. Augmented Dickey Fuller (Adf) Test

Dickey and Fuller (1979) who developed by Augmented Dickey-Fuller (ADF) unit root test would be employed in this study. The unit root tests must as the first test to run before run the cointegration test and Granger causality test. The purpose of unit root test is used for examine the stationary of times series data and first difference. The null hypothesis represents that the existence of unit root. Then, the variables are considered as non-stationary. Conversely, the alternatives hypothesis implies that there is no unit root which considered the series is stationary. To test the unit root, Dickey Fuller test (ADF) Act 1979 will be used for this method. ADF unit root test method is as follows:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^a \theta_1 Y_{t-1} + \sum_{j=1}^b \theta_j \Delta Y_{t-1} + \varepsilon_t$$

Without constant and trend:

$$\Delta Y_t = \delta Y_{t-1} + \mu_t$$

With constant:

$$\Delta Y_t = \alpha + \delta Y_{t-1} + \mu_t$$

Constant and trend:

$$\Delta Y_t = \alpha + \beta T + \delta Y_{t-1} + \mu_t$$

Where,

Δ is the first differentiation,

ε_t and μ_t are stationary random error.

The ADF test use t-statistic to examine the stationary of variables. The optimum lag length is chosen on Akaike Information Criterion (AIC). The decision of significance variable is based on critical value in 1%, 5% and 10% significance level. Based on the hypothesis of the unit root test, hypothesis H_0 will not be rejected which is meaning the variable is not stationary and have a unit root if the t-statistic obtained is greater than the critical value. Conversely, hypothesis H_0 is rejected which is meaning there is no unit root and the variables is stationary if the t-statistic is less than the critical value.

B. Johansen-Juselius (J&J) Cointegration Test

The purpose of this test in this study is to examine the long run relationship between the rural-urban migration and independent variables which are household income, unemployment, population and literacy. There are two tests that are required to carry out as part of the JJ test in order to determine the number of cointegrating vectors. The two tests which include the likelihood ratio Trace test and the Maximum Eigenvalue (λ - max) test (Johansen & Juselius, 1990). Trace test likelihood ratios is expressed as below equation.

$$T_{trace} = -T \sum_{i=r+1}^n \ln(1 - \lambda_{r+1})$$

Where,

T indicates the number of valid observations and

λ is the r^{th} largest estimated eigenvalue.

As for the Maximum Eigenvalue test is expressed as following:

$$\lambda_{max} = -TL(1 - \hat{\lambda}_{r-1})$$

Where,

T is the number of valid observations for the estimation use and

$\hat{\lambda}_{r-1}$ is the largest eigenvalue at r-1.

From the study conducted by Johansen and Juselius (1990), among this two test for cointegration testing the Maximum Eigenvalue test is much better and reliable than the likelihood ratio Trace test.

C. Vector Error Correction Model (VECM)

The VECM is used to analyze the existence of long run relationship between the variables after the cointegration is identify in the JJ cointegration test. The VECM model is as shown as below:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^n \beta_1 \Delta Y_{t-i} + \sum_{i=1}^n \beta_2 \Delta X_{t-i} + \gamma_1 ECT_{t-i} + \varepsilon_t$$

$$\Delta X_t = \varphi_0 + \sum_{i=1}^n \varphi_1 \Delta X_{t-i} + \sum_{i=1}^n \varphi_2 \Delta Y_{t-i} + \gamma_2 ECT_{t-i} + \mu_t$$

where Δ defined as the lag operator, $\alpha_0, \varphi_0, \beta_1, \beta_2, \varphi_1,$ and φ_2 represent the estimated coefficients, meanwhile n represent the optimal lags length, ε_t and μ_t are the serially uncorrelated random error terms, γ_1 and γ_2 measure as a single period response of the shock towards back to equilibrium.

D. Granger Causality Test

Finally, Granger causality test would be employed to investigate the short run causality between the variables. The null hypothesis H_0 will not be accepted if the variables are statistically significance at 1%, 5% or 10% level and probability is less than the significance level. Therefore, it can conclude that there are Granger causes between the variables. In contrast, the null hypothesis H_0 will be accepted if the variables are insignificance at 1%, 5% or 10% level and the probability is greater than the significance level. Thus, it concludes that those variables do not Granger cause each other. If the variable X is granger cause of Y and Y is also the cause of X, its means that the past of X help in anticipating the future Y. Similarly, the last value of Y also assists in the expected future value of X.

VI. RESULTS AND DISCUSSIONS

A. Unit Root Test

According to Granger and Newbold (1974); Phillips and Perron (1988), the results of regression results may be spurious if the variables has unit root (non-stationary). In order to avoid spurious estimation results, ADF unit root tests are selected to verify the stationarity or non-stationarity of the series of POP, HHI, UNEM and POV. The level and first differences of POP, HHI, UNEM and POV for rural and urban are checked and the results are shown in Table 1.

TABLE 1: Results on Unit Root Test of Rural and Urban

Variables	Rural		Urban	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
A: Level				
POP	-2.860859 (0) [-2.967767]	-2.249120 (0) [-3.574244]	0.223368 (0) [-2.967767]	-2.317056 (1) [-3.580623]
HHI	1.974975 (1) [-2.971853]	0.181519 (1) [-3.580623]	1.604772 (2) [-2.976263]	-0.960161 (1) [-3.580623]
UNEM	-6.455702 (0)* [-2.967767]	-5.555331 (0)* [-3.574244]	-4.373261 (1)* [-2.971853]	-4.070438 (1)* [-3.580623]
POV	-1.027880 (0) [-2.967767]	-2.613828 (0) [-3.574244]	-2.371543 (0) [-2.967767]	-2.353278 (0) [-3.574244]
B: First Differences				
ΔPOP	-4.449985 (0)* [-2.971853]	-4.924068 (0)* [-3.580623]	-4.586092 (0)* [-2.971853]	-4.673364 (0)* [-3.580623]
ΔHHI	-1.560849 (0)* [-2.971853]	-2.673436 (0)* [-3.580623]	-2.342789 (0) [-2.971853]	-3.243400 (1) [-3.587527]
ΔUNEM	-4.776669 (0)* [-2.971853]	-4.699978 (0)* [-3.580623]	-4.520707 (1)* [-2.976263]	-4.569872 (1)* [-3.587527]
ΔPOV	-4.839497 (1)* [-2.976263]	-4.792107 (1)* [-3.587527]	-5.541433 (0)* [-2.971853]	-5.804476 (0)* [-3.580623]

Notes: The ADF tests are based on the null hypothesis of unit roots (non-stationary). Asterisks (*) indicate statistically significant at 5 percent level. Figure in parentheses are lag length. ADF refer to Augmented Dickey-Fuller unit root tests. The optimal lag length for ADF test is selected using the AIC. The asymptotic and finite sample critical values for ADF are obtained from MacKinnon (1996). The ADF test examines the null hypothesis of a unit root against the stationary alternative. Δ denotes first difference operator.

As Engle and Granger (1987) highlighted, only variables with the same order of integration could be examined for cointegration. Results in both tables showed that both of the tests are non-stationary which denoted at I(0). At first difference, in Table 1, all of the variables are stationary which denoted at I(1) in rural areas, while HHI is found non stationary in urban areas. These results are in line to the statement that most of the macroeconomics time series is stationary after first differencing but has unit root at level form (Nelson and Plosser, 1982).

B. Johansen And Juselius Cointegration Test

Table 2 displayed the results of the Johansen Juselius Cointegration test for rural and urban. The lag interval used is one lag.

TABLE 2: Results on Johansen and Juselius Cointegration Test for Rural and Urban

RURAL				
Hypothesized No. of CE(s)	Max-Eigen statistic	0.05 critical value	Trace statistic	0.05 critical value
r=0	39.56867*	27.58434	88.20585*	47.85613
r≤1	33.92195*	21.13162	48.63718*	29.79707
r≤2	13.40296	14.26460	14.71523	15.49471
r≤3	1.312269	3.841466	1.312269	3.841466
URBAN				
Hypothesized No. of CE(s)	Max-Eigen statistic	0.05 critical value	Trace statistic	0.05 critical value

r=0	49.48647*	27.58434	85.91512*	47.85613
r≤1	20.10958	21.13162	36.43046*	29.79707
r≤2	14.87606	14.26460	16.32087*	15.49471
r≤3	1.44811	3.841466	1.444811	3.841466

Notes: Asterisks (*) denote statistically significant at 5% level. Trace test indicates 2 cointegrating equation(s) at the 0.05 level and denotes rejection of the hypothesis at the 0.05 level while Max-eigenvalue test indicates 2 cointegrating equation(s) for rural and 1 cointegrating equation for urban at the 0.05 level and denotes rejection of the hypothesis at the 0.05 level.

Based on the result, we have enough statistical evidence to reject the null hypothesis at 5% level. Trace test indicated that there are two cointegrating vectors at 5% level of significance. From the results above, we can identify that there are long run equilibrium exists between the variables. Since there are cointegrating vectors exist, the VECM framework is adopted to examine the long run relationship between the variables. In particular, there are 2 cointegrating vectors found in rural, and only 1 cointegrating vector is found in urban.

C. Vector Error Correction Model And Granger Causality

Table 3 showed that the Granger Causality result that estimated through Vector Error Correction Model (VECM) and the Error Correction Term (ECT) for each variable of rural and urban. Based on the results, there is no relationship exists between POP, HHI, UNEM and POV in the short run. The ECT of POP in the tested model of rural is less than 1, statistically significant at 5 percent level of significant (equal to critical value of 1.96) and negative value. Thus, POP solely bear the brunt of short run adjustment to bring about the long run equilibrium. The ECT coefficient of POP is 39.4 percent. It means that coefficient of POP need 39.4 percent of adjustment to long run equilibrium in a year shows that Malaysia needed about 2.54 years to bring back to equilibrium.

TABLE 3: Results on Vector Error Correction of Rural Migration.

Dependent variables	RURAL					ECT
	ΔPOP	ΔHHI	ΔUNEM	ΔPOV		
	x ² statistic(p-value)				Coefficient	
ΔPOP	-	0.000882 (1.99171)	0.270891 (2.60769)	0.049900 (2.04031)	-0.393634*	-2.70469
ΔHHI	14.05584 (0.17031)	-	39.34591 (0.82349)	2.926443 (0.26015)	-56.68262	-0.84678
ΔUNEM	1.221862 (4.49163)	0.001972 (2.93669)	-	0.026125 (0.70461)	0.632260	2.86564
ΔPOV	1.093580 (0.84078)	0.002946 (0.91735)	1.341891 (1.78210)	-	4.110418	3.89641
Dependent variables	URBAN					ECT
	ΔPOP	ΔHHI	ΔUNEM	ΔPOV		
	x ² statistic(p-value)				Coefficient	
ΔPOP	-	0.000195 (0.84708)	0.333784 (3.97364)	0.191646 (2.86630)	-0.355232*	-4.26362
ΔHHI	7.356934 (0.04994)*	-	59.84285 (0.72447)	74.17799 (1.12818)	-46.09713	-0.56263
ΔUNEM	0.423130 (1.06932)	0.000512 (0.84245)	-	0.143144 (0.81053)	-0.068090	-0.30940
ΔPOV	1.020205 (2.07447)	0.000399 (0.52893)	0.020550 (0.07452)	-	0.357152	1.30582

Notes: The x²-statistic tests the joint significance of the lagged values of the independent variables, and the significance of the error correction term (s). The figures in parentheses are the p-values. Asterisks (*) indicate statistically significant at 5 percent level.

In urban areas, POP can Granger cause HHI in the short run. It means that POP has a unidirectional relationship with HHI. The ECT of POP in the tested model is less than 1, statistically significant at 5 percent level of significant (equal to critical value of 1.96) and negative value. POP solely bear the brunt of short run adjustment to bring about the long run equilibrium. The ECT

coefficient of POP indicates that the speed of adjustment to go back to the equilibrium is 35.5 percent, thus this implies that it takes about 2.82 years to bring back to the equilibrium.

VII. CONCLUSION

Generally, both rural and urban areas in Malaysia have seen a decrease in overall population but urban population still remain at positive while the houses of rural population drop from positive to negative. According to the data of The World Bank (2018), the rate of change of rural population decreased in unstable condition from 1.50% to -1.19% while the rate of change of urban population also decreased in unstable condition from 4.63% to 2.25% although total urban population keep increasing. There are many determinants affecting the rural-urban migration in Malaysia.

Malaysia actually does not have a direct policy on internal migration, but economic policies such as development of Bumiputera Commercial and Industrial Community under the Malaysia Plans, as well as the regional corridor development do have a significant impact on migration. For example, in 1999, the seat of government was shifted from Kuala Lumpur to Putrajaya and the Multimedia Super Corridor was created to reduce overcrowding and congestion in the Klang Valley. There are a number of urban management policies and these include the National Urbanisation Policy, National Physical Policy, National Housing Policy, and strategies for managing urban growth while enhancing productivity and efficiency of small towns and rural areas. More efforts are needed to promote the integration of migrants at the place of destination. The impact and effectiveness of population redistribution policies/ programmes also need to be evaluated.

In order to undertake this study on policy and planning implications, government needs to review the development policies in Malaysia for several years. The policy changed since independence from agricultural to industrial. There are many policies that have to be looked at such as the Agricultural Policy, the National Economic Policy, the Industrial Development Plan, the National Development Policy, the five year Malaysia Plans and many more. There would help the policy makers and planners to create a better plan for the future to minimize the problems caused by migration and urban population growth.

The unemployment also is one of the determinants of rural-urban in Malaysia. The size of the educational system would also influence the amount of unemployment. If employers hire better-educated workers preferentially, the education of an additional worker will lower the number of urban jobs available to uneducated workers by one, reduce the uneducated urban labor force by something more than one, and thereby lower the total number of urban unemployed. These workers will return to agriculture and add to national output there, while the educated workers might be more productive in the urban sector than their uneducated. Counterparts and further contribute to national output. Hence, we derive the somewhat paradoxical result that over education of the labor force might have the beneficial effect of both lessening urban unemployment and increasing national income in both the rural and the urban sectors.

Job hiring in the modern sector are more than the number of jobs, which primarily influences workers' location decisions. We have seen that a small increase in the number of jobs has a much larger proportional effect on job hiring and induces substantial rural-urban migration and increases the rate of urban unemployment. Thus migration can be stemmed simply by not growing so fast. For countries which need or choose to develop by enlarging their modern sectors rather than by improving the well-being of those in the traditional sectors, this creates a harsh dilemma: the cost of more rapid growth is the enrichment of some (the fortunate few who are hired for the newly- created jobs), the impoverishment of others (those who respond to the new incentives by choosing a high unemployment labor market search strategy), and greater inequality in the distribution of income. Hopefully, this conflict between growth and distributional objectives might be moderated by improving the functioning of labor markets as suggested above or by designing a tax- transfer system following Bhagwati and Srinivasan's guidelines. Thus, Harris and Todaro's pessimistic conclusion about the undesirability of modern-sector job creation may not be fully justified.

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Competitiveness Analysis of *Gracilaria Sp.* in Bone Bay, South Sulawesi Province

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DOI: 10.29322/IJSRP.9.08.2019.p9266

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9266>

Abstract- To increase people's income and to find out the origin of *Gracilaria Sp.* Who has good quality, the government establishes the development of seaweed commodities as one of the entrances to progress and as a superior commodity. This research was conducted to analyze the marketing competitiveness of *Gracilaria Sp.* in Bone Bay, South Sulawesi Province. The competitiveness of seaweed marketing was analyzed using the Policy Analysis Matrix (PAM) method.

This research conducted in Bone Bay, South Sulawesi Province, from November 2018 to April 2019. The location was taken purposively by considering the existence of seaweed farmers in each district. This research is descriptive quantitative by using primary and secondary data. The number of samples used was 37 respondents

The results of the study show (1) the business of marketing seaweed *gracilaria Sp.* in Teluk Bone has comparative competitiveness. When viewed from the value of Social Profitability (SP), which is definite and Domestic Resources Cost Ratio (DRC) smaller than one. (2) Marketing of *Gracilaria seaweed Sp.* in Teluk Bone has a competitive value that would see from the benefit of Private Profitability (PP). In each has a positive value and Cost Ratio (PCR), that smaller than one. (3) Grass sea *Gracilaria Sp.* in Teluk Bone has a very high level of competitiveness. It indicated by a positive value (4+) of each farmer in Palopo City and Bone Regency that needs to get the main priority to develop. one of them is by increasing the value-added from processing (Half-Finished) especially who came from Palopo City because it was superior in quality compared to Bone Regency

Index Terms- *Gracilaria Sp.* Marketing, Competitiveness, Comparative and Competitive

I. INTRODUCTION

Seaweed is one of the leading commodities in the fisheries revitalization program, besides shrimp and tuna. Several things into consideration in their advantages, including the opportunity of a broad to open export market, relatively stable prices, and there are no restrictions or trade quotas for seaweed. Cultivation technology is simple to master; the cultivation cycle is relatively short and quickly provides benefits. Capital requirements are relatively small, which is an irreplaceable commodity because there are no synthetic products. The effort to

cultivate seaweed classified as a labor-intensive business so that it can absorb labor.

South Sulawesi Province has become one of the provinces that have experienced a significant increase in the field of seaweed cultivation. Which is likely to continue to increase because seaweed is one of the superior commodities of this region. The area of seaweed cultivation in this area reaches an area of 46,354.6 ha, which spread across several districts. Based on 2016 data, South Sulawesi seaweed production reached 3,409,048, 2 tons (DKP of North Sulawesi Province 2016).

Seaweed developed in South Sulawesi by farmers consists of 2 (two) species cultivated in the sea (*Eucheuma cottoni* and *Spiniosium sp*) and one species cultivated in ponds (*Gracilaria sp*). *Gracilaria* is one type of agar-producing seaweed (agarophyt) that widely found in Indonesian waters, especially South Sulawesi. *Gracilaria* seaweed generally contains called agarophytes as a result of its primary metabolism. Gelatin is obtained by extracting plant in an acidic or basic atmosphere and being produced and marketed in various forms, for example, flour gelatin, gelatin paper, and gelatin and processed into multiple types of snacks, pudding, jelly, and used as an additive in the pharmaceutical industry. Gelatin fiber content is relatively high so that gelatin consumed as diet food. Through specific processes gelatin is also produced for use in the laboratory as a bacterial culture medium or tissue culture (Angkasa *et al.* 2011).

Gracilaria seaweed as one of the leading commodities, its production continues to be driven in the coastal areas of Bone Bay and Makassar Strait. Based on data from *Gracilaria Sp.* 2016 shows the high productivity of *Gracilaria sp.* reached 76,771.90 tons in Palopo City and 87,397.80 tons in Bone Regency.

Although it designed as superior seaweed in South Sulawesi. Related to the issue of seaweed competitiveness, it still needs to be the main focus for improvement because it has a smaller market share. It happens because the production efficiency is still low and has not been able to meet increasingly high export quality standards.

The increasing international trade intensity makes productivity and competitiveness even more essential to note. Importing countries apply various requirements, especially concerning quality requirements for imported seaweed commodities in guaranteeing and protecting and consumer satisfaction.

The existence of quality standards set by each exporting country will affect the costs incurred by marketing agencies in the

process of collecting raw materials. The export process itself which will affect the amount set in the marketing process seaweed gains substantial profits. So, in the efforts to improve farm efficiency and marketing plant, competitiveness and marketing by region are very important. Deep understanding of this matter is essential, and therefore, it is necessary to research the problem in question. In detail, this study aims to: (a) analyze the financial and economic benefits of seaweed farmers *Gracilaria Sp.* (b) Analyze the competitiveness of the marketing of *Gracilaria Sp.* at the farmer level, (c) Analyzing the competitiveness level of *Gracilaria Sp.* At the level of the cultivator.

II. RESEARCH METHOD

The research will be conducted in November 2018 - April 2019. The research location is in Palopo City, South Sulawesi Province. Peng uptake or placement locations is done intentionally (*purposive*), taking into account the existence of farmers seaweed *Gracilaria Sp.* Cultivator samples take in a *simple random*

sampling where each population has the same opportunity to sample. The number of samples taken was 37 respondents.

Data analysis method

The analytical tool used in this study is the *Policy Analysis Matrix* (PAM) developed by Monke and Pearson (1995). The stages in preparing PAM Tables are as follows:

1. Identify all inputs used in the production process.
2. Allocate *tradable* inputs and *non-tradable* inputs.
3. Calculate the shadow prices of inputs, outputs, and exchange rates
4. Analyzing comparative and competitive advantages with the PAM model.

Policy Analysis Matrix (PAM)

The PAM model is used to analyze profits (private and social) and competitiveness (comparative and competitive advantages) with the formulations in Table 1.

Table 1. Matrix of policy analysis (*policy analysis matrix*)

Description	Output Receipt	Cost		Advantage
		Input Tradable	Domestic Factor	
Private Price	A	B	C	D
Social Prices	E	F	G	H
Divergence	I	J	K	L

Source: Pearson et al. (2005)

Information :

- Private Profit (D) = (A) - (B + C)
- Social Benefits (H) = (E) - (F + G)
- Transfer Output (I) = (A) - (E)
- Transfer Input (J) = (B) - (F)
- Transfer Factor (K) = (C) - (G)
- Net Transfer (L) = (D) - (H) = I - (J + K)
- Private Cost Ratio (PCR) = C / (AB)
- Domestic Resource Cost Ratio (DRC) = G / (EF)
- Nominal Output Protection Coefficient (NPCO) = A / E
- Nominal Input Protection Coefficient (NPCI) = B / F
- Effective Protection Coefficient (EPC) = (AB) / (EF)
- Profit coefficient (PC) = D / H
- Producer Subsidy Ratio (SRP) = L / E

Profit Analysis

Profit analysis consists of private profits (*Private Profitability / PP*) and social benefits (*Social Profitability / SP*). *Individual Profitability* (PP) shows the difference between revenue and costs received or paid by farmers. A PP value greater than zero (PP> 0) means financially profitable, or the commodity has a competitive advantage.

Private Profitability (PP) : D = A - (B + C)

= Private Receipt - (Input Tradable Fee (Private + Non Tradable Private Input Fee) (1)

Social Profitability (SP) shows the difference between revenue and costs calculated at social prices. If the SP value is more significant than zero (SP> 0), then it is economically profitable, or the commodity has an advantage comparative.

Social Profitability (SP) : H = E - (F + G)

= Social Receipts - (Social Tradable Input Costs + Non Tradable Social Input Costs) (2)

Comparative and Competitive Efficiency or Excellence Analysis

The level of business efficiency of a commodity can see from two indicators, namely comparative advantage, and competitive advantage. Competitive advantage can see from the value of the *Private Cost Ratio* (PCR). The ratio between domestic factor costs and value-added output from input costs traded on individual prices. If the PCR value is smaller than one (PCR <1), it indicates that the exploitation of the commodity is financially efficient or has a competitive advantage when there is government policy.

$$\begin{aligned} \text{Private Cost Ratio (PCR)} &= C / (A - B) \\ &= \frac{\text{Private Non- Tradable Input Fee}}{\text{Private Receipt - Input Cost for Private Tradable}} \end{aligned} \quad (3)$$

The comparative advantage of a commodity can see from the value of the *Domestic Resource Cost* (*Domestic Resource Cost* or DRC). The ratio of input costs that cannot trade with value-added output from input costs bought at economical prices. If the DRC value is smaller than one (DRC <1), then the business is commodities are economically efficient or have comparative advantages in conditions without policy.

$$\begin{aligned} \text{Domestic Resource Cost Ratio} &= G / (E - F) \\ &= \frac{\text{Non Tradable Social Input Costs}}{\text{Social Receipts - Social Tradable Input Costs ...}} \end{aligned} \quad (4)$$

Competitiveness Assessment Matrix

Competitiveness is reflecting in the range of commodities, including very high, high, medium, low, or very low competitiveness. These criteria are presenting in Table 2.

Table 2. Criteria for Assessing Competitiveness

Indicator	Value criteria				
PP	+	-	-	-	-
SP	+	+	-	-	-
PCR	+	+	+	-	-
DRC	+	+	+	+	-
Combined Value	4+	3+ and 1-	2+ and 2-	1+ and 3-	4-

Source: Kohari et al., 2005

Information :

PP: *Private Profitability*

PS: *Social Profitability*

PCR : *Private Cost Ratio*

DRCR : *Domestic Resource Cost Ratio*

4+ : Very High

3+ and 1- : High

2+ and 2- : Moderate

1+ and 3- : Low

4- : Very Low

The difference in the range of competitiveness in a commodity can be used to determine the priority scale of development of the related commodity, namely (Kohari et al., 2005):

- a. Products that have very high competitiveness are prioritized to develop.
- b. Commodities that have high competitiveness are still prioritized to develop, but more prioritized products that have very high competitiveness.
- c. Commodities with moderate competitiveness have two possibilities that would be developed and cannot extend. depending on whether the field studies are due to policy distortions or market failures.

- d. Meanwhile, commodities that have low or very low competitiveness should not need to develop.

III. RESULTS AND DISCUSSION

Business Description of *Gracilaria* Seaweed Cultivators *Sp* . in the Gulf of Bone

Cultivation of seaweed gracilaria sp. carried out in ponds located on the coast and near rivers. Cultivation is carried out with a one-time crop system to harvest several times.

Table 3. The stocking of Rata Land, Age, and Seaweed Production

No.	Regency / City	Description	total
1		Average arable land area (ha)	1.1
2	Palopo	Average plant age (days)	48
3		Average production (Kg / Production)	6,652
1		Average arable land area (ha)	1.0
2	Bone	Average plant age (days)	48
3		Average production (Kg / Production)	4.964

Source: Primary Data After Processing, 2019

The cultivated seaweed stocked in ponds with a size of 1 - 1.1 ha. Before conducting stocking, farmers usually do land preparation so that the quality of the plant produced has good quality, and can receive in the export market. Cultivation is carried out for 48 days, then harvested.

Macroeconomic Assumptions

The macroeconomic assumptions used in the *Policy Analysis Matrix* (PAM) analysis are nominal interest rates (% per year). Which obtained from information on formal credit interest rates (state banks, regional government banks, national private banks, foreign banks, and mixed banks, commercial banks, and other credit institutions). The nominal interest rate used is the average private interest rate for capital originating from formal credit institutions in the research location at 6% per year

For social interest rates (% per year), obtained from the sum of assumed *social opportunity cost of capital* of 15% per year plus

the national inflation rate in the year of the study. It consistent with the historical experience of Southeast Asian countries when they are at the same stage of development as Indonesia today. Based on data from Bank Indonesia on July 15, 2919, the national inflation rate in June 2019 was 3.28%. Thus the social interest rate was at the amount of 18.28% (Bank Indonesia, 2019). The exchange rate used to study is by the assumption of the State Expenditures Budget, which is in 2019 amounting to Rp. 14,129.00 per \$ (Bank Indonesia, 2019).

Policy Analysis Matrix (PAM) Gracilaria Seaweed Cultivator Sp.

Competitiveness of *Gracilaria Sp.* can know by using the *Policy Analysis Matrix* (PAM). The following are the results of the PAM analysis.

Table 4. Policy Analysis Matrix of Gracilaria Seaweed Cultivators Sp. in the Gulf of Bone

Districts/ City	Description	Reception Output	Cost		Advantage
			Input Tradable	Domestic Factor	
Palopo (N 23)	Private	27,620,983	2,035,000	4,424,783	21,161,200
	Social	281,965,696	2,035,000	5,967,791	273,962,904
	Divergence	(254,344,713)	0	(1,543,009)	(262,801,704)
Bone (N 14)	Private	17,375,000	804,730	1,241,786	15,328,485
	Social	126,252,707	1,868,613	2,875,714	121,508,379
	Divergence	(108,877,707)	(1,063,884)	(1,633,929)	(106,179,895)

Source: Primary Data After Processing, 2019

Analysis of Private Profits and Social Benefits

Private profit or *Private Profitability* (PP) is an indicator of the financial efficiency of a commodity. Based on table 4 above from 2 regencies / cities after going through the calculation of Input-Output, price and budget on private prices and and Input-Output, prices and budget at social prices, where individual and social input-output consists of fertilizers, medicines, labor, working capital, land rent, and total production, while the price is the price of fertilizer/kg, medicines/liter, labor/day, working capital/ha, land rent, and seaweed prices/kg.

Table 4 shows that *Gracilaria Sp.* in Palopo City has a PP value that is greater than zero, which is Rp. 21.1612 million, condition showed that farmers financially profitable business or have a competitive advantage. In other words, when the

production is reasonable, and the price of seaweed is Rp. 4,152 turns out to cover production costs.

Social profit or *Social Profitability* (SP) is an indicator of the social efficiency of commodities under conditions of policy implementation. The calculation results show the SP value is greater than zero, which is equal to Rp. 273,962,904 . It means that seaweed farmers have a comparative advantage. The SP value nominally obtained if all seaweed produced by the cultivator is assumed to export. So, farmers will benefit more from selling their seaweed from the global market compared to the domestic market. In Table 4 for Palopo City, it can seem that the divergences produced are all negative, except *tradable inputs*. This negative divergence occurs because the social price of seaweed is higher than the price received by farmers. For divergence, *tradable inputs* indicate that the social price of *tradable inputs* is equal to the price received by farmers. Negative divergence in income value also

occurs because the seaweed farmers' financial income is smaller than their social income. This condition indicates that seaweed farmers in Palopo City, South Sulawesi, lost the opportunity to earn a profit per ha of Rp 252,801,704,

Private benefits acquired by farmers in Bone Regency, which are the results of an analysis of Rp. 15,328,485 which indicates that the value of PP is greater than zero, meaning that the cultivator's business is financially profitable or has a competitive advantage. In other words, when the production is normal, and the price of seaweed is Rp. 3,500 turns out to cover production costs. Whereas from the social benefits, the SP value is Rp. 121,508,379. This condition means that farmers seaweed has a comparative advantage. The SP value nominally obtained if all seaweed produced by the cultivator is assumed to export. So, farmers will get greater profits if they can export seaweed.

From the divergence value produced by seaweed farmers *gratulation sp.* in Bone Regency, everything is negative. Negative divergences occur because the price of seaweed social is higher than the price received by farmers. Negative divergence in income value occurs because the seaweed farmers' financial income is smaller than their social income. This condition indicates that seaweed farmers in Bone Regency, South Sulawesi, lost the opportunity to earn a profit per ha of Rp. 106 , 179,895 .

The differences income of seaweed farmers shows seaweed farming in each research location, especially in Bone Regency still faces many obstacles in increasing the production and quality of seaweed. The main constraints faced by farmers/cultivators in each research location are pests and diseases, degradation of seed quality after harvest, level of drought, and level of cleanliness.

Analysis of comparative advantage and competitive advantage

Comparative advantage and competitive advantage are indicators of the level of efficiency of seaweed farmers *Gracilaria Sp.* Competitive advantage can see from the value of the *Private Cost Ratio (PCR)* and the value of the *Domestic Resource Cost Ratio (Domestic Resources Cost Ratio or DRC)*

Private Cost Ratio is the ratio between domestic factor costs and value-added output from input costs traded on individual prices. If the PCR value is smaller than one, it indicates commodity is financially efficient and has a competitive advantage. While the Domestic Resource Cost Ratio is the ratio between domestic input costs and revenues minus *tradable inputs* at social prices. If the DRC value is smaller than one, it indicates that a commodity is socially efficient and has a comparative advantage. Complete information about the importance of PCR and DRC can see in Table 5.

Table 5. Value of Competitive and Comparative Advantage Parameters of *Gracilaria Seaweed Sp.*

Regency / City	Parameter	Value
Palopo	PCR	0.17
	DRCR	0.02
Bone	PCR	0.07
	DRCR	0.02

Data Source: Primary Data After Processing, 2019

Based on Table 5, it can see that social benefits represent the difference between revenues and all costs incurred in the seaweed cultivation business of *Gracilaris Sp.* Per hectare at shadow prices (social), i.e., rates that are influenced by government policies such as subsidies and taxes.

The DRC value obtained by domestic facts / tradable inputs, so that the value derived from each seaweed cultivator is 0.02 and 0.02 respectively for Palopo City and Bone Regency. The results of this analysis state that the farmers of Palopo City and Bone District have comparative advantages. That means if to get an added value of 100 \$, additional internal factor costs of 2 \$ are needed for Palopo City and 2 \$ for Bone Regency or in rupees of Rp. 28,258 for Palopo City and Rp. 28,258 for Bone Regency.

Comparative advantage is only used to measure the benefits of economic activity in terms of the whole society or general. Therefore, in the development of relevant concepts to measure financial feasibility, the idea of competitive advantage is used.

Analysis of competitive advantage is used to measure financial feasibility. Based on table 5, it can see that seaweed cultivation businesses from Palopo City and Bone Regency have

a PCR value <1, which is equal to 0, 17, and 0.07. The results of the analysis state that farmers in Palopo City and Bone District have competitive advantages; this means to increase added value output of Rp. 100,000 in special prices requires additional domestic factor costs of Rp. 17,000 for Palopo City and Rp. 70,000 for Bone Regency.

Coconut Farming Competitiveness Matrix Assessment

Competitiveness is reflecting in the range of commodities, including very high, high, medium, low, or very low competitiveness. Based on the analysis and interpretation above, each indicator of competitive advantage and comparative advantage, namely *Private Profitability (PP)*, *Social Profitability (SP)*, *Private Cost Ratio (PCR)* and *Domestic Resources Cost Ratio (DRC)* given positive or negative values. For example, if a profitable PP has given a positive value, conversely if the loser is giving a negative value. The combined positive and negative values of the four indicators used as competitiveness assessment criteria, as in Table 6.

Table 6. Matrix for Assessing the Competitiveness of Gracilaria Seaweed Cultivators Sp. in the Gulf of Bone

Districts/ City	Indicator	Value	Criteria	Meaning	Combined Value	Competitiveness
Palopo (N 23)	PP	21,161,200	+	Competitive	4+	Very high
	SP	273,962,904	+	Competitive		
	PCR	0.17	+	Competitive		
	DRCR	0.02	+	Competitive		
Bone (N 14)	PP	15,328,485	+	Competitive	4+	Very high
	SP	121,508,379	+	Competitive		
	PCR	0.07	+	Competitive		
	DRCR	0.02	+	Competitive		

Source: Primary Data After Processing, 2019

The results of the assessment in Table 6 show the PP value of Rp. 21,161,200 and PCR 0.17 included in the decisive criteria, which means that they have competitiveness, while the SP value is Rp. 273,962,904 and DRCR 0.2 also included in the critical measures, which means that farmers in Palopo City have competitiveness and cultivators in Bone Regency, showing PP value of Rp. 15,328,485 and PCR 0.07 included in decisive criteria, which means they have competitiveness while the SP value is Rp. 121,508,379 and the DRCR value of 0.02 also included in critical standards, which means that it also classified as having competitiveness. So that if the costs are combined, there will be a positive value of 4. The combined values indicate that *Gracilaria Sp.* in Palopo City and Bone Regency, the competitiveness is very high, but seaweed farmers from Palopo City are superior.

IV. CONCLUSION

This study concludes that the business of marketing seaweed *gracilaria Sp.* The farmers in Teluk Bone have comparative competitiveness when viewed from positive *Social Profitability* (SP) and smaller than one *Domestic Resources Cost Ratio* (DRC). Cultivators of seaweed *Gracilaria Sp.* in Teluk Bone has competitiveness that describes from the value of the positive *Private Profitability* (PP), *Cost Ratio* (PCR) and the marketing of *Gracilaria Sp.* Teluk Bone has a very high level of competitiveness. It is indicated by positive values (4+) from Palopo City and Bone Regency that needs to get the main priors to develop. One of them is by increasing the value-added from processing (Half-Finished), especially from Palopo City, because it is superior in quality compared to Bone Regency.

V. ACKNOWLEDGMENT

The implementation of this research is something to be grateful. The author expressed many thanks to all those who helped specifically for the Center Marine and Fisheries Education,

the ministry of maritime Affairs and Fisheries for support was given starting from the beginning of this study to the publication of this journal.

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The Effect of Mind Mapping Learning on Affective Learning Outcomes of Grade X Students on Ancient Human Material at Islamic Senior High School

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DOI: 10.29322/IJSRP.9.08.2019.p9267

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9267>

Abstract - This study aims to determine the effect of mind mapping learning on grade X students' affective learning outcomes on human material. This study uses an experimental research design, a type of pre-experimental one shot case study. Data collection techniques used in this study used observation with a data collection tool observation sheet attitude of students. The research subjects were students of grade X-2 majoring in social sciences as many as 38 students. This study uses a non-parametric test to determine the effect of mind mapping learning on students' affective learning outcomes. Non parametric tests are used because data is not normally distributed. The binomial test was used to determine the effect of mind mapping learning on students' affective learning outcomes. The binomial test shows a significance value of 0,000. Because the binomial significance value of 0,000 > α 5%, there is the effect of mind mapping learning on students' affective learning outcomes in early human matter. Thus learning mind mapping can be used in learning to improve student's affective learning outcomes.

Keyword- mind mapping, affective learning outcomes, senior Islamic high school

I.INTRODUCTION

Learning outcomes are the most important element in the world of education (Casperson, 2014) and are key to learning (James, 2005). Bloom stated in the learning outcomes related to cognitive, affective and psychomotor aspects. On the cognitive aspects related to students' knowledge in learning. On the affective aspects with regard to student attitudes during the learning process and on aspects of skills relating to student skills (Suprijono, 2013).

The results of affective learning involve changes in the feelings, motivations and attitudes of students that arise from the process of experiencing learning (Buma, 2018). Affective learning outcomes are learning outcomes relating to the values, attitudes and behaviors of students. Affective learning outcomes are closely related to students' ability to listen and respond to others when interacting. Affective learning outcomes also relate to the ability within students to adapt according to situations and conditions (Shephard, 2008). Thus affective learning outcomes are learning outcomes that are far more complex compared to other learning domains, because affective learning outcomes have an important role in changing students' behavior and mindset (Ilonen and Heinonen, 2018).

One of the lessons that can shape students' affective abilities is mind mapping. Mind mapping directs students to explore the relationships between concepts in learning. The relationship between concepts in mind mapping allows students to understand the relationship according to their thinking abilities (Davies, 2010). Mind mapping is a method that can connect concepts through structure and images. Mind mapping can also make learning more meaningful (Polat et al., 2017). Mind mapping can effectively improve student learning outcomes, foster collaboration and enhance student creativity in learning (Hua and Wind, 2018). Mind mapping itself is an effective learning pattern to stimulate knowledge and make learning more enjoyable (McCrea and Lorenzet, 2018).

Previous research stated that mind mapping brings new enthusiasm to improve students' ability to master subject matter (Mento et al., 1999). Through mind mapping learning, there are positive effects on improving student learning outcomes in learning (Liu et al., 2014). Mind mapping is able to direct students to build knowledge in learning. In

addition, through mind mapping learning students can think critically in solving each problem faced by different styles (Ismail et al., 2010).

Based on previous research, the assessment of learning outcomes using mind mapping tends to assess cognitive learning outcomes and has not touched on other aspects. In this study, researchers assessed the effect of mind mapping learning on students' affective learning outcomes. Assessment of affective learning outcomes is closely related to the learning environment. The influence of the learning environment on the affective learning outcomes of students has a close relationship in determining student achievement (Sivan and Chan, 2013). The main view in assessing student learning outcomes is through student learning. In designing assessment of learning outcomes must be based on competencies developed by the teacher to meet student-oriented learning goals (Erikson and Erikson, 2018). Thus the purpose of this study was to reveal the effect of mind mapping learning on students' affective learning outcomes on ancient human material in Islamic senior high school.

II. THEORITICAL FRAMEWORK

2.1 Mind Mapping

Tony Buzan introduced mind mapping in 2004. Mind mapping is a learning strategy that is used to stimulate knowledge with a series of maps that have been conceptualized. Huda stated that mind mapping is one of many strategies to improve student thinking (2015, p. 307). Ngalimun stated that mind mapping learning is very suitable for students' initial knowledge review (2017, p. 348). Making mind mapping in historical learning is accompanied by a combination of colors, images, and curved branches. Through this method, it is expected to facilitate students in remembering the information contained in mind mapping. Mind mapping is the easiest method to use to extract information from inside and outside the brain. The steps for making mind mapping are as follows.

- a. The materials and tools used in making mind mapping are blank paper without lines and colored markers, students have been able to make mind mapping personally. The steps in making mind mapping are as follows.
- b. It starts with providing materials and tools in the form of blank paper without lines and markers placed on a flat plane. Then write the keyword in the middle of the paper and give the branch according to the desired concept in all directions to express it.
- c. Write down the central idea represented by the image. Images that have a thousand words and use imagination to develop the concept. Images will give more meaning and help students stay focused.
- d. Make branches related to central ideas. The existence of these branches can make it easier for us to remember and the relationships between the concepts made. In making branches, you should use lines, different colors and arrows to connect the central idea with supporting ideas.
- e. Using one keyword for each branch, a single keyword will make it easier to spur the emergence of new ideas and thoughts.
- f. Use different colors in each writing. Color diversity in mind mapping will make writing more interesting and stimulate the right brain to work better (Huda, 2015, p. 309).

2.2 Learning Outcomes Affective

Gagne states that learning is a process of changing behavior through experience. Behavior changes according to Benjamin S Bloom consist of three aspects which consist of cognitive aspects, affective aspects and psychomotor aspects. On cognitive aspects, related to students' abilities in knowledge processing. In the affective aspect, related to attitudes, feelings, interests and morality. In psychomotor aspects, it is related to the function of the nervous system, muscles, and physical functions. In general, teachers tend to make cognitive assessments and override affective and psychomotor assessments in students in the learning process. Wood (1996) affective assessment is a method used to reveal how a student feels about himself and the self-image that influences the environment (Basuki and Hariyanto, 2016, p. 184). Thus the objectives in the assessment of affective learning outcomes can be seen from the attitudes of students in the learning process. The attitude assessment in this study consisted of honest, disciplined, polite and responsible

III. METHOD

The research design used in this study was an experiment with a type of pre-experimental one shot case study design. Design uses one class in research without pre-test. Treatments were given directly by using mind mapping and then doing a post test in learning.



Figure 1
 Pre Experimental Research Design (One Shot Case Study)

Description:

- O : Posttest, to find out the affective learning outcomes of students after using mind mapping
- X : Treatment of mind mapping learning

(Chreswell, 2014)

This research was conducted at MAN 1 Pontianak, West Kalimantan , Indonesia. The sampling technique used was simple random sampling. The subjects in this study were students of grade X-2 majoring in social science. Data collection techniques with observation and data collection tools using observation sheets. Before conducting the research, the researchers tested the observation sheets of affective learning outcomes of students in different classes to find out the quality of the observation sheet that would be used in

IV.RESULT AND DISCUSSION

The study went through two stages consisting of expert validity and results of field research and statistical analysis. The following will be elaborated in detail the two steps carried out in this researcher.

3.1 Expert Validity

Expert validity was used to determine the quality of the instruments used in the study. The following are the results of the instrument validity of the student's observation sheet attitude.

Table 1. Results of Validity of Student Attitudes Instruments Observation Sheet

No.	Aspect Assessed	Value			Average	Kreteria
		V1	V2	V3		
1	Substance of	3.83	4	3.5	3.78	Very Good
2	Construction	3.83	4	3.5	3.78	Very Good
3	Languages	3.67	4	4	3.89	Very Good
Validator		3.67	4	3.44	3.76	Very Good

Description:

- V1: Validator 1
- V2: Validator 2
- V2: Validator 3

The substance aspect developed in the observation sheet is the attitude of students categorized very highly good with an average value of 3.78. The indicators developed in the aspect of substance consist of an assessment of students' honesty, student responsibility, student discipline, and polite students listed in the attitude assessment observation sheet. The construction aspect that was developed in the observation sheet was the attitude of the categorized students was very good with an average score of 3.78. Indicators developed in the construction aspect consist of including subject identity, assessment instructions, assessment rubrics, and assessment aspects. In the aspect of language, the observation sheet of the attitude of students developed has a very good category with an

average value of 3.76. The indicators that are assessed on aspects of the language include the use of good and correct Indonesian, communicative language and do not confuse privacy or groups.

Criteria for the withdrawal of decisions on the instruments of the observation sheet of students' attitudes are adapted from Riduwan (2014), as follows.

Table 2. Student Observation Quality Criteria Student

Value Interval	Value	Category
3.5	$3.5 \leq P \leq 4.0$	Very Good
2.9	$2.9 \leq P \leq 3.4$	Good
2.3	$2.3 \leq P \leq 2.8$	Good Enough
1.7	$1.7 \leq P \leq 2.2$	Less Good
1.0	$1.0 \leq P \leq 1.6$	Not Good

Based on the results of the assessment conducted by three validators, it can be concluded that the instruments of the student observation sheet can be used because they are very well categorized with an average score of 3.76.

3.2 The results of research in the field and statistical analysis

The following will describe the results of research in the field and statistical analysis used in the study. The study was conducted for one month. In the first three weeks, researchers gave mind mapping learning treatments to students and one week later the researchers assessed students' attitudes after the implementation of mind mapping learning in the classroom. The assessment results of student attitudes are as follows.

Table 3. Value of student attitudes

No	Name	Value of Students
1	PS2-1	100
2	PS2-2	98
3	PS2-3	100
4	PS2-4	95
5	PS2-5	100
6	PS2-6	97
7	PS2-7	98
8	PS2-8	100
9	PS2-9	95
10	PS2-10	97
11	PS2-11	100
12	PS2-12	100
13	PS2-13	97
14	PS2-14	98
15	PS2-15	98
16	PS2-16	100
17	PS2-17	100
18	PS2-18	100
19	PS2-19	98
20	PS2-20	98
21	PS2-21	100
22	PS2-22	100
23	PS2-23	98
24	PS2-24	100
25	PS2-25	95
26	PS2-26	97
27	PS2-27	98
28	PS2-28	98
29	PS2-29	100
30	PS2-30	100

31	PS2-31	95
32	PS2-32	100
33	PS2-33	100
34	PS2-34	97
35	PS2-35	100
36	PS2-36	98
37	PS2-37	98
38	PS2-38	98

Based on the attitude value of students it is known that the mean value of students' attitudes is 98.45, median is 98.00, variance is 2.740 and standard deviation is 1.655. Statistical analysis was used to determine whether mind mapping learning had a significant effect on students' affective learning outcomes. The statistical analysis in this study will be presented as follows.

Table 4. Nominality Test for Distribution

Shapiro-Wilk			
	Statistics	df	Sig.
Social attitudes	.806	38	.000

Normality tests were distributed using the Shapiro Wilk test with results of 0,000. The post test significance value is $0,000 < \alpha 5\%$ so the data is not normally distributed. Because in this study the data were not normally distributed, the researchers used binomial tests to determine the effect of mind mapping learning on students' affective learning outcomes. The binomial test results are as follows.

Table 5. Test of Binomial

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (2-tailed)
Affective	Group 1	≤ 75	0	.00	.50	.000 ^a
Learning	Group 2	> 75	38	1.00		
Total			38	1.00		

Binomial significance value of $0,000 > \alpha 5\%$, the categorized data is very significant. Thus there is a significant effect of mind mapping learning on students' affective learning outcomes.

Skinner states that learning is a process of behavior change. Behavior changes are obtained through the process of operant conditioning. In connection with the research conducted, changes in student attitudes occur because there is operant conditioning carried out in learning. operant conditioning in this study is learning using mind mapping. Mind mapping is used in research to change the behavior of students who previously tended not to respond to subject matter well. With the implementation of mind mapping learning, there is a change in student behavior, especially in student attitudes. Learning by using mind mapping has a positive effect on students so students feel interested in learning.

David P. Ausubel said that meaningful learning is learning that involves understanding how new information can be effectively organized, incorporated into structures, and taught so that it can be used. Meaningful learning occurs when students can connect new phenomena into their knowledge structure. Mind mapping learning is learning that links between concepts in learning, where in forming students' knowledge as a whole links between concepts based on the phenomenon being studied. Through mind mapping learning, students not only focus on strengthening cognitive aspects but also on students' attitudes in learning.

V.CONCLUSION

Learning does not only depend on cognitive enhancement of students, but also must be accompanied by changes in student attitudes. Changes in student attitudes are the result of a process of growth and development that must be maintained. Changes in student attitudes can be seen from the behavior of students in the teaching and learning process. This study has a research focus on the learning outcomes of student attitudes in learning. Based on the results of the study, it was found that mind mapping learning had a significant influence on the affective learning outcomes of students' attitudes in the learning process through binomial testing.

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Legibility of The People's Folklore of Enggano Ancestors

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DOI: 10.29322/IJSRP.9.08.2019.p9268

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9268>

Abstract: The purpose of this research is to know the readability of the book of folklore that is about Kamanippah Ancestor Enggano. This research was conducted by analyzing against the book of folklore and uses data readability calculations where looking for a hundred, a hundred in the first word of the second word and one hundred third Alenia said in the book. Quantitative data obtained from the calculation of sentences and words, while qualitative data obtained from the results of the analysis of the book and use the calculation chart fry. Based on the research, the average value of the number of terms 100 words is 11.23 and the average value of the number of sentences 100 words is 146.4. Of the three paragraphs taken from the first 100 words of the paragraph, the middle and last can be concluded that the legibility of the Kamanippah folklore of the Enggano Ancestors can be read for the 5th, 6th grade elementary school and for the junior high school in 7th grade.

Keywords: *Abstract, Readability, Folklore, Ancestors, Chart Fry*

INTRODUCTION

National Education Standards Agency (BSNP) set "legibility discourse" as one of the criteria that must be met by every textbook. On the other hand, apparently there are many textbooks that do not have a high level of legibility. If books like this still will be used as teaching materials in the classroom, teachers need to align its discourse with students' literacy first. Bertemali with this, Harjasujana (1987: 25) reminds us (read: Master) through the following statement: "One of the tasks is a strong challenge paramount for teachers of junior and senior is to align the student with a book that can be used effectively".

To do that of course, teachers need to have sufficient competence and performance in the field. In fact visible impression that the concept of legibility is not fully understood by most people, including academic circles once. It looks at the use of the term in a sentence. They often exchange the use of the term "legibility" with "keterpahaman", as if the two terms have the same meaning.

Readability is derived from the word "Readability" is derived from "Readable", meaning that it can be read or illegible. Readability is about to read whether or not a particular reading material by readers. Readability questioned the level of difficulty or ease tigkat a particular reading material for a particular reader ratings. Readability is

an appropriate measure of whether or not a reading for a particular reader in terms of level of difficulty or ease of discourse. To estimate the readability level of reading material, used a variety of formulas readability. Readability is usually expressed in terms of class rank. After measuring the readability of a discourse, people will be able to determine the suitability of the material for a particular class rank.

Muslich (2010: 85) states that legibility is the level of ease of an article to be understood his point. According to him, legibility is concerned with understanding. Reading that meets the suitability of legibility is reading that can be understood by the reader. Readings can not or difficult to understand the reader is reading that does not meet the suitability keterbacan. Readings are easily understood reader is also a reading that does not meet the suitability keterbacan.

Tampubolon (1990: 213) states that legibility is appropriate or not a reading for a particular reader in terms of the difficulty level. Said to be appropriate if the reading is not too difficult and not too easy or moderate. Said to be appropriate if the reading is difficult or easy. If the reading is too difficult, the reader is forced to read slowly, even repeatedly to understand the readings were read. He will not be impatient, lazy, even frustrating that it can not achieve the desired goal. Instead, reading is too easy to make the reader bored or underestimate because there is no challenge, feeling worthless, or felt it could be or know.

Mulyasa, (2013: 49) one key to success that determines the success of the implementation of the curriculum in 2013 is adequate learning resources, and should be realized, that until now the textbook is still a very important source of learning for students. To improve the quality of textbooks as a source of information, content or meaning is conveyed through text books need to be considered and presented in a form that is not only visually appealing but also easy to understand that aspect of legibility (readability) of a book reading or reading text.

Readability of a reading or text must be in accordance with the reading ability of readers. Further Klare (1984: 726) states that the reading has good readability level will affect readers in increasing interest in learning and memory, increase speed and efficiency of reading and nurture reading habits. Therefore, that aspect of legibility should be noted that the reader (students) are not only able to understand the meaning or content of textbooks but also can increase learning motivation.

Edward Fry readability formula introduced in the form of a graph called the Fry Graph (Nurlaili, 2011: 171). Formula legibility in this chart is based on two factors, namely short length and difficulty of the words marked by the number of words (many-at least) syllables that make up each word in the discourse. Therefore Fry basing its study on two main factors, namely (1) panjangpendeknya sentence and (2) the complexity of the short length of the word or words. The advantages of the Fry Graph readability formula is the result of an effort to simplify and pengefisienan technique of determining the level of legibility. which states that, "Fry Graph is the result of efforts to simplify and streamline the determination technique readability level of discourse.

Based on the results of the initial analysis, the researchers found that the students a story book entitled "Ancestors Kamanippah Enggano" where the book is suitable for classroom reading materials VI. This can be evidenced by the use of diagrams fry, where there are errors in some aspects such as the content of the story. In addition there is another aspect that is also important to note that aspects of legibility. Attempts

to test the suitability of a text or reading storybook students, researchers conducted in-depth studies to measure the readability of readings in the textbook readings.

METODOLOGY

Analyzing a sentence can not be separated from a text or discourse therefore the understanding of the text content is also very necessary, will therefore be clearer if we understand well the meaning of the text and discourse. Fairclough (1994: 5) provides an explanation of a text, traditionally a part of the written language as a whole 'work' like a poem or a novel, or a relatively discrete parts work as a chapter. Then, in the conception somewhat wider and has become common in discourse analysis, where the text may be either written or oral, such as the words used in conversations can also be said as a text.

Text is the data in the analysis of discourse, both spoken and written text. The text in this case refers to the shape of a kalimat transcription or speech circuit. Kridalaksana (2011: 238) in the Dictionary of linguistics states that the text is (1) a complete set of abstract language, (2) a row of sentences, words, and so on that form of speech, (3) the speech produced in human interaction. A text is also seen in terms of the intent and meaning diujarkan. Text has the unity and cohesion between the contents to be conveyed in the form of speech, and the situation existing conditions. In other words, that the text is merely the expression of the form language of which consists of a unity between the content, form, and situation conditions of use.

Readability relates to a sentence or text form easily understood when read, understand and remember the purpose and meaning of the text. Readability is a reading element that affects the overall success achieved by a group of readers with such materials (Hafni, 2005: 13). Readability is a matter that can read text in a fast, easy to understand, understood, and remembered. (Department of Education: 1998). Readability is often associated with the happenings of whether the material is read by readers (Tampubolon, 2008: 213).

Readability in English terms is called readability. Readability in teaching reading difficulty of the level of appropriate reading materials students read. Legibility (readability) is a measure of the suitability of a reading for a particular reader in terms of level of difficulty / ease of discourse.

To estimate the readability level of reading material, there are a number of measuring devices readability formula that takes into account such variables as determinants of text legibility, which is formula Flesch, Fog Index, Graph Fry, SMOG, and BI. Readability formulas is a formula that gives the figure as Sitepu readability index (in Yasa, 2013: 239).

Readability formulas are developed based on existing English and Indonesian based. Based English as Flesch formula, Fog Index, SMOG, and Graph Fry, while Indonesian is a formula-based BI. All the readability formulas developed to predict whether the material will be more difficult or easier to understand the reader when compared with other reading materials (Ginting, 1990).

Fry Graph formula using a variable difficulty and complexity of grammatical words as determinants of text readability. The calculation method is not much different from the previous formula, but after it was discovered on the calculation difficulty and complexity of grammatical word is then matched with a graph Fry. The measurement accuracy of discourse text readability with Fry Graph is determined by counting the exact number of syllables, words and sentences in the discourse. Steps of use readability using graphics fry measurement are as follows:

1. Choose a representative fragment of discourse to be measured readability level by taking 100 pieces of words of discourse to be measured keterbacannya.
2. The meaning of the word in this case is a group of symbols dikiri and dikanannya delimited. Thus the following symbols, such as Fatima, Teachers' Training College, 1999, and = each is considered as one word.
3. Count the number of sentences of the 100 words to the nearest decimal. That is if the word included in the word count of a hundred pieces (samples discourse) does not fall at the end of the sentence, the sentence calculation will not always intact malainkan always will be residual.
4. The rest of the course is a word that is part of a row of words that form a complete sentence. Due to the necessity of sampling discourse based on the number 100, then the rest of the words included in a matter of a hundred it diperhi-tungkan in decimal form (by tens).
5. Count the number of syllables of discourse samples 100 pieces words. As a consequence of the limitation of words (as described in step 1) above to enter numbers and abbreviations as words, to the word and abbreviation, each symbol counted as one syllable. For example, 234, is composed of three syllables, Teachers' Training consists of four syllables.

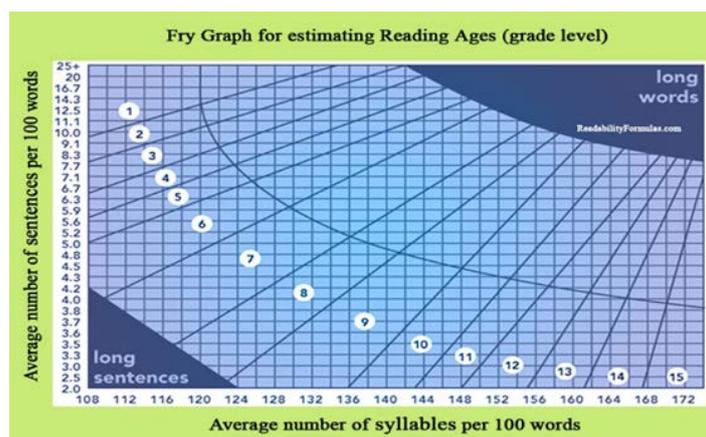


Figure 1. Table Graph Fry

Note the Fry graph above. Perpendicular column shows the number of syllables per hundred words and a horizontal line shows the number of sentences per hundred words. The data that we obtained in step (2), which is the average number of sentences and the data we obtained in step (3), which is the average number of syllables plotted into a graph to find points temunya. The meeting between the vertical line (the number of syllables) and the horizontal line (the number of sentences) showed levels reader class which is able to read the chosen discourse. If the line crosses the vertical and horizontal lines that are in the dark area or the shaded area, the discourse is declared invalid. Therefore it must have another discourse and repeat the same steps as described earlier.

Fry is a research chart for English language discourse. Though the structure of the English language with the Indonesian differ greatly, especially in terms of syllables. Based on this reality, will never be found in the Indonesian discourse suitable for class rank in the graphic Fry. For temunya point must exist in shaded areas. Therefore, in adding one more step is to multiply the number of syllables in figure 0.6.

RESULTS AND DISCUSSION

result

This research uses descriptive quantitative approach and diversified library research. The analysis in this study took a sample in which discourse has 100 words. The results of the analysis legibility folklore book "Ancestors Kamanippah Enggano" measurement procedure using graphs Fry formula, namely:

First Hundred Words

Very sunny days. The sun shone quite hot. Clear blue sparkling sea. Grains of white sand called waves. The sound of waves shouted with sea gulls in the air. However, a group of people can not enjoy the beauty of it. They were busy cutting down the palm trees, mangroves and coconut. They did not cut down arbitrarily. Only trees that were old enough and strong they choose. The trees have been felled cleaned fronds or branches. Once clean, the timber is dragged trooped to the beach. Sawn-logs that they tie together. They used ropes made of bark. It looks like they intend to make a raft. Raft which had been so stacked into two layers and

Result analysis:

Word count: 100 words

Number of syllables: $245 \times 0.6 = 147$

Number sentence: $14 + \frac{9}{13} = 14,69$

Mid Hundred Words

We had gone into the forests. Has also we are driving ravines, but there also we found the presence of our brothers, "he reported. Hearts chairman sad. "I'm so grateful for your hard work, Bujang. Do you really want me to believe that our brothers are gone, together with the Great Spirit. However, my heart is another want to make sure first that they do not exist on this island. "

The chairman paused and then asked,

"Tell me, Bujang, will there still be a place that you have not attended?"

"The only place we have yet to explore are the Mount Ekohe Nanuuwa, my lord," said the boy was. The chairman looked at Bukit Ekohe Nanuuwa Area

Result analysis:

Word count: 100 words

Number of syllables: $240 \times 0.6 = 144$

Number sentence: $8 + \frac{7}{10} = 8,7$

Last Words hundred

Kaahoa, Kaitora, and Kaarubi. They're starting a community in the Gulf Kinen. Because there are only four of them were on the island, Kamanippah and married three women. They live a happy and prosperous in the Gulf Kinen together their large family. Children who are born are named according to their mother's name. If he is the son of Kaahoa, he will be called back Kaahoa. Likewise, the rules for children Kaitora and Kaarubi. Their children and grandchildren we know as the Enggano today. They continue to grow. Until now become five indigenous groups, namely Kaahoa, Kaitora, Kaarubi, Kauno, and Kaaruba. That is the story of their ancestors Enggano.

Result analysis:

Word count: 100 words

Number of syllables: $247 \times 0.6 = 148.2$

Number sentence: $10 + \frac{4}{12} = 10,3$

Tabel 1. The result of the calculation of sentences and syllables in the story.

No.	Paragraphs in the page	Total Syllabics per 100 words	Number of sentencesper 100 words
1.	First page	$245 \times 0.6 = 147$	$14 + \frac{9}{13} = 14,69$
2.	Middle page	$240 \times 0.6 = 144$	$8 + \frac{7}{10} = 8,7$
3.	Last page	$247 \times 0.6 = 148.2$	$10 + \frac{4}{12} = 10,3$
Total		33.69	439.2
Average value		11.23	146.4

If taken into account through the fry chart table can be seen in the following figure:

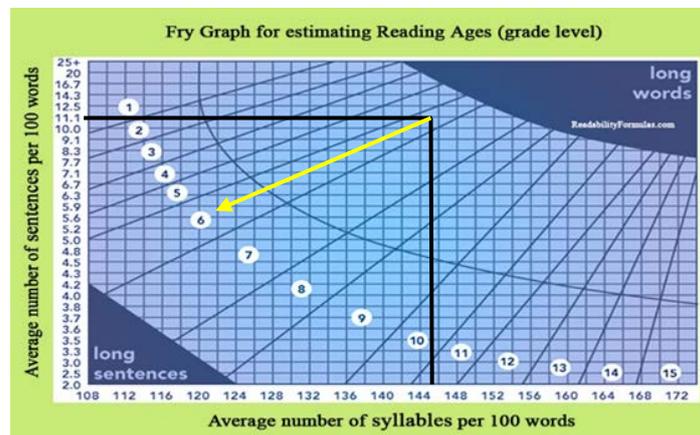


Figure 2. The results of calculations using charts fry.

The analysis result legibility by pulling both ranges in fry graph shows that the story entitled "Ancestors Kamanippah Enggano" is in level 6, where the value of the average number of sentences per 100 words is 146.4 and for the value of the average number of syllables of per 100 words is 11.23. The story thus suitable reading for students in grades 5, 6 and 7.

Discussion

From the calculation of the number of sentences and the number of syllables in the above, according to the story Kamanippah chart fry Ancestors Enggano, suitable as a reading material at the level VI. However, the result is still a chart fry estimate or range, so that the readability level still can be read on one level below or the level above it. For example, the story "Kamanippah Enggano Ancestors", suitable as a reading material at a level VI then the range underneath is $6-1 = 5$ which is suitable reading material read by the class V.

Then, the above range is $6 + 1 = 7$ which is suitable reading material is also read by the class VII. So, the story of Ancestors Enggano Kamanippah very suitable as reading material for class V, VI, and VII.

From the aspect of the use of the word, high readability in Indonesian language text if the text is presented with monosyllabic words simple and that has to do with the social context of student life (Suherli, et al., 2006).

Selection can be done by measuring the level of legibility. One of the easiest ways to measure the level of readability is to use readability formulas. Therefore, it is recommended to teachers to always test the readability of reading material with readability formula that had existed before ascertained as teaching materials for primary school children.

To improve the quality of the use of Indonesian, especially the aspect of legibility of text books, the author or publisher is advisable to always consider the vocabulary and sentences in the text book. In this case, the teacher can utilize readability formula as a tool.

CONCLUSION

Based on the results of the discussion, it can be concluded as follows:

- 1) Of the three paragraphs were taken starting from the beginning of the story, middle and last 100 words of the book and then look for the number of syllables and the number of parts requires using measurement calculation chart fry. Where the average value of both of these calculations that the number of sentences per 100 words is 146.4 and the number of syllables per 100 words is 11.23.
- 2) Use of the results of calculations using charts fry can know the contents of the reading is suitable for 5 and 6 grades for primary school and 7th grade for junior high school.
- 3) From reading books such as this can improve the communication of children, especially primary school children, can recognize some of the cultures that exist in Indonesia and learn the attitude of the character and how to emulate the figure in the book.

THANK-YOU NOTE

With gratitude to Allah SWT finally the author completed the task to keep a journal in which this task is the task of analyzing the book folklore entitled "Kamanippah Ancestors Enggano" and for the thoroughness of the results of final exams in courses Concept Indonesian elementary school at the State University of Surabaya (UNESA) majoring in Elementary Education Degree in 2017, which is taught by Mrs. Prof. Dr. Kisyani Laksono, M. Hum and do not forget also to all colleagues who have given their time and enthusiasm to do the work of up authors to finish well and correctly.

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The effect of games on grade 10th students' motivation in English class at Tran Hung Dao high school

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DOI: 10.29322/IJSRP.9.08.2019.p9269

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9269>

Abstract- This paper aims at investigating the effect of games on grade 10th students' motivation in English class at Tran Hung Dao high school, Quang Ninh province and seeks to determine the extent to which using games in learning process affects the improvement in students' motivation in learning process, how students experience the teacher's practice and behavior and measure the students' perceptions of the using games in learning environment with respect to its effectiveness. Questionnaire, observation and structured interview were used as the main tools to collect data. Both quantitative and qualitative data analysis methods were used to provide enough data for the present study. The results from the data revealed that the using games in learning process significantly affected students' motivation in language classes. In addition, most of the students involved in the study are generally happy about using language games in their study and they recognize the benefits of the language games in enhancing interaction between them and their classmates as well as their teacher

Index Terms- language games, high school students, motivation, attitudes, performance.

I. INTRODUCTION

In the current globalization and integration trend, English is considered to be the most widely used language in the world, as nearly 60 countries use English as their primary language, their mother tongue, and nearly 100 countries use English as second-language English. Therefore, this foreign language plays a very important role in the current integration of globalization.

The demand for training and development of foreign languages, especially English in Vietnam is increasingly focused and enhanced. However, at present, although the focus on foreign language training at the school level, the results have not yet reached the required standards. The objectives set out in the project "Teaching and learning foreign languages in the national education system for the period of 2008 - 2020" have created a strong impetus in teaching and learning foreign languages; However, from the objective to the actual results of the project, the distance is very far. On November 16, 2016, Mr. Phung Xuan Nha - Minister of Education and Training announced that "the government had failed to meet the goals of the NFL scheme for the 2008-2020 periods" (VN, 2016). Limited English proficiency results in loss of the opportunity to study and work for many students.

So as to learn a language well, students demand a relaxed atmosphere that increases motivating and this can be gained through games. Using games in teaching not only helps students to learn better but also increase students' motivation, rapport, cooperation and social interaction. On the one hand, playing games helped the students get ability for language, this good language ability helps students be self-confident and express themselves in their future life.

The game is very useful to improve motivation among shy students who cannot express their feelings or thoughts in front of others. By using the game, students can be more active, self-reliant and energetic to study about the environment, the world they live in, and take part in the teaching and learning process. We can teach all skills and components through game play, based on a learner-centered approach, while we are teaching; we must pay attention to the meaning, relevance and level of learners (Widodo, 2006)

At Tran Hung Dao High School, students live mainly in mountainous areas, with difficult conditions, their English communication environment is not available, and having a few chances to access learning languages resources as well as opportunities to communicate in foreign languages. Most students who have moderate level of learning, limited access to learning and access to outside knowledge, lack of opportunity to practice communication, Besides, being a foreign language teacher, the researcher have been step by step innovating, integrating and diversifying teaching methods into teaching periods in my classes to create the most comfortable atmosphere as possible for students to access the foreign language what they are learning best

Adding that, teaching English in most of Vietnam public schools often only focuses on tasks and exercises in the textbook, lack of many important activities, such as: active discovery, analysis, interpretation, problem-solving, memory, and physical activities, which leads to the boredom and be difficult for motivating students in learning foreign language. Hence in order to improve the teaching English in the classes more and more efficiently, as well as overcome these weaknesses, that is reason the researcher conduct the research "The effect of games on grade 10th students' motivation in English language class at Tran Hung Dao high school". And this research was implemented at Tran Hung Dao High School, Quang Ninh Province.

II. LITERATURE REVIEW

1. Definition of Games.

According to Martinson and Sauman (2008, p. 478), "Games are effective tools for learning because they offer students a

hypothetical environment in which they can explore alternative decisions without the risk of failure. Thought and action are combined into purposeful behavior to gain a goal. Playing games teaches students how to strategize, to consider alternatives, and to think flexibly". In other words, games are fun activities that help promote thinking, learning, interacting and solving problem. Normally, games have an aspect that permits the players to produce information in a short time period. Some games require the players to participate in a physical activity or complete a mental challenge.

However, Lengelling and Malarcher (1997) say that choosing a game is not easy task, it should be governed by some rules to guarantee the success of them. So, while planning games, teachers should take into consideration the following features: Classroom space, noise, materials necessary for the game, the amount of time needed for each game, and the level, culture, interest and age of students.

2. Educational Games

Like computer games or online games but these educational games focus on playing in the classrooms, and our definition maintains that such games require the involvement of rules, competition, relaxation and learning. A major purpose for using games in class is to promote students' motivation in learning English.

Prensky (2006 and 2011) defined educational games as interactive plays that teach us goals, rules, adaptation, problem solving, interaction, all represented as a story. They give us the fundamental needs of learning by providing - enjoyment, passionate involvement, structure, motivation, ego gratification, adrenaline, creativity, social interaction and emotion.

3. Games in English language teaching.

Games are useful for students involved in the learning of English since games can strengthen students' motivation and self-confidence. Using games in English teaching process to raise students' motivation and confidence which can then promote higher levels of English learning process. By using a game which helps students lots of opportunities to do, to act, and to move, they can acquire a greater quantity of meaningful lesson.

Foreman (2003, p.16) states that "Learning through performance requires active discovery, analysis, interpretation, problem-solving, memory, and physical activity and extensive cognitive processing". In other words, games provide a constructivist classroom environment where students and their learning are central, from there, students draw their own meaning from these experiences while learning from their mistakes and also from each other.

In other words, games stimulate students' activities in classroom and as a result, students become motivated and willing to learn. Philips (1993) supports this opinion by her statement that enjoyable activity is memorable then and the possible success that the children could reach in language learning will develop motivation for their further learning.

Games allow for creativity, independence and higher thinking. Usually, questions made by the classroom teacher are fact based and have only one answer, not allowing for creativity, personal expression. The answer is either right or wrong, but games can allow for multiple answers. They improve participation, self-confident, and vocabulary usage and moreover, games allow the students to see that there are many ways to solve the same problem. It is more like real life.

In short, the use of games has great pedagogical value in enhancing students' motivation and can be a springboard for teamwork. In a classroom based on teaching through games, there are different types of motivated interactions that make teaching-learning process enjoyable in learners-learners, learners and teachers' interactions.

4. Motivation

Gardner (1985) said that motivation is perceived as a goal-directed factor since it involves four aspects: a goal, effortful behavior, a desire to reach the goal, and favorable attitudes toward an activity. Motivation works as the starting point for learning and supporting the process of foreign language learning. In fact, if there is lack of motivation, no student will be able to continue with the process of achieving language proficiency; in the other word, high motivation will be useful for learners to attain proper proficiency in the second language, even if their ability or learning conditions are not appropriate (Cheng & Dörnyei, 2007). Motivation has been admitted as a remarkable factor in language learning success. Motivation research has evolved over the years through several stages demonstrating gradual integration with developments in motivational psychology, while having a clear focus on aspects of motivation related to language learning (Ushioda & Dörnyei, 2012).

Harmer (2002) said that motivation is a type of initiative that encourages someone to do things to reach a goal. Moreover, this is fundamental to succeed in most fields of learning; without such motivation, we will not be able to make the effort to learn. So, it is necessary to understand the its role when learning a language. The author distinguishes between extrinsic and intrinsic motivation coming from outside and inside the individual respectively.

Research has admitted intrinsic motivation as a decisive factor to stimulate success. Furthermore, in a model of intrinsic motivation proposed by Vallerand (1997), he found that intrinsic motivation is related to knowledge, accomplishment, and stimulation. These three aspects are respectively associated with exploring new ideas and developing knowledge, sensations embraced in attempting to master a task or achieve a goal, and sensations stimulated by performing the task. This kind of motivation is referred to as extrinsic motivation, the motivation that students bring into the classroom from outside (Harmer, 2007).

According to Thomas (2004), Robbins and Timothy (2007). "Motivation is the driving force by which humans achieve their goals. Motivation is said to be intrinsic or extrinsic. The term is generally used for humans but it can also be used to describe the causes for animal behavior as well". This study refers to human motivation. According to various theories, motivation may be rooted in a basic need to minimize physical pain and maximize pleasure, or it may include specific needs such as eating and resting, or a desired object, goal, state of being, ideal, or it may be attributed to less-apparent reasons such as altruism, selfishness, morality, or avoiding mortality. Conceptually, motivation should not be confused with either volition or optimism. Motivation is related to, but distinct from emotion.

However, in order to understand of terms used in this study, the following definitions are given to research.

The students' motivation is the desire to attend and learn the contents of the subject or the study program, which is the decision-making process of students on the orientation, concentration and

efforts of students in the study process. Learning motivation increases the knowledge and skills acquired by students in the learning process. This is reflected in their academic results. Students will not be able to get the best learning results if they do not have the right learning attitude. Learning attitude, in which motivation is the deciding factor.

5. Previous studies

Although there has been much research in the field of motivation, some studies have emphasized the impact of using games on English foreign language learners' motivation.

AlHaj (2011) conducted research to explore and solve a motivational problem in English foreign language Sudanese secondary students. The author used previous studies, direct observations, and guided interviews so as to obtain valuable information. The results showed that the lack of motivation in English foreign language classrooms within the study was due to the following factors: teachers and their training, schools, families and the lack of developing programs which maintain students' interest in learning process.

Additionally, it was found that a variety of classroom activities play an essential part in motivating students and facilitating the acquisition of English foreign language. Thus, it is recommended that teachers use debates, games, group work, pair-work, interviewing, problem-solving and role-plays to stimulate or motivate English foreign language learners.

In Tuan's (2012) study, key motivational factors which were influencing students' English learning performance and some effective ways of fostering these factors were analyzed. The aim of the research was to find out whether motivation had any impact on students' English learning process. Results showed that 94% of the participants agreed that motivational activities are necessary. Students love playing games, reading, translation, group or pair work, role-plays, and including television for watching films in English and cassettes for listening.

Chou (2014) examined the extent to which activities such as games, songs, and stories helped and motivated 72 Taiwanese English foreign language primary school pupils (between the ages of 8 and 11) to learn English vocabulary. The instruments used to collect qualitative and quantitative data were self-assessment questionnaires, achievement tests, and interviews. The information collected was analyzed using statistics software. The qualitative data was coded, classified and reported according to their similarities and differences. The results demonstrated that games, songs, and stories had a positive effect on learners' motivation to increase their English vocabulary.

Kamra, (2010) concluded that using games is an efficient way to teach English in the classroom. This way you get the best results in the classroom. It arouses students' motivation. Games prepare young learners for life and they acquire positive social attitudes. Games teach sharing, helping each other and working as a team. A child learns by doing, living, trying and imitating. So this kind of learning is lasting. During games some feelings such as the pleasure of winning and the ambition of losing may arise. This gives to the teacher an idea about student's character. So games are must-have activities for hardworking teachers. This is in the line with Buckingham (2003)

In conclusion, Prensky (2011) argued that students are naturally motivated to play games. Serious games are interactive play that teach students goals, rules, adaptation, problem solving,

interaction, all represented as a story. They give them the fundamental needs of learning by providing enjoyment, passionate involvement, structure, motivation, ego gratification, adrenaline, creativity, social interaction and emotion. "Playing has a deep biological, evolutionarily important, function, which has to be done specifically with learning." (Prensky, 2011, p. 134).

III. RESEARCH METHODOLOGY

1. 1. Research design

Action research is adopted as the research approach to answer the two research questions and achieve the aim and objectives of the study. According to Ferrance (2000), action research is a suitable method for teachers who want to make appropriate changes to student learning and measure the possible effects, and he demonstrates "Action research is used to chart the effects of implementation of a curriculum or strategy, to study student learning and responses." This method is also justified to offer significant benefits for the researcher, who is also a teacher.

2. Participants

The participants included 38 students in class 10A1, there were 20 females and 18 males and all of them are at the ages of fifteen at Tran Hung Dao high school. Most of them come from mountainous areas not have many opportunities to learn English. Their parents are mostly farmers, their living condition is quite low, their parents only pay attention to earning a living in order to support their living condition as well as caring their children, they have no time to take care of their children's learning.

3. Research questions

1. What is the impact of using games on grade 10th students' motivation in Tran Hung Dao high school?
2. How are the students' attitudes towards using games in the English foreign language classroom?

4. Instruments

* Questionnaire

In this study, the questionnaire which consists of six items were designed and delivered to all students. This questionnaire was designed in a five point Likert-scale which descend the meaning respectively from strongly agree, agree, neutral, disagree to strongly disagree. This model is helpful to figure out students' reaction, attitude, and opinion toward the educational games applied during the treatment time. All of the questions were written in English then translated into Vietnamese to make sure students understand all the items in the questionnaire.

Each question was designed to serve different purpose. To be specific, the 1st item aims to explore students' perception on the important of game in learning English, the 2nd item is to explore students' opinion on using games in teaching English to apply in real context conversation, the 3rd items aims at exploring students' understanding of the lesson when learning with games. Item 4 explores the students' perception on the effectiveness of language games, item 5 explores students' opinion and interaction when learning English with games. The last items deal with students' motivation when learning English with games.

* Observation

Observation was another method used to collect data in this study. Two teachers from the researcher's English division was invited to observe the teaching and learning process. The observers used an available observation form to take notes. In this study, the observation sheet was designed to explore the class atmosphere

and student's ability to speak English when applying language games in learning and teaching. Observers used the observation sheet to tick and check where appropriate with the actual situations in the class.

** Structured interview*

In additional to questionnaire and observation, the interview was conducted to explore students' feelings and opinions in using language games in teaching and learning English. Five students were randomly chosen from class 10A1 to answer the questions. All questions were in Vietnamese so that all students can best express their ideas. Each interview lasted 2 to 3 minutes and all the interviews were noted with the aim to explore the attitude of students to games with hope to show how enjoyable students were with the games and how well students were involved in the lessons. The information was used to reinforce one of the aspects of research questions mentioned above. Like using questionnaire, applying interview also has certain drawback. Some students followed the crowd and they do not express their own feeling because they probably think that their answers can affect their marks in class. Therefore, the researcher met them in person to avoid those negative effects.

4. Data collection and data analysis

The action research was conducted in two months in class 10A1 at Tran Hung Dao high school. Class 10A1 was taught with the implementation of language games integrated when learning language skills. When teaching in 10A1, after students learnt with games, they were asked to use the language they had learned in the game. For example, in one of the students play on a situation and context. Then, they were asked to use it in front of the class. It has much interest when they were divided into several groups and each group was responsible for role playing a specific part. Actually, each week students have 3 periods (45 minutes each) of English. In week 1 and week 2 of the second semester (school year of 2018-2019), there were 2 observations with 2 lessons without language games. In week 6 and week 8, two lessons with language games were observed to have data of students' participation and speaking time during the lesson.

At the end of week 8, questionnaires were delivered to all 38 students in class 10A1. Students were asked to write their responses to the items and then submit to the researcher.

Structured interviews were implemented in week 9 of the semester to gain data of students' feeling and opinions on using language games in studying English for the present study.

The data was categorized this way simply for seeking answers to research questions raised for this study. The quantitative data from questionnaire and classroom observation were collected, analyzed and classified to synthesize in the table statistics. The results were shown in the figures and charts. The data from the structured interview were counted and presented by quoting relevant responses from the respondents

IV. FINDINGS

1. Results of questionnaire.

From students' responses for the 1st item in the questionnaire, most of the students (64%) strongly agree and 4% of the students agree that games play an important role when learning English while 20% of the students think it is neutral, only (12%) of the students disagree and no student strongly disagrees with this statement. It is clear that students realize how essential of using

games in learning English process, they may find it an inseparable activity in the classroom.

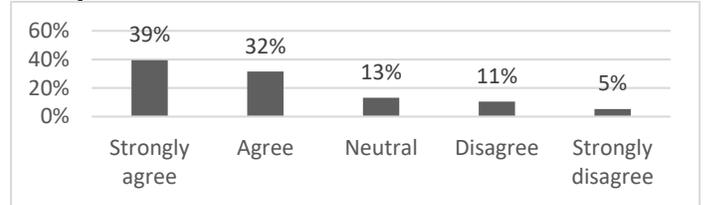


Chart 1: Students' ideas of the importance of using games in English learning process.

Additionally, students can use English in real contexts by studying through games, but it does not at the same rate. In fact, 39% of participants strongly agree that there are more chances for them to use games in real life situations while 32% of the students agree that they are able to apply games when they join in English learning process. 16% of the respondents cannot use the games in their learning process and the number of students answer neutral is 13%. This means that most of students recognize the purpose of using games is not only for creating excitement but also for providing students opportunity to speak out in class. The data are shown as following:

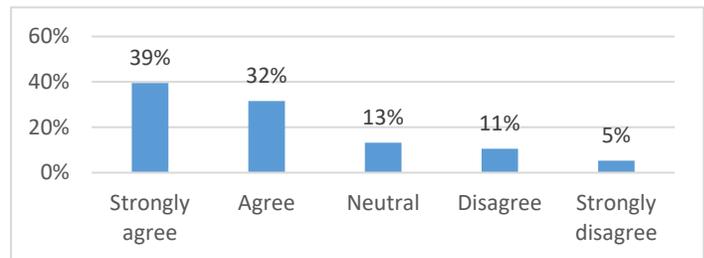


Chart 2: Students' opinion of using games in real contexts.

After English lessons, 74% students agree they can understand and practice lessons in class better through games, while 14% of the students responded that they were not able to understand and practice the lessons, 11% of the students answered they had no ideas. These figures confirm that the understanding of students is high and they really involve and understand in learning languages.

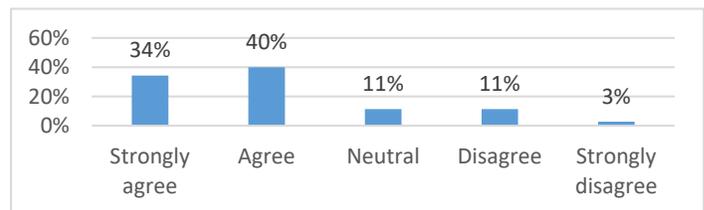


Chart 3: Students' understanding of the lesson

In exploring students' attitude towards using language games in teaching English, 27% of the students strongly agree that teacher's teaching method is effective and useful, 57% of the students agree with the idea and only 11% of the students disagree and strongly disagree with this statements. This indicates that most students like their teacher's new way of applying games in teaching process. As a result, they can be better in learning English and achieving their target.

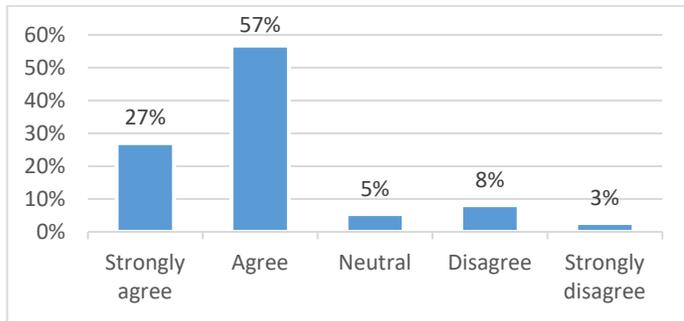


Chart 4: Students' attitude towards teaching method

Besides, the frequency of interaction among students-students and students-teacher through games is highlighted 18% of the students strongly agree that they use more English in their communication with their classmates and their teacher than learning English without games. 53% of the students agree they are able to interact with other students as well as with teacher. 13% of students say it is neutral and 16% of students disagree and strongly disagree with this idea. The data are presented in the following chart:

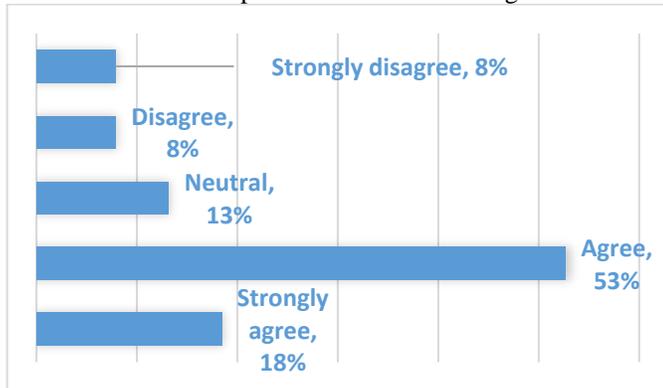


Chart 5: Students' interaction in English lessons

In Chart 6 below, it is clear that students had motivation when learning English with games since 97% of the students agreed that using games in learning English create strong motivation to practice English in class. Only 1 student (3%) did not agree with this idea.

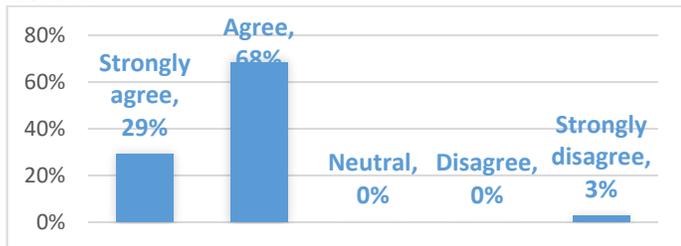


Chart 6: Students' motivation in learning English with language games

In sum, the above findings show that using games in teaching process can create strong motivation for students to practice English as well as provide real life situations so that students are able to apply what they studied to interact between students-teacher and students -students in class and outside class. This is a very positive outcome, particularly in light of the association between students' motivation and learning success.

2 Results of observation

When comparing these lessons with those using games, students had less chance to communicate and exchange ideas with others: about 48% for students spent too much time to do exercises.

Moreover, here the atmosphere was quiet and sometimes nervous but not funny and exciting. From the observation, students were tired at the end of the lesson. In fact, competition rate was about 30% because do not compete to answer teacher's questions. Furthermore, students' motivation was identified through the atmosphere inside classroom and students' English speaking time. Needless to say, two lessons using games create active and lively learning environment and students had more chances to speak English than the ones without games.

Comparison of students' motivation through lessons.

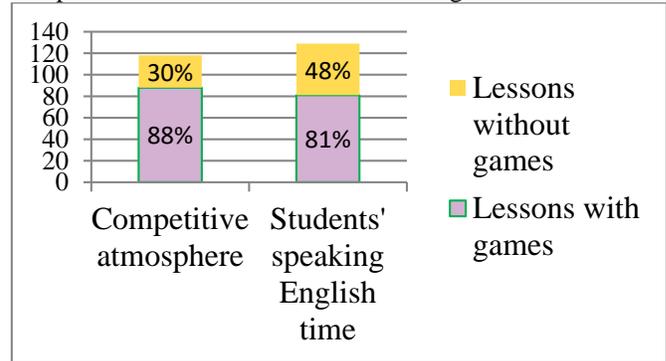


Chart 7: Comparison of students' motivation through lessons.

To sum up, findings of observation show that games seem to be relevant for students thanks to the extreme students' English speaking time as well as the collaborative learning. As a result, students can be successful in applying what they studied to real contexts.

3 Results of semi-structured interview.

The information collected from the interview, students' motivation is clarified through their feedback as well as suggestion in lessons and emotion to those games used in class. After the interviews with six students, the results are presented as below.

Question 1. Do you enjoy the games instructed by teacher?

All 6 students when interviewed responded that they "feel really exciting when studying with games" and they eagerly took part in more games and attempt to win these games. S1 said that he "enjoyed the non- stressful atmosphere, high motivation, as well as positive competition inside the classroom which is created by games". In fact, the students try to win because they receive the small gifts once they are winners. Sometimes, it is a lovely pencil, a small notebook or even lollipop or candy but these presents stimulate students to win the games as S4 said "it's lovely". S6 added "I can understand the games instructed by the teacher that made me enjoyed learning English". However, S3 made the researcher keep in mind when instructing games in class "I do not know how to play at first, so it is better to observe my classmate".

Question 2. Are you able to use new language when joining the games?

Most of the students said that they were able to use new structures when joining the games. S1 eagerly told the researcher that "I am sure I can use those structures immediately" or "why not, it's easy to practice with my friends when I am happy", said by S2. S5 added "I find it easier when speaking without pressure". Only 1 students found that it was difficult for him when he joined grammar game as he said "I need more time to think about the form to go to board and finish the game" (S4).

Question 3. Do you have more opportunities to communicate through game?

Five out of six questioned students said that they had more opportunities to communicate when joining the games. Data from observation also recorded about two third of the students often take part in the games positively. S2 said that “I have more opportunities to speak out what teacher instruct when they play the games”. S3 added “sometimes, I could not do finish the conversation but my friends forced me to finish to win the game”. S5 also explained “how could I shut my mouth when my friends kept asking me to speak”. S6 affirmed “even me, I have to speak”. However, S4 confessed “I am not good at English, even my teacher encouraged me but I think it’s difficult to speak”.

Question 4. Do you have stronger motivation when studying English with games?

When asking about motivation after studying English with games, S1 said that he “feel really interesting to learn English through the games, English is not too difficult as I thought”. S2 agreed “I think I am pretty good at playing language games”. S3 added “While I was working on the task I was thinking about how much I enjoyed the candy”. S4 believed he could do better when he said “I am suddenly stupid when everything was already clear at that time, I will do much better next time”. The similar statements were also expressed by S5 and S6.

Question 5: Are there any obstacles as you participate in the games?

Despite the fact that games bring many benefits, some students have unavoidable problems when they join the games. Most of the students said that there were not any obstacles as participating in the games, however, some minor difficulties when playing language games experienced by the students were: “I had wrong partners, they did not want to perform”, stated by S1 or “I had to run back and forth, because my friends were lazy. It was tired” mentioned by S2 or “teachers should give more time for us to prepare” (S3). S5 and S6 agreed that they need more time to be ready for the game. Only S6 had his own difficulty as he said “It’s fun but it’s difficult for me”.

In general, games or game like activities encourage most of the students positively to involve in lessons which can be seen through their motivation when playing games. Students feel confident and they are able to communicate better at the end comparing to those who are in traditional class. Although Translation Methods still affects the way students learn English, a good sign is that after the games students express their enjoyment as well as they think that games are beneficial for applying language features in their communication

V. CONCLUSION

This paper clarified the strong points of using games for students at Tran Hung Dao high school. The results from this action research expressed the positive influences of games on students’ motivation. Three kinds of datasets consisting of questionnaire, observation, and interview which showed an attempt to answer the two research questions posed at the beginning of the study and gave researcher evidence-based judgments to the innovation. They have promoted the trend of adopting games in teaching process for students at Tran Hung Dao high school. The using games in learning process offers to the students was successful due to a combination of factors. In addition, the games tasks were enjoyable, which increased their motivation to learn and gave them higher confidence in persisting with more challenging tasks.

Vitally important, pertinent games and activities should be examined to identify the most relevant ones for studying English. The upcoming study of using games in teaching process could be continuously investigated in different high school of Vietnam. Therefore, the collected information is more valid and reliable.

Games play an important role in teaching and learning process as well as they promote students’ motivation. The data was collected from the questionnaire, observation and interview were analyzed quantitatively and qualitatively. The data analysis helped the researcher achieve the aims of the study.

Major findings of the thesis, from the thorough analysis and discussions of the data collected from the survey questionnaires and score analysis, significant findings were identified.

Firstly, it was discovered that using games in teaching and learning process did have positive effects on the students’ motivation. Games provide comprehensible input while learners interact in the group and allowing students to clarify the ways of learning new languages. Implementing games in teaching also enhanced students’ motivation to learn English in class. The strategy also allows the students to interact effectively with peers, which is also used as student-centered method. The games also provided a challenge, where they need their concentration to get the tasks done which strengthen students’ mental work. Such activities were also new to students’ experience and they think carefully to get the right answers.

Secondly, from the questionnaires, it was found that most of students had positive view toward the implementation of using games in class. Most students liked learning through games it could improve students’ motivation. Last but not least, by implementing the games in the class students could improve their interest in learning process. The win as a drive to play a language game cannot be underestimated. It is the factor which allows a learning class environment to be conditioned and shaped according to the needs of the students, the learning process, or the requirements of a course.

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Factors affecting English language learning processes at Thai Nguyen University

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DOI: 10.29322/IJSRP.9.08.2019.p9270

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9270>

Abstract- The present investigation aims to investigate the factors that affect the teaching and learning processes of English teachers and learners at Thai Nguyen University. These factors were divided into two categories: socio-psychological (interest, personality family circumstances) and teaching situation (teachers and syllabus). Two sets of questionnaires were administered as the data collection instruments to gain enough data for the analysis. Results from both questionnaires show that social psychological factors influence the students' attitude and motivation towards learning the English language. Students hold positive self-concept manifested in rating themselves versus their ideal person. And both are reflected in the general low level of anxiety in the English classroom as reported by the students themselves. Parental support was reported as generally encouraging. In addition, attitudes towards English speaking people were fairly favorable though attitudes towards English culture were rather neutral. Teachers' attitudes towards their profession and towards the students' performance appear to be "good" and they are generally satisfied with their profession and its conditions. Teachers also showed their satisfaction with the syllabus and believed the goals, objectives and teaching methods could match the students' needs
Index Terms- Thai Nguyen University, attitude, motivation, English learning, English teaching.

I. INTRODUCTION

The construction of an educational system capable of preparing humanity to live productively and meaningfully in this shifting world is one of the most essential and critical responsibilities of a modern society (Griswold, 2008). In an increasingly globalized world, numerous factors have emphasis on foreign language learning as a part of educational practice has become particularly important.

A number of factors have been identified as influencing students' engagement with L2 learning. Characteristics of L2 learning such as cognitive and social aspects, individual learner differences, affective issues, motivation, learning styles and learning strategies have drawn much attention from researchers. Consequently, learner variables have become one of the most significant domains of research in second language acquisition (Van, 2008)

Learning is the most fundamental and most important activity for every student at universities and colleges, and this activity can only greatly benefit from motivation. According to Piaget (cited by Duy, 2009) motivation is all factors that work to meet the needs

and direction of the learning process. Motivation exists in two forms: internal motivation and external motivation. The inner motives are formed from the interest in learning to satisfy the need for understanding. External motivation is not created by the excitement of oneself in learning but the excitement resulting from learning (high scores, reward, punishment, to please someone...). Motivated people will actively participate in the learning process and have the independence in solving problems, like new things, new challenges. On the other hand, people with strong external motivation, when achieving their goals, tend to be less motivated and often fail to cope with failure, difficulties and complex tasks (Chi, 2007).

Besides, according to Curran & Rosen (2006) every courses in the curriculum, along with the is the leading factor that brings knowledge, understanding and skills to students. The content of the courses and the curriculum that is clear, practical and highly applied will promote the learning behavior of students who are trying to learn to accumulate knowledge and skills for the future. In Thai Nguyen university, all institutions have their own EFL programmes to cater for the needs of their students. The programmes ranged from the very basic to the most advanced, adapted to the varying proficiency levels of learners. In all universities (except the School of Foreign languages), the English competence of the students before entering university is different. In addition, English is not the tested in the entrance exam, students are not classified according to placement test to teach in group, the syllabus has not been systematically compiled, the number of students in a large English class. Those factors have been foreseen that affect the teaching and learning processes of teachers and learners at Thai Nguyen University. However, up to date, there has been no research conducted to explore factors affecting the teaching and learning process extensively. Therefore, this study's intention is to acquire as much information in these factors as possible. From the point of view of the language teachers, the more knowledge they accumulate, the more confident they become in creating a language learning environment that will maximise the gains experienced by the students.

II. LITERATURE REVIEW

1. English Language Learning.

Language learning is an active intelligent, rule-seeking, problem-solving process that develops through the construction and application of a system of rules. These rules allow the speaker to create innovative utterances never heard before. It would take too

long, the cognitivists argue, to learn language through a process of stimulus-response. Learners must understand and analyse grammar rules to develop their competence as a basis for performance. Its purpose is to enhance the same sorts of abilities that native speakers possess.

One of the main principles of the communicative approach was that language is learned best through the negotiation of meaning in task-based interaction with others. Communicative language teaching classroom procedures are usually composed of group activities, language games, and role plays; yet these activities and the ways in which they are used are not exclusive to communicative classrooms. Richards (2002) explained that the communicative approach may have survived into the new millennium because it refers to a diverse set of rather general and uncontroversial principles, and it can be interpreted in many different ways and used to support a wide variety of classroom procedures.

The communicative approach is not a single method; it is to a certain extent a point of reference that can be adapted to practically any method, including cognitive and acquisitionist. Due to its social structure the communicative approach is most closely related to sociocultural approaches (Collings, 2007).

2. Factors affecting language learning

* Family and parents

According to Terenzini, (1993), Engle, (2007), the change of L2 students often requires learning and adapting to new academic and social systems. Their challenges lie in the fact that these new academic and social systems are not part of their family and cultural traditions. Thus, adapting to new academic and social systems requires them to break away from their old traditions and cultural norms.

The parents who are involved in their children's school, tend to have fewer problems and better learning performance, and are more likely to complete high school than students whose parents are not involved in their school. Positive effects of parental involvement have been demonstrated at both the elementary and secondary levels across several studies, with the largest effects often occurring at the elementary level. Drake (2000) states, "Nowadays, family involvement has reached a new level of acceptance" (p. 34).

More explicitly, Wells (2008) said, social capital "includes the social and personal connections or networks that people capitalize on for interpersonal assistance and personal gain, which for youths are often developed in schools in addition to the home" (p. 29).

As a result, it can be said that socio economic status is necessary for successful foreign language learning and academic performance causes significant social, cultural, and academic success.

* Curriculum and Syllabus

Harris and Schaible (1997) stated that "anecdotal evidence suggests that both students and faculty members believe that students improve their writing and subject-area knowledge in writing across the curriculum-based courses" (p. 31). According to Harris and Schaible, "The overwhelming weight of current evidence suggests that LAC (learning across the curriculum) can improve both student comprehension of subject-specific knowledge and their writing, but only when it is consistently and rigorously applied" (Harris and Schaible, 2000, p. 37)

Rose (1985) cited "The way of talking about writing abilities and instruction is woven throughout discussion of program and curriculum development, course credit, instructional evaluation and resource allocation. And, in various ways, it keeps writing instruction at the periphery of the curriculum." (p. 341). Morris (1998) offered, "The content of curriculum in UK have been explained with reference to areas of learning or experience which is a combination of forms of knowledge and types of skills and attitudes of a culture that assists students in writing" (p.27).

It is clear that English learning is important. It is the poor English learning achievement that has called for attention to teaching and course design in order to improve the situation (Abbott, 1992). To achieve better English teaching and learning, the first possible issue to look at is the curriculum, as it is often the first thing on which learning objectives, teaching content, assessments and teaching methods are based, and it is a major factor affecting language learning outcomes.

Therefore, we can perceive that curriculum is an important influential factor to develop English language learning of students.

3. Attitudes and motivation in language learning

2.3.1 Attitudes and Motivation

Language aptitudes could be defined as "a set of cognitive or verbal abilities which appears to be related to second language achievement" (Gardner, 1985). This variable has always been combined with the attitudes and motivation variables to compare their relative effects on achievement. However, some researchers nowadays question the value of such concept as they see that all individuals acquire a first language, and have debated the issue of innateness or acquisition of a language.

Besides, "Attitudes and motivation" refer to a class of nonability variables presumed to be important in second language acquisition" (Gardner 1985, p.119). Some research dealt with a number of attitudinal and motivational measures and others with one attitudinal object. Almost all report a relationship between attitudinal variables and indices of second language achievement. In this study, the attitudinal/ motivational dimension includes attitudes towards learning a foreign language, towards learning English as a foreign language towards English culture and English speaking people, motivational intensity, daily political situation, attitude towards the English language course and teacher.

4. Factors affecting Attitudes and Motivation in language learning

Since attitudes and motivation influence second language learning, the factors that influence them could be exemplified in parental and teacher attitudes, community beliefs or cultural expectations, peer pressure, relevance of the course.... Most research so far has dealt with parental and teacher attitudes and their effects on student attitudinal/motivational characteristics.

Parents are believed to have a major role in their children's second/foreign language process. Gardner (1985) identifies two roles for the parents: active or passive. The first refers to the parents' conscious promotion of the children's language learning as they monitor their progress and praise their success. The latter may include encouraging and supervising the children's work but necessarily involves transmitting negative attitudes towards foreign language learning. This can be manifested openly through comments about speakers of the target language or the importance of language learning in the curriculum, or indirectly by showing apathy in the foreign language. Mao (2011) reported that parents who have positive attitudes towards French Canadians and who

are integratively oriented encourage their children to study French and as a result these children are skilled in French. Bain (2010) reported that children with ethnocentric tendencies have parents with similar attitudes. Gardner (2010) reported an association between the students' orientation and difficulty with cultural identification and their parents'. The only parental characteristics investigated in this research are the educational and occupational background and encouragement of English language learning as reported by the students themselves. As the latter is the subjects' perception of the parents' encouragement, it must be said that it may or may not conform to the parents' opinion; however, this perception is the students' reality in their practical learning process.

Likewise, teachers play a significant role in the foreign language teaching process. Teachers are expected to have some general characteristics, personal and professional, to be successful in their task. Personal characteristics are those pertaining to the teacher as a human being, that is, they have no relation to professional competence. Patience, tolerance, warmth, flexibility, sensitivity, open-mindedness, and self-confidence are the major characteristics a teacher has to have. Such qualities- Gu (2009) believes- are innate but could be brought to surface or enhanced. For the purpose of this research, one part of the students' questionnaire was designed to elicit information about how the students perceive their English language teacher; personally and professionally. Furthermore, the teachers' questionnaire involved some questions about the teachers' educational background, enthusiasm towards the teaching profession and relationship with students.

5. English language teaching in Thai Nguyen University

Thai Nguyen University (TNU) is located in the northern midland and mountainous region where many ethnic minorities live in harmony for a long tradition, in which ethnic minorities accounted for 24% - the highest rate in the country with their own cultural identities. At present, TNU has a current enrollment of 90,000 students, of which there are about 65,000 undergraduate (55,000 full-time and 10,000 part-time) and others are professional vocational students. The annual application average is from 70-80,000 applications from various parts of the country, mostly from 16 northern upland provinces of Vietnam.

Inn TNU, English is a compulsory subject across all programmes at different institutions (except the School of Foreign Languages, the International School and 5 advanced programs at TNUT and TUAF). Students study 10-12/120-132 credit hours, accounting for nearly 10% of the total credit hours of an undergraduate programme. Most of the students come from mountainous areas and there are no entrance exams or placement test. Most students understand from beginning of English course that they need to be good at English to be confident looking for jobs. However, apart from students with an English major, English was only taught in the first two years of university for a couple of hours a week. In all institutions within TNU, students who had already learnt three or seven years of English at school are still placed in a class with the students who had not learnt any English before entering university. Thus, they all learn English from the beginning with the same textbook and the same contents delivered in each lesson. In a mixed class of 30 to 40 students who have to relearn English feel bored, while the others feel nervous and lack confidence. Then, for the last few years at universities, English is no longer

taught in the curriculum, any student who wants to maintain and improve their English have to spend their money to improve their English in language centres outside universities.

III. RESEARCH METHODOLOGY

1. 1. Research design.

The present study will be quantitative research in nature. The data collected from two questionnaires of both students and teachers will provide quantitative data for the study. The data will be compared and contrasted to see the main factors affecting the language teaching and learning processes as well as the relationships (if any) among those factors.

2. Participants

* Students

Seven hundred and thirty students enrolled as regular students in 4 universities within Thai Nguyen University served as subjects for this study. The total of 730 students aging from 17 to 23 responded to the student questionnaire.

* Teachers

Seventy-eight English teachers from 9 institutions within Thai Nguyen University responded to the questionnaire for teachers. 11 of the teachers are males and 67 are females. Sixty-six teachers are M.A. degree holder and 12 Ph.D. All the teachers are full-time teachers at their institutions

3. Research questions

1. Which of the social and psychological factors influence the students' English language learning?
2. What are teachers' attitudes towards their profession and towards the teaching curriculum?

4. Instruments

* Students' Questionnaire

The questionnaire as used in this study consists of two main parts and 9 subsections aiming at eliciting descriptive information about students' gender, university, number of English language courses taken. Some of its basic ideas are adapted from the Attitude/Motivation Test Battery which is developed by Gardner and his associates to assess the non-linguistic aspects of second language learning. Changes-major and minor- as well as additions and subtractions to the original items were needed to assess the non-linguistic aspects of foreign language learning in TNU.

* Teachers' questionnaire

The teachers' questionnaire is constructed on similar lines to the students' questionnaire. Since the student and the teacher are the two important elements in the teaching/learning process, equal emphasis should be put on examining both of their views about this situation. The teachers' questionnaire is composed of three parts.

Part I asks about teachers' attitude towards the teaching profession. Part II asks about teachers' attitudes towards the teaching/learning situation and towards the students' performance in general and Part III asks about teachers' attitude towards the syllabus at their institutions.

4. Data collection and data analysis

After transferring the questionnaire into Google form and publish online, the researchers wrote an email to ask for help from teachers who are teaching English at 9 institutions within TNU. The teachers were then randomly assigned students in their classes whom they were teaching at that time to complete the questionnaire. After five months (from December 2018 to May

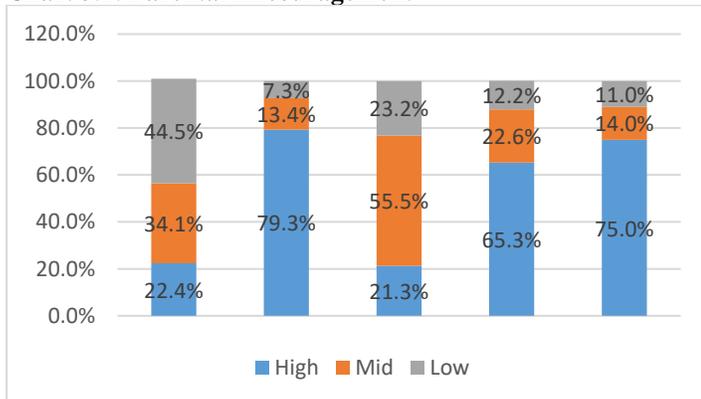
2019), 730 completed online questionnaires were collected and ready to provide data for the present study. The teachers' questionnaire was administered in similar procedure and 78 questionnaires forms were collected. Data collected from two sets of questionnaire was collected where frequencies and percentages are given, the ratings on the five-point scale items which appear in the questionnaire were reduced to three points: high, mid and low for ease of interpreting the results. The high rating was created by combining scales 4 and 5, and the low rating by combining scales 1 and 2; the mid rating represents scale 3: neutral. Besides, the high level represents "strongly agree" and "moderately agree", the mid-level "neutral", and the low level "moderately disagree" and "strongly disagree". The results were then presented in tables to see the correspondence

IV. FINDINGS

1. Results of questionnaire.

* Parental Encouragement

Chart 3.1: Parental Encouragement



In general, students reported positive attitudes of their parents towards the teaching/learning of English as a foreign language. The majority reported neutral responses as to whether parents think their children should spend more time on the English courses (55.5%). Besides, 44.5% students thought that their parents did not help them to learn English. The reason could be that either parents themselves are not proficient enough in English or it is not expected that parents offer help to their children at the university level.

* Interest in Foreign Languages

Chart 3.2 below states that students showed general positive interest in foreign languages. One of the four items indicating the level of interest in foreign languages which is a general statement concerning "the importance of learning foreign languages for the Vietnamese" received 90% high ratings. The other three items on the other hand, concerning the students' own use of foreign languages received lower percentages of ratings. The reason could be that they perceived 'the book' as a textbook related to their field of study, thus they feel a more urgent need to read it in the original language it was written in. Another reason could be the lack of local newspapers and magazines written in English; thus, students may not find equal interest as in reading about issues that concern them more directly found in newspapers and magazines.

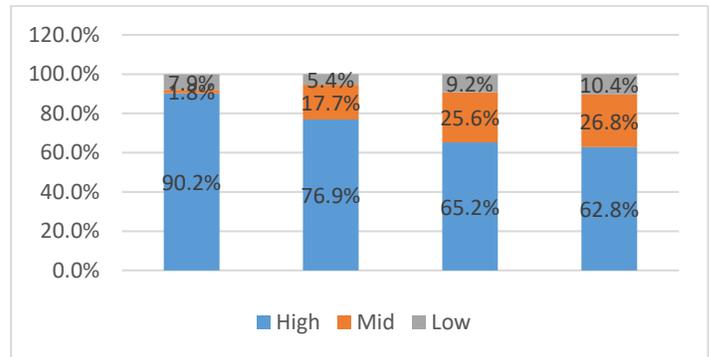


Chart 3.2: Students' Interest in Foreign Languages

* Instrumental Motivation

Chart 3.2 below shows students' instrumental motivation of TNU students. Two items (*studying English ... to meet and converse...* and *studying English ... make me more knowledge person*) indicated a very high level of instrumentality among the students. The first item could be considered a social one where other people are also involved, 'students could meet and converse with a variety of people'. The second could be labelled as personal, where students could be more knowledgeable. However, only 48% reported that studying English can be important because knowing a foreign language would make them more respected (item 3). Though this item can be considered both social and personal, it does not seem that knowing a foreign culture is associated with 'social respect'. One item (number two) which showed less instrumental motivation could be said to relate to ethnocentrism; "Studying English can be important because it will offer me a chance to leave the country" received 38% high ratings, 32% low ratings and 30% 'neutral'.

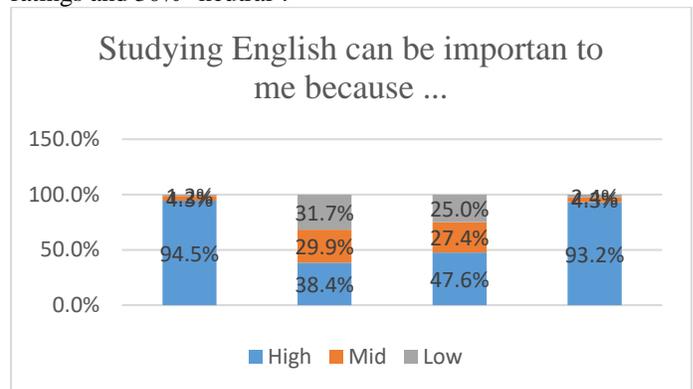


Chart 3.3: Students' instrumental motivation

* Attitude towards English Culture

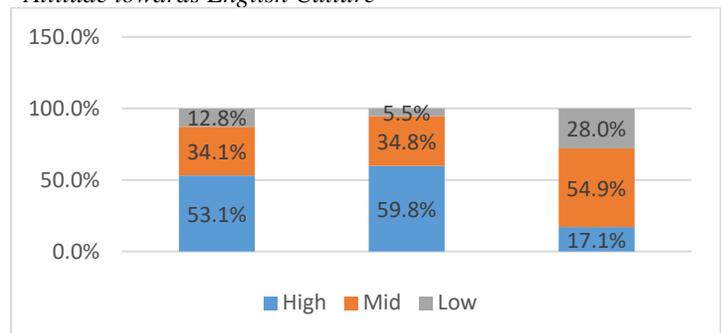


Chart 3.5 Attitude towards English Culture

An average of 56% of the students showed positive attitudes towards English speaking people, and English culture on two

items. However, the percentage of high ratings dropped to 17 concerning their directly stated attitudes towards English culture with 55% neutral responses, “... *I have discovered that some aspects of that culture are not as good as I had thought*”. That more students showed positive attitudes towards English speaking people and ‘artists and writers’, but more or less neutral attitudes towards the culture, tending toward low level- may be because ‘culture’ is more inclusive than individuals. That is, students may have a relatively negative attitude towards a culture which they believe has some effect, in one way or another, on their own culture or identity, whereas individuals of that foreign culture are not perceived as having direct influence. This may also be related to the students’ degree of ethnocentrism, where the higher the level of ethnocentrism is, the more negative their attitude towards the foreign culture is expected to be.

** Attitude towards Learning English*

In the questionnaire, there are 8 items aiming at exploring students’ attitude toward learning English as follows:

- Item 1: I plan to learn as much English as possible,
- Item 2: If I had the opportunity to see a play in English, I would definitely go.
- Item 3: English is an important part of the Lebanese educational system,
- Item 4: I would rather spend my time on courses other than English.
- Item 5: Learning English is a waste of time.
- Item 6: I am studying English only because it is a requirement.
- Item 7: If there were an English Club in the University dealing with English poetry, drama, books, cooking, movies..., I would attend meetings,
- Item 8: If I had the opportunity to speak English outside the classroom, I would do it.

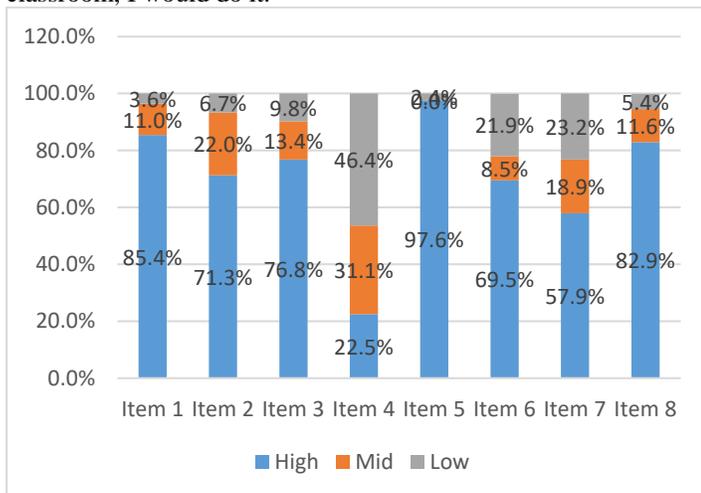


Chart 3.6 Attitude towards Learning English

Students’ attitudes towards learning English tended to be high on all items except one. The highest percentage of high ratings was for the following item: “*Learning English is a waste of time*”. Of the 730 students, 98% disagreed on this statement and none was neutral. This means that most students have a great value for learning English. An average of 84% reported they plan to learn English as much as possible and that they would speak it outside the classroom given the opportunity. However, only 76% agree that English is important in the Vietnamese curriculum. The item “*I am studying English only because it is a requirement*” received

70% high ratings and 22% low ratings. While 71% of the students would go to a play in English, 58% would join an English club at the university. The fact that the second item is related to the students’ lives at the university could explain the discrepancy in percentages, though relatively not too big. The interesting point here is that though the majority has positive attitudes towards ‘the learning of English’ (item numbers 5, 1, 8, 3, 2, 6 and 7 in order of high percentages), 46% show negative attitudes and 31% are neutral on one item: “*I would rather spend my time on courses other than English*”. The reason that only 23% showed positive attitude on this item can be that it is concerned with the language course- content, readings, assignments...- rather than the value of English or the general use of it.

2 Results from teachers’ questionnaire

**Attitude Towards the Teaching Profession*

The majority of teachers (59%) reported they had planned to teach English. Those who responded they were happy with their choice formed 86% and those who would not change their profession if they found a more suitable one were 68%.

More than half of the teachers (59%) do not find the teaching profession materially rewarding but 82% find it is socially. An average of 82% reported that teaching is enjoyable but tiring, and 64% find it satisfying. All of the teachers agreed that teaching is a ‘respectable’ profession.

Of the total teachers, 81% felt their interest in the profession has not decreased as years passed. About 73% do not feel satisfied if only a few students show progress. All teachers give extra assignments to help the students overcome their points of weakness.

In general, teachers seem to be quite happy with their jobs though more than half (an average of 59%) had not planned to teach and do not find the profession materially rewarding. This satisfaction seems to give them the incentive to carry on their duties and responsibilities such as maintaining their interest, wanting more students to progress and giving extra assignments.

Relationship with students

The two adjectives used most to describe the kind of relationship between teachers and students were ‘disciplined’ and ‘friendly’. The frequency of use of the six adjectives came in the following order: ‘friendly’ (67), ‘disciplined’ (54), ‘formal’ (38), ‘informal’ (3), ‘strict’ (30), and ‘permissive’ (16). From these figures, one could better understand the relationship between the two. Teachers would prefer to be ‘friendly’ but at the same time ‘disciplined’. This may be explained by the still prevailing belief among the Vietnamese: parents, teachers and students, that teachers are “the authority” in the classroom and that they have to be serene. While the terms ‘formal’ and ‘informal’ received equal number of frequency of usage, words such as ‘strict’ and ‘permissible’ tended to be rarely used probably because of the strong connotation each word carries.

Of the total number of teachers, 14% would ‘definitely’ make an attempt to know a little about the students’ background at the beginning of the semester and 41% would, only if they feel they should know more. The rest (46%) do not make any attempt at all. As to whether the teachers are willing to give extra time to help weak students, 86% reported they would if they find the student really needs help, and the rest (14%) would but not more than their assigned office hours.

Finally, while only 9% of the teachers remain optimistic and try to help students overcome their points of weakness, 64% find it difficult to maintain such a feeling. The decision of the rest (27%) depends on the general atmosphere of the class.

Teachers seem to be quite responsible and willing to help and instruct the students, and at the same time, realistic concerning their everyday, practical, professional chores. For the first two questions, teachers showed mild interest and responsibility towards students, that is, within their professional duties; however, they find it difficult to remain optimistic and try to help students, possibly because of factors relating to the general atmosphere of the university and/or country, and not necessarily for educational reasons

**Teachers' level of Satisfaction*

In general, teachers seemed satisfied with most of the teaching/learning aspects. However, the language laboratory, facilities offered by the university, and the outside opportunities the students have to practice English received relatively lower ratings of satisfaction. On the other hand, teachers seemed quite happy with the way they evaluate the students' achievement and their availability for consultation.

**Teachers' Attitudes Towards the Syllabus*

Of the total teachers, 63% reported that the aims of teaching English in TNU are known to themselves and to all teachers of English. Therefore, what they believe the aim of teaching English to university students should be is summarized in the following (the number in brackets after each phrase represents the number of times it was mentioned in the questionnaires), to help students:

- a. express their thoughts in any form- written or spoken (67)
- b. communicate with people (51)
- c. in their academic studies, undergraduate as well as graduate (40)
- d. in their profession (37)
- e. read, write, listen and speak in the foreign language (with different emphasis on the skills) (30), and
- f. know about the foreign people and culture (21).

Of the total number of teachers, 91% reported their departments have set goals for the teaching of English. Of these, 95% thought these goals match theirs, 80% believed they match the students' needs to learn English as a foreign language. However, only 40% had a say in setting these goals. About 90% reported their actual teaching matches the departmental goals and 75% felt students are aware of these goals.

Of the total teachers, 68% think students do feel the need to learn English. This was quite evident in the students' questionnaire where students reported the value of learning English in different instances. As to what kind of syllabus teachers have, 55% reported they follow a general one where they are given guidelines, but interpretation is left to them; 41% reported they follow a rigid one where they are given a day to day schedule. Only one respondent said he/she follows an open one where decisions about what and how to teach are left entirely to the teacher. All except one would like to have a general syllabus, which is justifiable by the fact that teachers do need to know what is expected of their teaching and at the same time can adapt that according to what may be more suitable and efficient in certain conditions.

Whether students should be consulted about the content and method of courses in sciences and mathematics, the majority of teachers (82%) expressed disagreement. However, as far as language courses are concerned, 50% of the teachers agreed. This

may be natural since the syllabi in the former type of course could be more precise with definite steps and clear guidelines to be followed.

V. CONCLUSION

Regarding social psychological factors influence the students' attitude and motivation towards learning the English language, it can be concluded that in general, students had a positive opinion of their proficiency in foreign languages- especially English, their performance in English language skills, as well as their frequency of using the skills. This is accompanied by the students' positive self-concept manifested in rating themselves versus their ideal person. And both are reflected in the general low level of anxiety in the English classroom as reported by the students themselves. Parental support was reported as generally encouraging.

Attitudes towards English speaking people were fairly favorable though attitudes towards English culture were rather neutral. However, nearly half of the students expressed interest in spending more time discussing the culture of English speaking people in the classroom. Students have a general satisfaction in the teaching/ learning situation. They believed that learning a foreign language does not endanger their cultural identity. This may be linked to their general interest in foreign languages as shown in the results "It is important for the Vietnamese to learn foreign languages" (90%). The value of learning English was also appreciated by the subjects; "Learning English is not a waste of time" (98%). This was also obvious in their desire that only English be spoken during the class. This is reflected in the subjects' relatively positive motivational intensity in the English language course, except for volunteering for extra assignments.

Regarding teachers' attitudes towards their profession and towards the students' performance, the second important figure in the teaching situation in this research, seem to be generally satisfied with their profession and its conditions; "it is socially rewarding" and "their interest has not decreased". Moreover, they are willing to exert extra effort when needed, and their relationship with the students appears to be "good". They showed the great effort on helping students not only to learn English but also to be a good citizen as the most frequent words appeared were "friendly" and "disciplined". In addition, English teachers at TNU also showed their satisfaction with the syllabus and believed the goals, objectives and teaching methods could match the students' needs.

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Clinicopathological Outcome of Uterine Clear Cell and Pappillary Carcinoma at AHRCC Ongoing Study

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DOI: 10.29322/IJSRP.9.08.2019.p9271

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9271>

Abstract- OBJECTIVE –The objectives of this study were to analyse clinico-pathological determinants of the clear cell and uterine pappillary serous cell carcinoma.

Material methods- A cohort of patients diagnosed and underwent complete surgical staging for upsc and clear cell of the endometrium from 2010- 2018 were viewed. The significance of the independent variables were calculated by chi-square. The multivariate regression analysis of the factors influencing the nodal status.

RESULTS- We could analyse that both clear cell and upsc, was prevalent in 61 yr age. They are associated with comorbidities. They present with a higher grade (G3), pre-op imaging, showed more number cases with et of 15 mm. The nodal status was significantly affected by myo-invasion > 50% lvs in clear cell carcinoma. Where as the lvs+, adnexa+, omentum+, peritoneal cytology+, myo-invasion > 50%, was significantly found associated with a positive nodal status in uterine pappillary serous cancer.

Index Terms- UPSC – uterine pappillary serous cell carcinoma, ET – endometrial thickness, Mmmt- malignant mixed muellerian tumor, LVSI - lymphovascular space invasion

I. INTRODUCTION

Clear cell carcinoma of the uterus is the rare subtype accounting for 1-6% of uterine cancers, is characterised histologically by clearing of cytoplasm (1). They present in higher stage. Comprehensive surgical staging is recommended in all clear cell carcinoma. Aggressive, multimodality of treatment (including surgery, chemotherapy, and/or radiation therapy), is recommended as compared to endometrioid carcinomas. Clear cell carcinomas are genetically distinct from endometrioid cancer. Clear cell tumors show similar gene expression profiles regardless of origin. (2)

- Uterine pappillary serous cancer is the most common prototype of type II endometrial cancer, which accounts for only 10% of all endometrial cancer but is responsible for 40% death in endometrial cancer (3). The most common symptom diagnosed in UPSC, as is for women with endometrial cancer, is postmenopausal bleeding. This is usually mixed with grade 3 endometrioid and

clear cell. UPSC tends to occur in older women. Increase risk is seen in African American women. UPSC is highly aggressive and more likely to be presenting in advanced stage III and IV. (4). Women, on tamoxifen for breast cancer, is at a risk of UPSC. Association between BRCA and UPSC, is evident in the emerging data. There is a precursor lesion for, but it may present late, at advanced stage. There are some similarities in serous ovarian cancer and UPSC such as tendency for peritoneal carcinomatosis, presenting with ascites, upper abdominal involvement and early lymph node involvement (5). The 5 yr survival for patients with UPSC has been reported from 18% to 27%, which is probably due to extra uterine spread in 60 - 70% of the patients at diagnosis (6).

- Although clear cell serous cancer constitutes less than 10% of the endometrial cancers, they account 50% of recurrences and disease related deaths. The most common presentation in clear cell carcinoma is postmenopausal bleeding. There is association of BRCA, ARID1A with clear cell cancer. There is increase frequency of clear cell, post radiation. (7) Diagnosis and work up endometrial biopsy, by pipelle has sensitivity of 99%. Ultrasound not reliable for UPSC (8)

II. MATERIAL- METHODS-

Inclusion criteria- 1. all cases of clear cell and upsc of the endometrium

- **Exclusion -** 1. all endometrioid
2. mmmt
3. sarcomas
4. cervical cancers

The clinical and pathological data were reviewed at AHRCC. All the specimens were evaluated by pathologists. The patients underwent the surgical staging, histopathology was analysed. Their comorbidities, preop imaging with respect to endometrial thickness were taken into consideration. The age, parity, menopausal status and presenting symptoms. The chi-square and the multivariate regression analysis done using the SPSS

Descriptive statistics for Clinical part	
Total case = 39	
Overall Median (range) age in years = 61(36-88)	
Overall Median (range) imaging in mm = 15(3.5-34)	
Clinical part for clear cell	
Variable	n (%)
Age	21
Median (range) in years	60 (45-70)
<60 year.....	08(38)
≥60 year.....	13(62)
O/H	21
Multipara.....	17(81)
Nullipara.....	04(19)
M/H	21
Menopause attended.....	21(100)
Menopause not attended.....	00(00)
Comorbidity	21
Present.....	09(42.9)
1.Hypertention.....	05
2.Diabeties.....	03
3.Both.....	01
Absent.....	12(57.1)
Imaging	21
Median (range) in mm	15 (3.5-23)
<15 mm.....	10(47.6)
≥15 mm.....	11(52.4)
Presently symptoms	
Pr.tb.....	21
Present.....	20(95.2)
Absent.....	01(04.8)
Pmwd.....	21
Present.....	02(09.5)
Absent.....	19(90.5)
pmod.....	21
Present.....	00(00)
Absent.....	21(100)

FIG-1

DESCRIPTIVE STATISTICS OF THE CLINICAL DETERMINANTS OF CLEAR CELL CARCINOMA UTERUS

Clinical part for papillary serous
 Click to add text

variable	n (%)
Age	17
median (range) in years	61.5 (36-88)
<61.5 year	06(35.3)
≥61.5 year	11(64.7)
O/H	17
Multipara	13(76.5)
Nullipara	04(23.5)
M/H	17
Menopause attended	16(94.1)
Menopause not attended	01(5.9)
Comorbidity	17
Present	08(47)
1.Hypertention	02
2.Diabeties	04
3.Both	02
Absent	09(53)
Imageing	17
median (range) in mm	14.5 (3.5-34)
<14.5 mm	09(53)
≥14.5 mm	08(47)
Presently symptoms	17
Pmb	17(100)
Present	17(100)

Fig-2 DESCRIPTIVE STATISTICS OF CLINICAL PART OF PAPPILARY SEROUS CANCER OF UTERUS

Descriptive statistics for Pathological part

Total case = 39	
Overall Median (range) Tumor size in cm = 03 (0.3-10)	
Overall median (range) Endometrial Thickness in mm = 15 (3.5-34)	
Pathological part for clear cell	
Variable	n (%)
Node	21
+ve node	12 (57)
-ve node	09 (43)
GRADE	21
G1	00 (00)
G2	07 (33)
G3	14 (67)
Myometrial invasion	21
<50%	09(42.8)
≥50%	12 (57.2)
Cervical Extension	21
Yes	02 (9.5)
No	19 (90.5)
Tumor size(in cm)	21
<3 cm	12 (57.2)
≥3 cm	09 (42.8)
Lymphovascular invasion	21
Yes	02 (9.5)
No	19 (90.5)
Omentum	21
Yes	02 (9.5)
No	19 (90.5)
Other intra abdominal organs	21
Yes	00 (00)
No	21 (100)
Peritoneal cytology	21
Yes	06 (28.6)
No	15 (71.4)
Adnexa	21
Yes	04 (19)
No	17 (81)
Endometrial Thickness	21
< 15 mm	04 (19)
≥15 mm	17 (81)

FIG 3 – DESCRIPTIVE STATISTICS OF THE PATHOLOGICAL PART OF CLEAR CELL CARCINOMA OF UTERUS.

Pathological part for papillary serous

Variable	n (%)
Node	18
+ve node	07 (38.9)
-ve node	11 (61.1)
GRADE	18
G1	00 (00)
G2	06 (33.33)
G3	12 (66.67)
Myometrial invasion	18
<50%	09 (50)
≥50%	09 (50)
Cervical Extension	18
Yes	04 (22.2)
No	14 (77.8)
Tumor size(in cm)	18
<3 cm	07 (38.9)
≥3 cm	11 (61.1)
Lymphovascular invasion	18
Yes	09 (50)
No	09 (50)
Omentum	18
Yes	05 (27.8)
No	13 (72.2)
Other intra abdominal organs	18
Yes	01(5.5)
No	17 (94.5)
Peritoneal cytology	18
Yes	05 (27.7)
No	13 (72.3)
Adnexa	18
Yes	06 (33.3)
No	12 (66.6)
Endometrial Thickness	18
< 15 mm	09 (50)
≥15 mm	09 (50)

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FIG4 DESCRIPTIVE STATISTICS OF THE PATHOLOGICAL PART OF UPSC

Univariate analysis for Pathological part

For **clear cell**

Variable	χ^2 -value	p-value
Age	2.036	0.154
Grade	0.000	1.000
Myometrial invasion	3.646	0.056
Cervical Extension	1.658	0.198
Tumor size (in cm)	0.016	0.899
Lymphovascular invasion	3.646	0.056
Omentum	1.658	0.198
Peritoneal cytology	2.353	0.125
Adnexa	0.643	0.422
Endometrial Thickness (in mm)	1.289	0.256

N.B.: Statistical significance ($p < 0.05$) i.e, 5% level of significance, χ^2 : chi-square, Total no of cases = 21.

FIG-5 UNIVARIATE ANALYSIS OF THE FACTORS AFFECTING THE NODAL STATUS UTERINE CLEAR CELL CARCINOMA

For **papillary serous**

Variable	χ^2 -value	p-value
Age	0.234	0.629
Grade	5.727	0.017
Myometrial invasion	5.844	0.016
Cervical Extension	0.417	0.518
Tumor size (in cm)	0.177	0.732
Lymphovascular invasion	5.844	0.016
Omentum	4.923	0.026
Peritoneal cytology	4.923	0.026
Adnexa	7.481	0.006
Endometrial Thickness (in mm)	2.104	0.147

N.B.: Statistical significance ($p < 0.05$) i.e, 5% level of significance, χ^2 : chi-square, Total no of cases = 18.

FIG -6 UNIVARIATE ANALYSIS OF FACTOR DETERMINING THE NODAL STATUS OF PAPPILARY SEROUS CANCER

Multivariate Analysis of Pathological part

For clear cell

Variables	OR	95% CI		p-value
		Lower	Upper	
Age (in years)				
<60	1			
>60	3.869	.589	25.435	.159
Grade				
Grade-2	1			
Grade-3	1.234	.175	8.710	.833
Myometrial invasion				
<50%	1			
≥50%	11.043	.980	124.383	.052
Tumor size (in cm)				
<2	1			
≥2	7.513	.125	450.375	.334
Lymphovascular invasion				
no	1			
yes	6.000	.893	40.306	.065
Peritoneal cytology				
no	1			
yes	5.714	.532	61.410	.150
Adnexa				
no	1			
yes	5.519	.125	244.172	.377
Endometrial Thickness (in mm.)				
<15	1			
≥15	.357	.059	2.159	.262

N.B.: Statistical significance ($p < 0.05$) i.e, 5% level of significance,
 Statistical significance ($p < 0.1$) i.e, 10% level of significance, Total no of cases = 21

N.B.: None of the above significant at 5% level but Myometrial invasion and Lymphovascular invasion are significant at 10% level.

FIG-7 MUTIVARIATE ANALYSIS OF FACTORS INVOLVING THE NODAL STATUS OF CLEAR CELL CARCINOMA

For papillary serous

Variables	OR	95% CI		p-value
		Lower	Upper	
Age (in years)				
<60	1			
≥60	.625	.093	4.222	.630
Myometrial invasion				
<50%	1			
≥50%	16.000	1.315	194.623	.030
Cervical Extension				
no	1			
yes	.440	.036	5.435	.522
Tumor size (in cm)				
<2	1			
≥2	3.373	.161	70.557	.433
Lymphovascular invasion				
no	1			
yes	16.000	1.315	194.623	.030
Omentum				
no	1			
yes	13.333	1.048	169.557	.046
Peritoneal cytology				
no	1			
yes	13.333	1.048	169.557	.046
Adnexa				
no	1			
yes	30.080	1.616	559.773	.022
Endometrial Thickness (in mm)				
<15	1			
≥15	.256	.015	4.331	.345

N.B.: Statistical significance ($p < 0.05$) i.e. 5% level of significance. Total no of cases = 18.

FIG -8multivariate analysis of the factors influencing the nodal status in papillary carcinoma

III. RESULTS

Our study analysis revealed that maximum cases of clear cell in the median age range of 61 yrs, 13 (62%) more than 60yrs. Most of the clear cell associated with co-morbidities 21 cases(100%). 17(81%) were multiparous. They usually present with post-menopausal bleeding 20(95.2%), few presented with watery discharge 2(9.5%) Pre-op imaging revealed, endometrial thickness of 15 mm was detected in 47.5%, range of minimum of 3mm to a maximum of 34 mm recorded. 14(57%) showed a grade 3. The nodal positive status 12(57%). On multi-variate analysis, lymphovascular space invasion and myo-invasion was found to statistically significant, with a p-value. **.052 and .065** respectively that affected the nodal status in clear cell carcinoma. UPSC was, more prevalent in age group of 61 yrs, multiparous 13(76%), median of 61.5 yrs. Most of them was associated with co-morbidities 8(47%), 94% attained menopause and presented with postmenopausal bleeding(100%). The pre-op imaging showed a median of endometrial thickness of 14.5 mm, 9 (53%) the minimum of 3.5 mm to a maximum of 34mm were recorded. (66%) 12 cases presented with grade 3 **11(61.7%)** were nodal status positive in UPSC. The myo-invasion >50%, LVSI+omentum+ peritoneal cytology+, adnexa+, was significantly associated with nodal positivity in UPSC in multivariate regression analysis with a p value of **.03, .03, .046, .046, .022**. **Conclusion** – Most of the cases of upsc and clear cell in our study group present in postmenopausal age group, with post-

menopausal bleeding. All cases of clear cell were associated with comorbidities. Although the spectrum of presentation varied from watery discharge to bleeding in clear cell. The range of endometrial thickness varies from 3mm to 34 mm. In our study 57% case clear cell presented in stage III. The nodal status was significantly influenced by lvsi and myo invasion.

All cases of upsc presented with postmenopausal bleeding. maximum number cases had the co-morbidities. 61.7% presented in stage III. The factors such as myoinvasion, lvsi, omentum+ adnexa+, positive peritoneal washings significantly influenced the nodal positivity of upsc.

- **Purpose** – Was to present the clinicopathological features and analyses of the factors influencing the lymphnode, Due to the rarity of the UPSC, the clinicopathological of the patients with upsc is poorly understood. Further more randomized clinical trials aiming at exploring standards of treatment for clear cell and papillary serous cancer

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The effect of employee satisfaction and organizational commitment: A conceptual Review

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DOI: 10.29322/IJSRP.9.08.2019.p9272
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9272>

Abstract

The main purpose of this study is to investigate the effect of employee satisfaction and organizational commitment. Accordingly, this paper attempts to review the articles and research papers based on employee satisfaction and organizational commitment on work at different institutions. In identifying the effect of employee satisfaction and their organizational commitment to work, the researcher incorporated a survey methodology in which the researcher did an in depth analysis into the relevant literature and sources. The analysis of relevant literature and discussion suggest that there is a better co-relation between these two variables namely employee commitment and satisfaction and organizational commitment.

Keywords: Job satisfaction, Employee commitment, employee–employer relationships, working environment

1. Introduction

Employee satisfaction and retention are very important issues for an organization. And also it is very essential to people who study the relationship between employee satisfaction and organizational commitment (Syptak et al., 1991). One studies have paid attention to employee satisfaction in a private religious institutions (Schroeder, 2003).

There is an interest in employee satisfaction. Roznowski and Hullin (1992) explained that after an individual is rented, knowledge of the employees' satisfaction becomes the very essential part of data in an organization.

Robbins (1998) explained about the important of job satisfaction. A satisfied workforce gains higher outputs. Employee absenteeism, departure of good employees and incidences of destructive employee behavior are less disruptions for an organization. One of a research has been done in this area. But still there are some major controversies such as what are the main factors are that contribute to employee satisfaction and dissatisfaction. Employee achievement, the work itself, job recognition, advancement and responsibility are gained the employee motivation and satisfaction. These are the intrinsic factors for the employee satisfaction (Hackman and Oldman, 1980; Herzberg, 1957). Some studies highlight wage, policies of the company and administrative as well as supervisory practices are important for employee satisfaction. These factors explained as extrinsic factors (Butler, 1982; Gruenburg, 1980; Herzberg, 1957; Seybolt, 1976).

Linkages have become progressively essential in modern society. Mowday et al. (1982), employee–employer relationships and social linkages are the important things for employee commitment to the organization. The quality of employee and employer relationships is important for an organization as well as individual and the society. These consequences include both negative and positive consequences. Turnover, low productivity, tardiness, absenteeism and theft influence for negative behaviors. Loyalty,

high productivity, dedication, punctuality and commitment has no impact to positive behavior. Positive behaviors encourage the organization's success (Newstorn and Davis, 1997). Strong linkages are help to the wellbeing of an entity (Tyree, 1996). Wood (1976) emphasizes, "the health of a higher educational institution depends on the job satisfaction of its employees". Problems related to job satisfaction and organizational commitments among employees within different types of organizations have been studied broadly by the researches in different countries. Spector (1997) described that job dissatisfaction and poor commitment of employees lead to negative repercussions in an organization. Employees' absenteeism, lack of interest in the work and high employee turnover are few examples. Lack of promotional opportunities, poor working environment, employee relations and unsatisfied supervision are some of the factors that affect job satisfaction of employees. Herzberg (1959) in his motivation theory explained that some of the employees motivated to perform an activity for its own sake and personal rewards. And the other type of employee are motivated to perform an activity to earn a reward or avoid punishment. Large number of researches have been done to find out the factors that influence to the employees satisfaction and organizational commitment. (Oshagbemi 2003; Lu et al.2005; Horton 2006; Chen et al. 2006). Chen et al. (2006) developed a model of six factors to measure the satisfaction of university teachers, namely organization vision, respect, result feedback and motivation, management system, pay and benefits and work environment.

2. Purpose of the Study

The employee satisfaction is a crucial factor for the advancement of any organization. Employees' commitment for the development of an organization and the satisfaction of their customers are greatly influenced by the employee satisfaction. Employees are considered as the internal customers of an organization. Hence their satisfaction with the existing working environment of the organization will support to achieve the long term and short term financial and non-financial goals of an organization.

Employee satisfaction has been given the minimum attention in many organizations. Most of the mangers have not recognized the importance of job satisfaction. Therefore, most of the organizations are not gaining the maximum contribution from its employees. There are many factors that affect the dissatisfaction of the employees which cause financial as well as non-financial problems to the organization.

Most of the organization focus and invest to increase their customer satisfaction and pay minimum attention on employee job satisfaction which affect one of the most important factor for the sustainable development of any organization. Continues less attention or less zero investment on human capital development will affect the organization to move away from its main goals and objectives and make them less competitive in the market. Therefore it is important to study and understand how the organizational commitment impact on employee satisfaction. Hence the purpose of this study is to identify the relationship between employee satisfaction and the organizational commitment.

3. Literature Review

The employee satisfaction is the most acceptable and the most widely used theory than any other theories of motivation (Alexander, 1985; Iredale, 1985; Schroeder, 2003; Srisawat, 1990; Thorn, 1985) explains that the motivation-hygiene theory is preferred over the alternative theories. Because it becomes a tool of the management and had motivated many empirical and theoretical studies related to employee satisfaction and commitment.

To motivate employees, it is essential to supply one or more satisfiers of Herzberg's. Those satisfiers can be explained as motivators, comprised a sense of achievement, creative or challenging work, advancement opportunities, responsibility and recognition. These factors are helpful to develop and grow employee as a person and professional.

This theory shows that not only hygiene factors to avoid employee dissatisfaction. But it is essential to provide factors intrinsic to work it. There are numerous discussions over issues about the relationship between job satisfaction and organizational commitment. Few researchers have explained that the employee satisfaction is a predictor of organizational commitment (Dramstad, 2004; Ferris, 1986; Meixner and Bline, 1989; Porter et al., 1974; Price, 1977; Rose, 1991; Williams and Hazer, 1986). Some other studies have explained organizational commitment as a predictor of employee satisfaction (Aranya and Ferris, 1984; Aranya et al., 1984; Bateman and Strasser, 1984; Lachman and Aranya, 1986; McGregor et al., 1989). However these studies have suggested a different causal procedure between employee satisfaction and organizational commitment.

Hygiene Factors - Herzberg stated that hygiene factors relate to the environment in which the task is carried out and do not directly relate to the task. The hygiene factors are the causes of job dissatisfaction on the job and the existence of negative hygiene factors will lead to employee dissatisfaction and unhappiness. However, employee satisfaction will not be attained by improving these factors. Improving hygiene factors is preventing the impediments of Job dissatisfaction. He concluded that it is the presence of job dissatisfaction that makes employees to leave a company (Herzberg, Mausner and Snyderman, 1959,). Therefore, this will be the benchmark of evaluating the implementation of hygiene factors.

Motivation Factors - Herzberg stated that the motivation factors relate directly to the task being performed. The motivational factors were the primary cause of job satisfaction and a decline in these factors would not lead to job dissatisfaction. The individual would just go back to the original neutral level (Herzberg, Mausner and Snyderman, 1959). Therefore, this will be the benchmark of evaluating the implementation of motivation factors.

The job satisfaction can be define as an employee's affect to their job based on comparing real outcomes with preferred outcomes (Cranny, Smith, and Stone, 1992). In generally it can be recognized as a multifaceted construct. It is included employee feelings about a variety of both internal and external job elements (Howard and Frink, 1996). Porter and Steers (1973) controvert that the extent of employee satisfaction is reflected in the cumulative level of met worker expectations.

There are certain features with preferential values which are expected by the employees from their jobs such as pay, promotion, autonomy etc. The importance of these preferences can be differ across individuals, but when the unfulfilled expectations are accumulated, there is less job satisfaction and then they leave the career (Feilds, 2002) indeed, some interest in employee satisfaction is focused basically on its effect on absenteeism, intentions to quit, employee commitment and real turnover (Agho, Mueller, and Price, 1993). But some studies have explained the variance in turnover is a level of satisfaction. It may be smaller than originally thought (Hom and Griffeth, 1991; Lee, Mitchell, Holtom, McDaniel, and Hill, 1999). One other study presented that employees who changed jobs and moved into a new job had higher levels of satisfaction in the new job (Riza and Ganzach, 2014). The facets of meaningful work and promotion opportunities can be identified as important predictors of intentions to leave an organization. Mathieu's (1990) test has explained the effects of a variety of antecedents on organizational commitment were mediated by their impact on employee satisfaction (Feilds, 2002).

Aspects of the situation of work have been shown to be determinants of employee satisfaction (Arvey, Carter, and Buerkley, 1991). A broad situational factor, job level, is positively related with satisfaction with all aspects of the job. Because higher-level jobs effect to have better working conditions, promotion opportunities, pay, autonomy, supervision and responsibility (Feilds, <http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9272>

2002) found that perceptions that employees have about numerous aspects of their work environment (management climate, job content, reward fairness, employee influence and promotion opportunities) described job satisfaction. This study also indicates different patterns of work satisfaction at different age levels for non-college graduates (U shape), non-elite professionals (downward sloping) and elite professionals (upward sloping). Personal characteristics such as age, gender, education level, and pay grade did not contribute incrementally in explaining the variance in work satisfaction beyond that explained by variables describing the job situation. In Fields (2002) evaluation of alternative confirmatory factor models found that job satisfaction and the personality tendencies of negative and positive affectivity were empirically distinct. Job satisfaction can be describe as a satisfactory favorable emotional state resulting from the administration of one's job, an effective reaction to one's job and an attitude towards one's job (Weiss, 2011). According to this this definition we form attitudes towards our career by considering our feelings, beliefs and our behaviors. Cranny et al. (1992) explained that employee satisfaction is a contribution of cognitive and affective responses to the differential perceptions of employees. (Cranny, Smith, and Stone, 1992) Researchers like Porter and Lawler define job satisfaction as a one-dimensional construct; that is, you are generally satisfied or dissatisfied with your job (Porter and Lawyer, 1968). In contrast, Smith, Kendall and Hulin dispute that job satisfaction is something multidimensional; that means you may be more or less satisfied with your career, your supervisor, pay and the workplace (Smith, Kendall and Hulin, 1985). Two main theories that have always been referred in job satisfaction are Maslow's theory of needs and Herzberg's two factor theory. Maslow's theory has explained five levels of individual needs. They are self - actualization and esteem needs at the top level whilst social, safety and physiological needs at the bottom. This theory has frequently been used to conceptualize employee's motivation based on the different levels of needs. Maslow assumes that some needs are more important than other needs and must be satisfied before the other needs can serve as motivator (Maslow, 1959). However, studies dating back to Herzberg's have shown that workers satisfaction is as a result of motivation factors whereas dissatisfaction are a result of hygiene factors (Herzberg 1957). It is logical that more satisfied workers will tend to add more value to an organization. Unhappy employees will not give 100 percent of their effort for very long (Herzberg 1957) For the organization, job satisfaction of its workers means a work force that is motivated and committed to high quality performance. Increased productivity, the quantity and quality of output per hour worked seem to be a byproduct of improved quality of working life. It is significant to note that there is no conclusive or stable literature on the relationship between job satisfaction and productivity. (Spector, 1997)

4. Discussions

To understand the causes of employee (dis) satisfaction, Frederick Herzberg (1957) conducted a study that was later revalidated in 2003 by Harvard business school. In the late 1950s, many people considered Frederick Herzberg as a pioneer in motivation theory and he did a research with a group of employees to find out what mode them satisfied and dissatisfied on the job. Based on his findings, Herzberg created a two-dimensional paradigm of factors affecting employee' attitudes about work, intrinsic (Hygiene) and extrinsic (Motivators) factors as : Hygiene Factors Salary, Supervision, Company and Administration policy, Interpersonal relationship, Job security and Working conditions : Motivation Factors Achievement and recognition, Responsibility, Work itself Growth and advancement. These factors are directly influencing for employee job satisfaction and their commitment.

Tansel and Gazioglu (2014) indicate there are four measures of Job satisfaction; they are satisfaction with influence over job, satisfaction with amount of pay, satisfaction with sense of achievement and satisfaction with respect received from supervisors. The survey is rich in individual characteristics and workplace characteristics. A matched Employer-Employee survey and a rich set of questions on work conditions and management-employee relations were included in this research. The results in this research is to support the following propositions. First, the management employee relationships are not much content in large firms. However, there is also evidence that large firms are likely to compensate for their size by providing regular discussions of promotion possibilities, training needs and pay issues. Second we observe lower levels of job satisfaction in larger firms as it is

often reported in the literature. Third, the observed lower levels of job satisfaction in the large firms may be due to weak management-employee relationships. As per this study; staffing issues, pay issues, health and safety at work, chances of promotion, training needs, and management-employee relationships are influencing factors for employee job satisfaction and their commitment.

Chen et al.,(2006) has introduced an employee satisfaction model for higher education. That study had used relevant academic literature to establish a satisfactory model for the university teachers in Chin Min Institute of Technology which is a private university situated in middle Taiwan. Using a questionnaire based on the Importance of satisfaction model, 248 teachers were administered the questionnaire, to investigate and analyze their importance of satisfaction level. There are six dimensions in this model. They are organization vision, respect, result feedback and motivation, management system, pay and benefit and work environment.

An individual or an employee who is already satisfied with basic needs will focus on social needs and esteem needs. Accordingly, the college teachers who are already satisfied with physiological and safety or security needs focuses on higher salaries and fair promotion system (Chen, Yang, Shiau, and Wang 2006).Therefore, salaries and promotion system are directly influencing employee's job satisfaction and their commitment.

Humborstad and Perry (2011) employee job attitude were measured using job satisfaction and organizational commitment. Humborstad and Perry (2011) have tested the relationship between perceived practices and Chinese employee service effort. Although it has tested the turnover intention to inspect the mediating role of employee attitudes in this relationship. By this research employee job attitudes were measured by using job satisfaction and organizational commitment.

Humborstad and Perry (2011) have developed a model of the mechanisms of their empowerment that includes the variables of job attitudes. These variables of job attitudes combine employee satisfaction with affective organizational commitment.

Employee empowerment gives employees greater autonomy and responsibility in handling daily activities (Haas, 2010). It allows employees to solve problem themselves (Humborstad and Perry, 2011). Researches in the West suggest to stimulate the untapped human resources to empower employees (Spreitzer, 2008). Empowerment efforts in China need to be linked with the creation of positive attitudes for it to deliver the desired output for an organization. Positive attitudes can be created through wider communication on empowerment efforts, and stronger organizational and supervisor support (Sut, Wong and Chad 2011) Positive attitudes create pleasant working environment. In this situations can see supervisors are parsing and acknowledging employees. Therefore, the above factors can be introduced as influencing factors for employee job satisfaction and their commitment.

Cho and Park (2011) investigated the role of trust within one US federal agency, the Federal Administration, by examining the relationship among several managerial practices, trust and employee attitudes including employee satisfaction and organizational commitment. Trust is very essential for employee job satisfaction and their commitment. Cho and Park (2011) has identified three types of trusts. Basically, they have divided into two as fallows; Vertical Trustsand Horizontal trust. Vertical trust means Trust in management andTrust in supervisors. Horizontal trusts mean Trust in co-workers.

Trust in management has a larger effect in commitment than the other two forms. Trust in management is substantially associated with employee satisfaction and organizational commitment. Having trustworthy supervisors increase thee supervisor employee satisfaction but it does not increase commitment. Because employee consider supervisor as separate from the organizations. Trust in co-workers is positively related to satisfaction and commitment.

However, compared to trust in management, trust in co-workers is weekly related to satisfaction and commitment. Trust in management, trust in supervisor and trust in co-workers are influencing factors for employee job satisfaction and their commitment.

Bjerke, Ind and Paoli (2007) have explained that the aesthetic environment in work places creates positive feelings and the removal of existing nice environment would create dissatisfaction.

This correlates with Herzberg's argument (Herzberg, 1957) that environment and working conditions influence people's dissatisfaction with their work, whereas people are seldom made satisfied by a good environment – that relies primarily on the job itself. Employees working with business clients are happier when the workplace have aesthetic feature (Bjerke, Ind, and Paoli 2007).

According to Bjerke, Ind and Paoli (2007), a strong organizational culture contributes to strengthened feelings of identity among employees. The clearer the company values are defined and explained, the stronger the sense of being a part of the organization. The degree is determined by the length of time an employee work for a company, the importance of their job, the quality of employee working environment and the quality of the colleagues. Bjerke, Ind and Paoli (2007) has identified pleasant working environment, nice colleagues, and varied job tasks as motivational – and satisfaction factors. The analysis of the interviews explained that employee satisfaction seemed good. There could be an impact of physical environment on the satisfaction employees. But they didn't think that people were so aware of the influential power of art, design and architecture.

In general, respondents believed that a nice environment created positive feelings among them and several respondents agreed that if the unique art, design and architecture at Telenor was "removed" or changed, dissatisfaction could well increase. This tie in with Herzberg's argument (Herzberg, 1957) that environment and working conditions influence people's dissatisfaction with their work, whereas people are seldom made satisfied by a good environment – that relies primarily on the job itself.

Several of those working with business clients mentioned a sense of pride also because of the art, design, and architecture, particularly when they had customer meetings at the company site, and when they took customers on a tour to show art, design, and architecture.

When employees identify themselves with the culture, the working environment will have a tendency to become more pleasant and this again may increase morale. Telenor says that employees seem to identify with the company and its culture, the internal co-operation may become better and new ideas welcomed. Employees who are allowed to work with a greater freedom and flexibility are more creative than the employees with less freedom and flexibility. The open space office leads to greater creativity because of the possibility to exchange ideas and thoughts with colleagues.

Nicholas and Paoli (2007) suggest that there could be a link between physical environments, creativity, and the provision of service quality. If this explained that the environment contributes to performance improvement and to a change in motivation. Physical environment motivate them to provide a better service quality to customers. A strong organizational culture leads to stronger employee performance.

Brown and Sargeant (2007) has stated age, education, gender, Occupational area and tenure, salary and fringe benefits, organizational policy and administration are influential factors for employee job satisfaction and their commitment. Brown and Sargeant(2007) found the longer employees stayed at their institution, the higher the levels of organizational commitment and employee satisfaction.

Wang and O'Reilly (2010) examined the relationships among dispositional sources of value preferences and personality attributes, organizational commitment and satisfaction. He has identified four types of models for employee job satisfaction and

their commitment. They are; Direct effects of dispositions on organizational commitment, direct effects of dispositions on organizational satisfaction, direct effects of dispositions on organizational satisfaction, which in turn explains organizational commitment and Mediation effects of organizational satisfaction on the relationship between dispositions and organizational commitment.

Wang and O'Reilly (2010) has focused on two types of organizational commitment: instrumental commitment and normative commitment (Caldwell, Chatman and O'Reilly, 1990) The instrumental commitment focuses on reward-based incentives of the organization and the nature of an exchange relationship between the individual and the organization, while the normative commitment refers to individuals' commitment to the organization because of the internal factors of the organization. These might include for example, the norms, values and culture that characterize the organization, which are shared by individuals and the organization.

The models of direct effect of disposition on organizational commitment as well as the mediation effect of organizational satisfaction on the relationship between disposition and organizational commitment.

Piketon Research and Extension Center -1998: James R. Lindner, a researcher and extension Associate of The Ohio State University conducted a research study on employees' satisfaction at Piketon Research and Extensions center (Linder.1998).

The employees were requested to rank the importance of the following ten factors of Herzberg's theory. They are job security, sympathetic help with personal problems, personal loyalty to employees, interesting work, good working conditions, tactful discipline, good wages, promotions and growth in the organization, feeling of being in on things, and full appreciation of work done. The research design of this study employed a descriptive survey method. The target population of this study included employees at the Piketon Research and Extension Center and Enterprise Center (centers). The centers are in Piketon, Ohio. The ranked order of factors were Interesting work –motivation factor, good wages – hygiene factor, full appreciation of work done – motivation factor, job security - hygiene factor, working condition - hygiene factor, promotion and growth - motivation factor, responsibility - motivation factor, personal loyalty to employees - hygiene factor, supervision - hygiene factor and interpersonal - hygiene factor.

Canada 2003: Employees satisfaction research was conducted in twelve different studies in Canada (Ouedraogo and Leclerc, 2013). The sample of the studies were a wide cross-section of different industries and job classes, and included lower level supervisor. The findings from this study reviewed that the top two motivators leading to employee satisfaction were achievement, and recognition for the achievement. These are the motivation factors. The top two de-motivators leading to employee dissatisfaction were bureaucratic and unfair company policies and administration, and poor supervision. These are the hygiene factors (Ouedraogo and Leclerc, 2013). The findings are in line with Herzberg's findings on factors that satisfy and dissatisfy employees (Herzberg, Mausner and Snyderman, 1959). It is essential to note that an average wage did not lead to employee satisfaction. And also it is not lead to job dissatisfaction. An inadequate wage however resulted in employee dissatisfaction.

Herzberg's Research: Herzberg conducted an employee satisfaction research study on 200 Pittsburgh engineers and accountants in the 1940's. Herzberg's research used a pioneering approach, based on open questioning that was explorative approach and very few assumptions to gather and analyze details. Herzberg's combined this approach with open interviews in order to get more meaningful results than the conventional practice of asking closed (basically yes/no) or multiple-choice or extent-based questions. In his studies, he discovered that the factors that produced job satisfaction were separate and distinct from those that lead to employee dissatisfaction. However, the extrinsic factors (motivators) were the primary cause of employee satisfaction

and the intrinsic factors were the causes of dissatisfaction on the job. He concluded that it is the presence of employee dissatisfaction and unhappiness that makes employees to leave a company (Herzberg, 1957).

5. The conclusion and future research direction

Internal factors have an effect on job satisfaction and employee commitment. The focus is on factors that management can control to improve employee satisfaction and commitment. The job satisfaction survey should be conducted from time to time. In the future surveys can also focus on “External factors that have an effect on job satisfaction and employee commitment”.

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Compilation of Sharia Economic Law and Islamic Law Positivation in Indonesia

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DOI: 10.29322/IJSRP.9.08.2019.p9273
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9273>

Abstract; Muslims in Indonesia occupy the first rank in terms of quantity. Along with that, naturally it is fulfilled its needs in the field of law, both in the civil and criminal fields. In the civil sector, many laws have been born, for example; waqf laws, zakat laws, marriage laws and compilation of Islamic law, banking laws and a series of other laws including religious justice laws. This is a manifestation of the struggle of Muslims to align Islamic law in the legal system in Indonesia. These successes did not dampen the enthusiasm of Muslims to continue to fight for their rights in the form of a compilation of sharia economic law which contained the regulation of the economic dispute of Muslims. The application of this effort is the cultivation and desire of Indonesian Muslims in positioning themselves in the field of law, which is called Islamic law positivation into national law. The struggle for compilation of Islamic law in Indonesia as a form of handling the problem of legal disputes in the civil sector, apart from the issue of waqf, zakat and marriage, banking disputes in Indonesia have reached a deadlock, should be found the right solution by formulating a law that is the legitimate basis for resolution the problem of bank disputes among the people, especially the issue of status and ownership rights of customers who are customers of Islamic banks.

This problem is related to the concept of contract contained in chapter II, but if further observed the settings in book I (subject to Law and Amwal), Book III (Zakat and Grants), and Chapter IV (Shari'ah Accounting), basically concerns the problem contract. However, in several articles, for example in the capital market discussion (article 580-583) it is not included in the contract but about the place where the contract is held. On the other hand, the practice of agreements that are mudhorobah has been expanded again with the existence of intermediary parties, namely banking. So as to reduce the risk of moral hazard, usually in other Shari'ah banks and institutions, debtors must include their collateral. It seems that the Codification of the Sharia Economic Law needs to be carefully regulated regarding this guarantee. If the debtor includes the guarantee while the business experiences a loss, what will the Bank or Islamic Financial Institution do with the guarantee. Bearing in mind the mudhorobah system if there is a loss due to the normal process of the business, and not due to negligence or fraudulent management, the loss is borne entirely by the owner of the capital, while the manager loses the energy that has been poured out, while the manager loses due to negligence and fraud. completely against these losses. On the settlement side, it is not possible to settle the dispute in the district court, so that the religious court is the only court that is used as a place for resolving the dispute.

Keywords: Legal compilation for the certainty of the banking system

A. Introduction

At the beginning of the 20th century, Islamic banks were only an obsession and theoretical discussion of academics from both the field of Islamic law (fiqh) and economics. Awareness emerged that Islamic banks were the solution to solving the nation's economic problems for the achievement of social welfare, but concrete efforts that enabled the practical implementation of the idea were almost drowned in a sea of world economic systems that could not escape the interest of banks with conventional systems. Nevertheless, the idea continues to grow even if only slowly. Several trials continue to be carried out starting from simple project forms to large-scale cooperation. From this effort the proponents of Islamic banks can think of making a banking system infrastructure that is interest-free.

The development of the Islamic economic system from time to time along with the struggle with the world economic system (capitalist and social), economic development in Indonesia can be said to experience delays compared to other Muslim countries. The development of the Indonesian economy since the 90s, faced with the nuances of information disclosure and the rate of economic growth in Islamic countries in the world, then at the same time Muslims in Indonesia play an important role in developing and growing Islamic economic systems with reason and enthusiasm to avoid usury. the emergence of Shari'ah banking in Indonesia as evidence of the attention of Muslims and the establishment of Bank Muamalat as the first Islamic Bank as a means of developing Islamic economics and supporting the country's economy. When compared with Malaysia, this country has far demonstrated its economic development with a satisfying Islamic banking system.

After the existence of Bank Muamalat in Indonesia, the presence of this bank was enough to give a prospect on the national economic scene, especially after it appeared in 1992, which was able to ward off Indonesia's economic crisis around 1998. The presence of the Bank was followed by Sharia Financial Institutions (LKS) others such as the Bank of Sharia Financing and other syari'ah microfinance institutions are determining economic growth in Indonesia.

Seeing the reality of developments and positive consequences for the development of Islamic financial institutions, with the emergence of Islamic Banks and Islamic Financial Institutions - other Sharia Financial Institutions show significant consequences of the development of Islamic economic institutions, of course they will be faced with problems that arise due to attraction interesting between the interests of the parties in economic matters, meanwhile, currently there are no specific legislation that specifically regulates these problems. Furthermore, in 1994, the existence of the Syari'ah Arbitration Board became the only mediator institution for resolving disputes between parties in terms of the Shari'ah economy. The presence of this institution determines the birth of legal decisions in the field of syari'ah arbitration which is not necessarily a legal binding. The regulations applied are still limited to following the Bank Indonesia (BI) Regulations and only refer to the fatwa of the National Syari'ah Council of the Indonesian Ulema Council. While the fatwa itself is only a non-binding legal opinion.

In line with the efforts of Shari'ah economic law positivist in Indonesia became a sign of starting a new direction of legal policy for banking management in Indonesia after the revision of Law No. 7 of 1989 became Law No. 3 of 2006 concerning the Religious Courts. In the revision, it is stated that the Religious Courts are currently not only authorized to settle disputes in the fields of marriage, inheritance, wills, grants, endowments and sadaqah, but also the Religious Courts are authorized to handle adoptions and resolve disputes over zakat, infaq and the Islamic economy.

The consequences of the expansion of the authority, requiring law enforcers, especially in the Religious Courts and the Supreme Court, must prepare law enforcers at the judiciary by increasing their capability in the Islamic economy to provide a sense of justice for the community, especially sharia law with material the legislative material mandated by the Act in question, for example in terms of resolving Muslim disputes in the field of shari'ah economy.

As a follow up to this, the Supreme Court formed the Compilation Team of the Syari'ah Economic Law Compilation, the existence of this Compilation of Syari'ah Economic Law is indeed very necessary as a guide and reference for the Religious Courts in deciding sharia economic disputes. To compile a draft Compilation of Syari'ah Economic Law, the team from the Supreme Court has held various discussion and seminar events that examine the draft of the manuscript with institutions, scholars and legal experts, so that in approximately one year the compilation of the Shari'ah Economic Law Compilation completed. However, as an effort to maximize and improve the Compilation of Syari'ah Economic Laws, towards the ideal format, of course the efforts to get the criticism received responses from various parties to continue to be followed up to date.

B. Positivation of Islamic Law in Indonesia

The application of the concept of Islamic banks requires sharia economic law or positivation legislation in Indonesia. This law has an important position in the legal system in Indonesia. Therefore, in order to be able to apply formally it is necessary to positivate sharia economic law. The positivity of sharia economic law in Indonesia originated from the birth of Law No. 10 of 1992 which contained provisions concerning the possibility of banks operating with profit sharing systems. UU no. 7 of 1992 concerning Banking has not explained the definition of profit sharing and the understanding of the results of the statement is further explained in Government Regulation (PP) No. 72 of 1992 concerning Banks Based on Principles of Profit Sharing and promulgated on October 30, 1992 in the State Gazette of the Republic of Indonesia No. 119 of 1992. The Bank is based on the profit sharing principle then described in a Bank Indonesia Circular Letter (SE.BI) No. 25/4 / BPPP dated February 29, 1993.

In 1998 Law No. appeared. 10 of 1998 concerning Amendment to Law No. 7 of 1992 concerning Banking, where there are changes that provide greater opportunities for the development of Islamic banking. Enactment of Law No. 10 of 1998 was followed by the issuance of a number of implementing provisions in the form of a Decree (SK) of the Bank Indonesia Board of Directors which provided a stronger legal basis and broad opportunities for the development of Islamic banking in Indonesia.

Based on this new Banking Law, the banking system in Indonesia consists of Conventional Commercial Banks and Islamic Commercial Banks (or used the term System Dual Banking). Since the enactment of Law No. 10 of 1998, followed by government policies which were originally set out in the form of Government Regulations transferred to the Policy of Bank Indonesia (BI) as the Central Bank. The Bank Indonesia Policy Regulation that replaces the position of PP in the Banking sector is an improvement on the provisions that support the operation of Sharia Banking in Indonesia.

With the issuance of Law No. 23 of 1999 concerning Bank Indonesia, so in the explanation of the Law it has been mandated that to anticipate the development of sharia principles, the duties and functions of BI to accommodate these principles. In order to fulfill the mandate, Bank Indonesia has opened a Sharia Banking Bureau that handles the regulation, supervision and licensing of Islamic banks. On the other hand, the Indonesian Ulema Council has also formed a National Sharia Council which is tasked with providing fatwa 27 and establishing a Sharia Supervisory Board (DPS) in every Islamic financial institution in Indonesia. These two institutions work together to issue legal products or fatwas for the development and supervision of Sharia Banking business activities and activities in Indonesia.

In connection with resolving sharia economic disputes, with the issuance of Law No. 3 of 2006 concerning Amendment to Law No. 7 of 1989 concerning the Religious Courts, then sharia economic disputes constitute the absolute authority of the Religious Courts. This law is a product of legislation that first gave competence to religious courts in resolving sharia economic cases.

Along with the rapid sharia banking industry in Indonesia, it requires a separate regulation which is *lex specialis* from the Banking Law. On July 16, 2008 Law Number 21 of 2008 concerning Sharia Banking was ratified. Birth of Law No. 21 of 2008 the existence of Islamic Banking has become stronger and has a stronger legal basis. However, on the other hand, the provisions of Article 55 paragraph (2) of Law No. 21 of 2008 along with its explanation, juridically, shows that there has been a reduction in the competence of religious courts in the field of Islamic banking. Given Law No. 3 of 2006 has provided absolute competence in sharia economic matters (including Islamic banking) to the Religious Courts. Islamic insurance emerged in 1994 along with the inauguration of PT. Syarikat Takaful Indonesia which later established 2 subsidiaries namely PT. Family Takaful Insurance in 1994 and PT. General Takaful Insurance in 1995. This insurance operating license was obtained from the Ministry of Finance through Decree No. Kep-385 / KMK.017 / 1994 dated August 4, 1994. From a legal standpoint, Islamic insurance is still basing its legality on Law No. 2 of 1992 concerning Insurance Business which actually does not accommodate sharia insurance because it does not regulate the existence of insurance based on sharia principles.

Indonesia, which is inhabited by the largest number of Muslims, has also contributed its thoughts and actions in order to advance Indonesia in general, on the other hand it cannot be denied that Muslims must be able to fight for their needs or needs in various ways including the current positivisation of Islamic Law. into national law. Legal experts often call it the theory of existence which in relation to Islamic law is a theory that explains the existence of Islamic law in Indonesian national law. The Indonesian national law is a national law originating from the Pancasila state philosophy.

The positivist effort itself has actually been going on for a long time, with the issuance of the Agrarian Law of 1960, Law Number. 1 of 1974 concerning Marriage Law, then increased to Islamic law as a source of national law in Law Number. 7 of 2009 concerning Religious Courts, Presidential Instruction No. 1 of 1991 concerning the socialization of the Compilation of Islamic Law, Law Number. 41 of 2004 concerning Waqf, Zakat Law, Hajj Act and the last Law Number. 3 of 2006 concerning Amendment to Law Number. 7 of 1989 concerning the Law on Religious Courts which provides the expansion of material competence for the Religious Courts, including in the economy of Shari'ah.

When talking about law, in fact it will not be far from the political range. The involvement of Muslims in political matters also determines the character of the legal product produced. The character of legal products is identical to the nature and nature of legal products. Referring to the statement above, then it should provide opportunities in various fields, including the law on sharia economic disputes settlement in the form of the Compilation of Shari'ah Economic Law (KHES), so that Muslims can breathe a sigh of relief. The law is into national law. The application of the desires and results of the efforts of Indonesian Muslims is in the field of law.

Law is not entirely autonomous institution, but it is in a position that is interrelated with other sectors of life in society. One aspect of this situation is that it must always make adjustments to the objectives of the community. Therefore, law is a dynamic. Political law is a factor of cause such dynamics, therefore it is directed to the *iure constituendo* (*ius constitutum*) that law should apply.

The development of national law objectively recognizes legal plurality within certain limits. The policies of customary law and religious law for certain legal and natural environments are therefore not possible to impose a legal unification for several fields of life. There is no need to question if the subject of Islamic law is carried out by Shari'ah economic law. Furthermore, it is also natural in family relations that sometimes local customary law is more dominant. The principle of legal unification must be a guideline, but so far unification is impossible, then the plurality of laws must be accepted in reality. Ideally legal plurality must be accepted as part of the national legal order.

Through the struggle of Islamic nationalist founding fathers to incorporate Islamic values into the Indonesian constitution with the seven words in the Pancasila as the basis of State ideology, it has shown the effort to proceed, even though the the struggle to include the seven words in the Pancasila failed to realize the reason for the creation of national unity and unity. This is not an obstacle to continuing to fight for Islamic values in every constitution in Indonesia.

Referring to this description, actually since the establishment of this State Islamic values have been fought for in the field of law, as Soepomo argues, explaining that Indonesia does not have to be an Islamic state, but a country that uses the noble moral basis advocated by Islam. If examined in depth these opinions, it is appropriate that Muslims in Indonesia must continue to fight for and maintain and enhance Islamic values in fields that are very urgent needs to regulate and resolve the problems faced by Muslims today. Of course to fight for a constitution based on the moral basis of Islam must be encouraged by the performance of Muslims themselves in every policy. Both for those who sit in Legislative institutions, Executive institutions and Judicial institutions. Without the role of Muslims in these institutions it is impossible for Islamic moral values to be fulfilled and placed in the Indonesian constitution. This can be achieved and at least depends on tenacity and shrewdness because often political interests can hinder the program of Islamic law legislation. However, Indonesian Muslim-majority society has made Islam as a way of life in daily life, of course, only limited to personal and in limited matters.

Thus, the presence or absence of an Islamic political obsession in various legal formulations organically from fundamental norms and constitutional activities in the course of the nation's history does not have the slightest influence on the existence of Islamic law. The close closure of the opportunities at each social and political forum is not able to withstand the seepage of Islamic law. To be able to answer that challenge, Muslims must also have the right methodology and strategy for the positivist efforts of Islamic law in Indonesia. Because the views of different policy holders, including among the Islamic community itself, so that the attraction of interests between various existing political interests, including with the state or exponents of other religions will be increasingly stringent.

According to Syamsul Anwar as quoted by M. Rusydi, there are at least two stages for the positivist process of Islamic law, namely the hermeuneutis stage and the political stage. At the stage of hermeuneutis there is a need for classification of shari'ah law so that the classification can produce a legal format that has been compromised with the context of space, time, situation, and conditions of the Indonesian people. Therefore, the terminology put forward has become a universal language that will be easily accepted by all groups. Whereas at the political stage carried out by the legislature, people's representatives, especially those carrying out Islamic values can dialogue about Islamic values with various legislators. So that qualified foresight and lobbying from Islamic legislators is crucial. Related to the Islamic economy that has spread in this country, of course many expect a set of rules that are certain about it. Through efforts to compromise politics and the sincerity of various parties little by little the regulations concerning the shari'a economy have begun to be rolled out including the existence of the Compilation of Shari'ah Economic Law.

Thus the positivisation of Islamic law in Indonesian National Law can be achieved if various parties are able to lift macro and micro potentials of Islam that are able to blend with national law can certainly be supported by two abilities and stages, namely the potential that emerges from Muslims as implementers of Islamic teachings itself and sustained by the next stage, namely the political stage, namely the stage of Muslims who are able to fight for it in the legislature, people's representatives, especially those carrying out Islamic values can dialogue with various other legislators, so that carefulness and lobbying by Islamic legislators becomes very decisive to produce results.

C. Urgency of Codification of Shari'ah Economic Law

After the birth of various laws relating to the needs of Muslims starting from the Agrarian Law of 1960, Law No. 1 of 1974 concerning Marriage Law, then increased to Islamic law as a source of national law in the Law Number. 7 of 2009 concerning the Religious Courts, Presidential Instruction No. 1 of 1991 concerning socialization of the Compilation of Islamic Law, Law No. 41 of 2004 concerning Endowments, Zakat Law, Hajj Act and the last Law No. 3 of 2006 concerning Amendments to Law -Number of numbers. 7 of 1989 concerning the Law on Religious Courts (UUPA) which provides for the expansion of material competence for the Religious Courts. This did not dampen the enthusiasm of Muslims to identify the needs of Muslims which must be addressed in regulations as directors in the lives of Muslims in all fields, then other important things were hastened so that Muslims struggled for Sharia Economic Law which was then formulated in the form of Legal Compilation Syari'ah Economy (KHES), considering the shari'ah economic law as the law of muamalat has a variety of different views.

Codification is the collection of various regulations into laws or matters for the preparation of statutory books. In its history, the formulation of a law or regulation was made in writing called *jus scriptum*. In subsequent developments various regulations in written form were born called *corpus juris*. After the number of regulations became so many, it required a legal codification that gathered various kinds of laws and regulations.

Legal experts try to master the regulations well so that they can solve various kinds of legal problems that arise in the community with full justice and benefit. In making decisions in the courts in the field of Islamic economics there is a possibility of differences of opinion. Therefore, legal certainty is needed as a basis for decision making. Moreover, with the characteristics of the muamalah which are "elastic and open", it is very possible to vary these decisions which can potentially hinder the fulfillment of a sense of justice. Thus the birth of Codification of Sharia Economic Law in a Civil Code of Islamic Law became a necessity. It is understandable that the formulation of material for Codification of Sharia Economic Law is not found in Jurisprudence in Indonesian judicial institutions. Nevertheless, jurisprudence in the same case can be referred to as long as it does not conflict with the principles of sharia economic law. That is, the legal decisions of the past were disputed, because they were judged to be in accordance with sharia.

So the work of the Indonesian sharia economic mujtahids, not only formulates new economic laws that come from *fiqh* / sharia norms, but how can they facilitate existing national law. National law sourced from the Civil Code (BW), most likely in accordance with sharia, then the material and legal decisions in the form of *jurisprudensi* can be accepted or adopted.

Based on that rationale, then sharia economic law originating from *fiqh muamalah*, which has been practiced in activities in Islamic financial institutions, requires a forum for legislation to facilitate its application in business activities in these Islamic financial institutions. The existence of Sharia Economic Law Codification is a new breakthrough as an effort of Islamic Law positivisation into national Law. The rapid development of the Syari'ah Economy in Indonesia has made the need to prepare material for the Shari'ah Economic law to be held immediately. In the framework of these needs Codification of Sharia Economic Law finally emerged as the material law of the Shari'ah economy.

D. Analysis of Compilation of Shari'ah Economic Law

When the authority to adjudicate sharia economic legal disputes is the absolute authority of religious court judges, it is necessary to have a complete sharia economic law codification so that Islamic economic law has legal certainty and judges have standard references in resolving disputed cases in the Shari'ah business. In the field of marriage, inheritance and waqaf, we already have KHI (Compilation of Islamic Law), whereas in the field of Islamic economics we do not have it yet. The position of KHI is constitutionally, still very weak, because its existence is only as presidential decree. Therefore a stronger rule of law is needed which can be a reference for judges in deciding various legal issues. For this reason we need to formulate a Codification of Islamic Economic Law, as made by the Ottoman Turkish government named *Al-Majallah Al-Ahkam al-Adliyah* consisting of 1851 articles.

Codification is the set of various regulations into laws or the matter of drafting statutory books. Historically, the formulation of a law or regulation was made in writing called *jus scriptum*. In later developments various regulations were written in a written form called the *corpus juris*. After the number of regulations became so many, it required a legal codification that gathered various kinds of laws and regulations. The legal experts and judges also try to master the rules well so that they can solve various kinds of legal

problems that arise in the community with full justice and benefit. Based on that rationale, then Islamic economic law originating from fiqh muamalah, which has been practiced in activities in sharia financial institutions, requires a forum for legislation to facilitate its application in business activities in Islamic financial institutions.

In making decisions in the courts in the field of Islamic economics there is a possibility of differences of opinion. For this reason, legal certainty is needed as a basis for decision making at the Court. Moreover, with the characteristics of the muamalah which are "elastic and open", it is very possible for the variability of these decisions to be very potential to hinder the fulfillment of a sense of justice. Thus the birth of the Codification of Sharia Economic Law in a Civil Code of Islamic Law became a necessity. It is understandable that the formulation of material for Codification of Sharia Economic Law is not found in Jurisprudence in Indonesian judicial institutions. Nevertheless, jurisprudence in the same case can be referred to as long as it does not conflict with the principles of sharia economic law. That is, the legal decisions of the past were disputed, because they were judged to be in accordance with sharia. If you look at the contents of the Syari'ah Economic Law Compilation (KHES), of course there are still some things that can be used as notes for future improvements. Some of these things include:

1. Preparation of Compilation of Islamic Economics Law Codification

Impressed in the compilation of the Compilation of Shari'ah Economic Law, it was too hasty. The duration of the making of the Islamic Economics Law Codification is approximately a year. When compared to the making of the Compilation of Islamic Law (KHI) it seems that the preparation needed takes quite a long time. Compilation of Islamic Law was prepared since 1985 with the Joint Decree (SKB) of the Chairperson of the Supreme Court of the Republic of Indonesia and Minister of Religion No. 07 / KMA / 1985 and No. 25 of 1985 dated March 25, 1985. The period of project implementation was set for two years from the date of the enactment of the Joint Decree.

One of the most important things in drafting a law is the excavation of the sociological aspects of Islamic law and legal opinions among experts, scholars, pesantren and academics. This effort is a way to more "Indonesianize Islam" so that it is in accordance with the Indonesian culture itself. Besides that, by listening to input from each party, the existence of the law is expected to be of higher quality. When looking at the preparation for the preparation of the Codification of the Sharia Economic Law, it seems that it does not optimize the sociological aspects and legal opinions of many experts. Those involved in the preparation of the Codification of Sharia Economic Law are arguably only a small part, in contrast to the formulation of the Compilation of Islamic Law which involves many Ulama (Kyai), Islamic boarding schools, and the emission of several well-known State Islamic Institutes in Indonesia, and several other practitioners. But of course, this did not dampen our appreciation for the existence of the Compilation of Syari'ah Economic Law as a "grand" work from the Supreme Court as a new breakthrough in the History of Islamic Law in Indonesia.

2. The term Syari'ah in the Codification of Sharia Economic Law

The Material of Sharia Economic Law Codification (KHES) is basically a compilation of various types of fiqh that already exist, there are even a number of things that are classified as ijtihad compilation team of Codification of Sharia Economic Law itself. When looking at Shari'ah terminology as rules or points set by God so that humans make it as a rule in relation to God, fellow Muslims, fellow humans, and their environment. In other words, syari'ah is a basic, fixed and wide-ranging regulation. When using the term Shari'ah in the Codification of Sharia Economic Law, this contains contradictions because Economic Law, which is Muamalat Fiqh, is certainly not static but dynamic. As has become a general rule in muamalah, that the law of ashli from muamalah is permissible as long as there is no text that prohibits.

Economic law contained in the Codification of Sharia Economic Law is of course the result of human thoughts that will continue to be dynamic in accordance with the development of the times. Even the terms contained in the Islamic Economics Law Codification of course there are those that contain new terms such as capital markets or accounting. From this description, it is actually inappropriate to mention the term syari'ah in the Codification of Sharia Economic Law, perhaps it is more appropriate to use the term Islamic Economic Law as it is commonly used in other Islamic countries.

3. Content of Codification of Sharia Economic Law and Concept of Contract

When looking at the entire contents of the Islamic Economics Law Codification it seems too much to discuss the concept of contract. As stated by the Supreme Judge Dr. Abdurrahman, Islamic Economics Law Codification almost 80% contained about contract. In accordance with the contents of the Sharia Economic Law Codification, the discussion of the concept of contract can be found in chapter II, but if further observed the settings in book I (subject to Law and Amwal), Book III (Zakat and Grants), and Chapter IV (Shari'ah Accounting), basically related to the issue of contract. However, in several articles, for example in the capital market discussion (article 580-583) it is not included in the contract but about the place where the contract is held.

4. Formulation of Covenant Terminology

Concerning the formulation of the contract contained in the Codification of Sharia Economic Law article 20 number (1). This article defines a contract with an agreement in an agreement between two or more parties to do or not carry out certain legal actions. This formula seems to be just a duplication. Because the contract itself is translated by agreement or contract. According to Mustafa Ahmad Az-zarqaakad in language means al-rabth which means to collect or collect two ends of the rope and tie one to the other until both of them continue and become one strin.

There are several terminology of the contract proposed by experts including Wahbah Az-zuhaili defining the contract as a connection between consent and qabul that is justified by syara 'which creates legal consequences for the object. Meanwhile, according to Syamsul Anwar, the definition of contract with the meeting of consent and obedience is a statement of the will of two or more parties to give birth to a legal effect on the object. The definition of the contract shows the following: First, the contract is an attachment or meeting of consent and obedience which results in the emergence of legal consequences. Second, the contract is the act of two parties because the contract is a meeting of the ijab that presents the will of one party and the decree which expresses the will of the other party. Third, the purpose of the contract is to give birth to a legal effect. Thus, the meaning will be even richer if the terminology put forward by the Sharia Economic Law Codification does not contain duplication, but rather parses the principles of the contract such as the qabul agreement between the two parties.

5. Not Mentioning Sub-Subjects of Important Topics in Covenants

Sharia Economic Law Codification has not mentioned important sub-topics in the contract, so the contents are still too general. This will cause problems when cases arise which are not covered in the Sharia Economic Law Codification, so the interpretation of the "forced" judge will actually cause another problem, namely the sense of justice of the parties. This is where the need for a more detailed legal format, so that it can answer many problems. If the law is too global, the difference in interpretation especially for judges will not be inevitable given the different perspectives and paradigms of judges.

In Islamic law, recognizing the contract of al-Qardh is a loan contract to the customer (muqtaridh) which requires provided that the customer must return it at a specified time. This financing product is guided by the DSN fatwa No.19 / DSN-MUI / IV / 2001 concerning al-Qardh, Bank Indonesia Regulation No. 9/19 / PBI / 2007 and Law No. 21 of 2008 concerning Islamic Banking. In its implementation, this contract is rarely used by Islamic Banks because in this contract there must be no additions to the loan agreement, according to the rules of jurisprudence "Every receivable that brings (takes) benefit / additional / additional, then it is usury." therefore, even if it is used, the bank is very careful in its implementation because on the one hand it cannot take profits and on the other hand the bank also minimizes the risks that will occur. As for usually banks use this contract as a complementary product for customers who have proven their loyalty and loyalty that require immediate bailout funds for a relatively short period of time. The customer will return the money as soon as possible, can be exemplified: Hajj bailout loans, where prospective hajj customers are given a bailout loan to meet the conditions for depositing the cost of the Hajj trip. As a facility for customers who need fast funds while they cannot withdraw funds, for example because of deposits. As well; Islamic financing card products (Syariah charge card). As a loan to a small businessman, where according to the calculation the bank will burden the entrepreneur if given financing with a scheme of buying and selling, ijarah (wages-wages or rent), or mudharabah (profit sharing). In this case special products in Islamic banking have been introduced called Qardhul Hasan. As a loan to the bank management, where the bank provides these facilities to ensure the fulfillment of the needs of the bank's management.

a. Guarantee in Musyarakah

Musyarakah is financing based on cooperation agreements between two parties or more a particular business, where each party contributes funds provided that the benefits and risks will be borne together in accordance with the agreement. This financing product is guided by the MUI DSN fatwa No. 08 / DSN-MUI / IV / 2000 concerning Musyarakah, Bank Indonesia Regulation No. 09/19 / PBI / 2007 and Law No. 21 of 2008 concerning Islamic Banking. In implementing the Musyarakah it is commonly used in Project Financing. Musyarakah is usually applied to finance projects where sharia customers and banks both provide funds to finance the project. After the project is completed, the customer returns the funds together with the agreed results for the bank. Venture Capital In special financial institutions that are allowed to invest in company ownership, musharaka is applied in a venture capital scheme. Investments are carried out for a certain period of time and after that the bank disvests or sells part of its shares, both briefly and gradually.

b. Mudhorobah Guarantee

In classical fiqh, there is no provision even the necessity for a mudhorib to surrender a guarantee to Shohibul Maal in a mudhorobah contract. This is because, the practice of mudhorobah in the past is still very simple and of course it is still in an atmosphere of kinship and mutual acquaintance with one another. In contrast to the current reality, mudhorib and Shahibul Maal sometimes do not know from one another, even the practice of Mudhorobah has now been expanded again with the existence of intermediaries, namely the banking sector. So as to reduce the risk of moral hazard, usually in other Shari'ah banks and institutions, debtors must include their collateral. In accordance with its meaning Mudharabah is a fund investment transaction from the owner of the fund (Shahibul Maal) to the fund manager (mudharib) to conduct certain business activities that are in accordance with sharia, by dividing the results of the business between the two parties based on a previously agreed ratio. This product is guided by the DSN MUI No.07 / DSN-MUI / IV / 2000 fatwa concerning Mudharabah, Bank Indonesia No Regulation. 09/19 / PBI / 2007 and Law No. 21 of 2008 concerning Islamic Banking. In its Implementation Sharia Banks use this contract in the collection of term savings funds, namely savings savings intended for special purposes, such as hajj savings, qurban savings, deposits, and others. Special deposits (special investment), where funds are given by customers specifically for certain businesses, such as murabahah or ijarah (services) only. then in Fund

Distribution / Financing Working capital financing such as working capital for trade or services. Special investment, also called *mudharabah muqayyadah*, where special funding sources, special fund disbursement with the conditions set by the funder (Shahibul Maal).

Types of *Murabahah* in Islamic Banks *Mudharabah Muthlaqah* (unrestricted Investment Account) The owner of capital (Shahibul Maal) does not set certain limits or conditions for the manager (*mudharib*). *Mudharabah Muqayyadah* (Restricted Investment Account) The owner of a fund establishes certain restrictions or conditions for the fund manager regarding the place, method and object of investment. *Mudharabah muqayyadah* is divided into two, namely *Mudharabah Muqayyadah On Balanche Sheet*, namely the flow of funds from one investor customer to a group of business executors in certain sectors, or in certain types of contracts, (and banks bear the risk of channeling investment funds, called *Executing Agent / Executing*)) *Mudharabah Muqayyadah Off Balance Sheet*, namely the flow of funds from one investor customer to one financing customer. Banks only act as arranger (*intermediary*), (and the bank does not bear the risk, called *Channeling Agent / Channelling*). *Easyarabah Musytarakah* Is a combination of *mudharabah* contract and *musytarakah* contract). *Mudharabah Musytarakah* is a form of *Mudharabah* agreement in which the manager (*mudharib*) includes his capital / funds in the investment collaboration. Based on the fatwa of the National Sharia Council of the Indonesian Ulema Council (MUI DSN) number 50 / DSN-MUI / III / 2006 concerning the *Mudharabah* agreement *Musytarakah*.

Guarantees in *Mudharabah* Basically there is no guarantee of capital, however, so that the fund manager does not make a deviation, the owner of the fund can request a guarantee from the fund manager or a third party. This guarantee can only be disbursed if the fund manager is proven to have made a deliberate, negligent mistake or violated the agreed upon matters in the contract.

The explanation above should be used as a reference for managing the contract in the banking system, especially for Islamic banks, but it is not reflected as intended, this indicates that the codification of the Sharia Economic Law needs to be carefully regulated regarding this guarantee. If the debtor includes the guarantee while the business experiences a loss, what will the Bank or Islamic Financial Institution do with the guarantee. Given in *mudharabah* if there is a loss due to the normal process of the business, and not because of negligence or fraudulent management, the loss is borne entirely by the owner of the capital, while the manager loses the power and expertise he has devoted. If there is a loss due to negligence and fraudulent management, then the manager is fully responsible.

In the banking system like this, a legal policy is needed to regulate the second agreement between parties with the fund manager so that there is no promise (one achievement) between the two parties, and there will not be any loss in the agreement, so that the contract deemed legal.

6. Status of Usury in the Qardh Agreement

In *syari'ah* banking services or other Islamic Financial Institutions there are usually types of *qardh* loans. *Qardh* is a virtuous / soft loan without compensation, usually for the purchase of fungible goods (ie items that can be repaid and replaced according to their weight, size and quantity). While *Riba* linguistically, usury also means growing and growing so that, usury means taking extra from basic assets or capital in vanity, but in general there is a red thread that confirms that usury is an additional take, both in buying and selling transactions and borrowing in vanity or contrary to the principle of *muamalah* in Islam.

In the Codification of Sharia Economic Law, there is no mention of the legal status of usury in the *qardh* contract, on the other hand it is stated that the administrative costs in the *qardh* contract are borne by the customer without limitation. This will cause problems when creditors over-interpret administrative costs so that they can overload the debtor. So feared there will be hidden usury. In order for administrative costs not to be covered in interest, these costs may not be proportional to the loan amount.

7. Nishab in Zakah on Plants and Fruits

Nishab is the minimum amount that *zakat* must be issued. In this case the value is calculated from assets that exceed the basic needs: clothing, food, and shelter. The provisions of *nishab* are important in *zakat* because of the extent to which a person is obliged to issue *zakat*. In the Codification of Sharia Economic Law the issue of plant and fruit-fruit *zakat* rules has not yet been stipulated so that it creates a counterproductive effect on determining the minimum limits of plants and fruits that must be paid for *zakat*. While all other types of assets are mentioned. Plants and fruits are of various types. But the majority of jurists argue that there is no obligation to produce *zakat* from fruits and fruits before reaching five times. Based on the hadith, the scholars have calculated the equation of five *wasaq* (a single word from *ausaq*) with the size of the present measure, and found that the amount is equal to approximately 653 (six hundred fifty three) *kelo* grams of staple food in each country.

In Indonesia, of course with rice. Counting *nishab* on fruits, such as dates and grapes, is done by calculation after both have dried. Namely the still wet dates (*Ruthab*) become dates, and wine becomes raisins. As for calculating the number of dates and grapes before cooking, it is best to estimate them by estimation or estimation carried out by *zakat* collectors, who are experts and experienced, when the fruits begin to look perfect (before they are fully cooked).

Such an assessment aims to find out how many kilos of dates or dried grapes (raisins) will be obtained later. In order for this estimate to be known in the form of the amount of *zakat*, and how many are still the rights of the owner. It will be more complicated if the Codification of Sharia Economic Law discusses the characteristics of plant and fruit *zakat*. In order to make the Codification of Islamic Economics Law more complete.

E. Conclusion

The existence of the Compilation of *Syari'ah* Economic Law is a breakthrough and response to the needs of current economic law. When the development of Islamic economic activity in Indonesia shows a satisfying number, of course it will be accompanied by a clash of various interests. Then the Law No. 3/2008 concerning the Religious Courts came out which gave the Religious Courts the breadth to deal with *Shari'ah* economic disputes.

Based on the conditions and needs of Muslims when in various fields including economic needs, the Religious Courts began to improve and prepare material laws to resolve the Islamic economic dispute. Thus it was important that the Compilation of *Shari'ah* Economic Law was born. The existence of regulations that breathe Islam is of course an attempt to positivist Islamic law into national law.

The compilation of *Shari'ah* Economic Law is of course not a holy book, so it cannot be changed. Therefore, it can be analyzed that there are still many shortcomings that must be corrected in the Codification of Sharia Economic Law. This is something that commonly happens as happened in the past in Islam and has been embodied in the rules of *fiqh*; the law can change with changes in time, place and condition at the time of the stipulation of the law.

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Effectiveness of Self-Care Management Instructional Program on Women's Knowledge undergoing In-Vitro Fertilization in Al-Najaf City

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DOI: 10.29322/IJSRP.9.08.2019.p9274

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9274>

Abstract- Self-care management, including the physical and psychological aspects, affects health and wellness. In vitro fertilization, lifestyle factors affect the production of oocytes, fertilization rates, miscarriage and pregnancy. The aim of study to assess the effectiveness of the instructional program on the women knowledge undergoing in-vitro fertilization/intracytoplasmic injection about self-care management A Study and Control Groups, Pre-Test and Post-Test (Quasi Experimental Design), were used to study the Effectiveness of Self-Care Management Instructional Program on Women's Knowledge undergoing In-Vitro Fertilization , from the period of 17th September 2018 to 4th July 2019. A non-probability (purposive sample) of (60) infertile women was included in the study. The sample is distributed as the study and control groups (30 women for the study group and 30 women for the control group). The study is conducted in Al-Najaf City/Al Sadder Teaching Hospital / Fertility Center data collected through the use of a questionnaire that was design and women interview, which included demographic characteristics, reproductive characteristics, and questions about women's knowledge about self-care management. Validity and reliability of the questionnaire were identified. The data was collected through the use and application of the instructional program for the study group using lectures, booklets and videos. Data analysis was performed through the application of descriptive and inferential statistical data analysis approaches. Results revealed that 83.3% of women had poor knowledge before intervention. However, 100.0% of them had good knowledge after one month of intervention. Moreover, that the women in the study group benefited from the application of the instructional program, there was a development and improvement in all the program information and application. The study revealed that there were statistically significant differences ($p < .001$) in the study group between pre- and post-test in all items related to self-care management. The study concluded that the implementation of the educational program was effective and clearly good and improved women's knowledge and awareness. The study recommended that instruction program be developed in all fertility centers in Iraq regarding self-care management before, during and after IVF/ICSI and that the nurse must take the role in teaching the women about self-care management.

Index Terms- instructional program, self-care management, in vitro fertilization.

I. INTRODUCTION

Infertility is the impaired of ability to pregnant after a year of not protected regular sex. According researchers, it affects more than 15% of couples worldwide and is recognized as a health problem [1].

According to WHO, in developing countries, one in four couples suffers from infertility [2]. The centers for disease control and prevention (CDC, 2015) apprise that 6% of married women between the ages of 15 and 44 years in the United States of America suffer from infertility and that on 12% of women age 15-44 years. In addition in 2013 it was apprise that 7.4 million women in the United States of America had used some form of infertility treatment. Assisted Reproductive Technology comprises all fertility treatments in which both eggs and embryos are treated outside the body. In general, Assisted Reproductive therapy involves the removal of mature Oocytes from the ovaries using a thin needle, a combination of eggs and sperm in the laboratory, and the return of embryos to the woman body. And the basic form of assistive techniques was in vitro fertilization / ICSI [3].

To increase the number of patients receiving infertility treatment by assisted reproduction techniques. Modification in lifestyle factors prior to treatment can lead to a natural improvement in fertility and can reduce the requirements of in vitro fertilization treatment procedures. Recent studies indicates that infertility is also Caused due to lifestyle situation , so it is necessary to make an awareness in the young people regarding the causes & advanced treatment modalities for Infertility [4]. Most women undergoing IVF/ICSI are ready to modify lifestyle behavior and are therefore aware of the lifestyle changes they can make to enhance and improve the success of IVF [5].

While there is a great deal of health care, time and manpower in the search for and treatment of infertility, doctors ignoring the full care of the person as a whole. Factors influencing QoL quality are likely to be identified Improve care and compliance of infertile women [6]. Self-care describes the preservation of health, prevention and treatment of disease by the individual. Proving to improve patient satisfaction, quality of life. The four components of self-care lead a healthy lifestyle, treat simple illnesses, manage chronic diseases and care after leaving the hospital[7]. Moreover, there is increasing evidence that self-

care in chronically ill patients is associated with improved quality of life [8].

Self-care for women’s undergoing IVF includes lifestyle measures such as maintaining a healthy weight and nutrient intake as accurately as possible vitamin and antioxidant supplementation, as well as adhering to medication, exercise, psychological stress, Increase intake of caffeine , alcohol consumption and exposure to environmental pollutants to help women accomplish healthy Pregnancy[9].The nurse is responsible for the continuous assessment of the patient and generally begins multidisciplinary care when the physical, emotional or social conditions of the patient are required. Patient and family education and continuous self-care support are additional services provided by the nurse.

II. METHODOLOGY:

Design of the study:

A quasi-experimental design is used through the present study in order to achieve the objectives of the study. The period of the study is from 17th September 2018 to 1st July 2019.

Setting of the study:

The study was conducted in Al-Najaf City/Al-Najaf Al-Ashraf Health Directorate / Al-Sadder Medical City /fertility center.

Sample of the study:

A Non-Probability (Purposive Sample) ,consist of 60 women. The sample is divided in two groups; 30 women as study group are exposed to the instructional program, and the other 30 women not exposed to the instructional program considered as a control group.

Tools of Data Collection: It includes three main parts:

Part I: Self-administered questionnaire sheet related to socio-demographic data of the women’s:

This part is concerned with the collection of basic socio-demographic data; this part is filled by the women (age, residency, level of education, occupation status, cigarette smoker and smoking type.

Part II: Self-administered questionnaire sheet related to personal data of the women.

This part is concerned with the collection of basic personal data, this part is filled by the women (infertility type, number of IVF/ICSI cycle have you done in the past, number of abortion have you gotten due to IVF/ICSI.

Part III: Self-administered questionnaire sheet associated with self-care management on the women’s knowledge undergoing IVF/ICSI.

It is constructed to assess general knowledge of women with regard to self-care management and increasing the chances of pregnancy.. The questionnaire sheet is also complete by the women, the study purpose is explained erstwhile to get questionnaire sheet. The contributors are demanded to answer the questionnaire. This knowledge test is composed of (25) multiple choice question (in vitro fertilization description, infertility reasons and information about IVF consideration, success rate, process steps, Physical self-care, and psychological self-care). The test is covered with the relevant points from the major content area of instructional program. For the purpose of this study, the number of correct responses of the knowledge questionnaire is used as the measure of the level of knowledge. Each question is scored as the correct answer get (2) point and the incorrect answer get (1) point.

III. STUDY RESULTS:

Table (1) Socio- Demographic Data of the Study Sample NO. =60 (study and Control Groups)

Socio-Demographic Data	Rating And Intervals	Grouping	
		Study Freq. / %	Control Freq. /%
Female age / years	20-24	1	5
		3.3%	16.7%
	25 – 29	8	6
		26.7%	20.0%
	30 – 34	8	9
26.7%		30.0%	
35 – 39	8	3	
	26.7%	10.0%	
40+	5	7	
	16.7%	23.3%	
Male age / years	25 – 29	3	5
		10.0%	16.7%
	30 – 34	8	9
26.7%		30.0%	

	35 – 39	8	7
		26.7%	23.3%
	40+	11	9
		36.7%	30.0%
Residency	Rural	18	24
		60.0%	80.0%
	Urban	12	6
		40.0%	20 %
Levels of education	Unable to read & write	2	1
		6.7%	3.3%
	Read & Write	4	5
		13.3%	16.7%
	Primary school graduate	5	5
		16.7%	16.7%
	Intermediate school graduate	11	14
		36.7%	46.7%
	Secondary school graduate	4	0
		13.3%	.0%
Institute graduate	1	1	
	3.3%	3.3%	
College and above graduate	3	4	
	10.0%	13.3%	
Occupation	Housewife	26	27
		86.7%	90.0%
	Employee	4	3
		13.3%	10.0%
Smoking	Yes	1	0
		3.3%	.0%
	No	29	30
		96.7%	100.0%
Smoking type	active	0	1
		.0%	3.3%
	Passive	30	29
		100.0%	96.7%

Table(1) shows the socio-demographic data of study group which as females were 26.7 % For three age groups 25-29,30-34 , 35-39 years old, 60.0% of them was residency Of urban, 36.7% Intermediate school graduated , (86.7%) she was housewife, 96.7% from women not smoking , 100% of them was passive smokers. The socio-demographic of control group was 30% of the sample was female, at age 30-34 years old and male were 30% for two age groups 30-34 ,40 and over, 80% of them was urban residency , 46.7% Intermediate school graduated, 90% she was Housewife,100% from women not smoking, 96.7% of them was passive smokers .

Table (2) assessment of the Study Sample Responses at the Pre-Test for Both Study and Control Groups

Items	Responses	Grouping					
		Study			Control		
		Freq. (%)	Mean	Assessment	Freq. (%)	Mean	Assessment
what is IVF	Incorrect	20	1.33	Fail	17	1.43	Fail
		66.7%			56.7%		
	Correct	10			13		
		33.3%			43.3%		
What are the causes of infertility and late procreation	Incorrect	24	1.20	Fail	19	1.37	Fail
		80.0%			63.3%		
	Correct	6			11		
		20.0%			36.7%		
What are the possible complications of treatment	Incorrect	27	1.10	Fail	21	1.30	Fail
		90.0%			70.0%		
	Correct	3			9		
		10.0%			30.0%		
The success rate of IVF in women aged 30-35	Incorrect	9	1.70	Pass	14	1.53	Pass
		30.0%			46.7%		
	Correct	21			16		
		70.0%			53.3%		
Your commitment with health care provider guidelines	Incorrect	8	1.73	Pass	7	1.77	Pass
		26.7%			23.3%		
	Correct	22			23		
		73.3%			76.7%		
The day of the egg retrieval process should be fasting at least..... hours:	Incorrect	20	1.33	Fail	12	1.60	Pass
		66.7%			40.0%		
	Correct	10			18		
		33.3%			60.0%		
What is the period of rest and relax after the embryo transfer.....	Incorrect	16	1.47	Fail	18	1.40	Fail
		53.3%			60.0%		
	Correct	14			12		
		46.7%			40.0%		
What is the adequate sleep hours during day	Incorrect	9	1.70	Pass	16	1.47	Fail
		30.0%			53.3%		
	Correct	21			14		
		70.0%			46.7%		
What are the right ways to make your sleep healthy	Incorrect	22	1.27	Fail	21	1.30	Fail
		73.3%			70.0%		
	Correct	8			9		
		26.7%			30.0%		
What are the risks of exercise and hot baths	Incorrect	15	1.50	Pass	15	1.50	Pass
		50.0%			50.0%		
	Correct	15			15		
		50.0%			50.0%		
What chemicals do you avoid during the I.C.S.I	Incorrect	6	1.80	Pass	13	1.57	Pass
		20.0%			43.3%		
	Correct	24			17		
		80.0%			56.7%		

What is the benefit of eating large amounts of fruits and vegetables during the ICSI	Incorrect	16 53.3%	1.47	Fail	12 40.0%	1.60	Pass
	Correct	14 46.7%			18 60.0%		
How many cups are recommended for drinking water	Incorrect	17 56.7%	1.43	Fail	24 80.0%	1.20	Fail
	Correct	13 43.3%			6 20.0%		
What foods do we avoid during ICSI	Incorrect	16 53.3%	1.47	Fail	10 33.3%	1.67	Pass
	Correct	14 46.7%			20 66.7%		
What is the benefit of iron-rich foods such as green leaves and peas during ICSI	Incorrect	27 90.0%	1.10	Fail	22 73.3%	1.27	Fail
	Correct	3 10.0%			8 26.7%		
What is the benefit of zinc intake during the ICSI	Incorrect	23 76.7%	1.23	Fail	23 76.7%	1.23	Fail
	Correct	7 23.3%			7 23.3%		
What is the recommended daily amount of whole fat milk that helps boost your fertility	Incorrect	21 70.0%	1.30	Fail	17 56.7%	1.43	Fail
	Correct	9 30.0%			13 43.3%		
What is the benefit of vitamin D during ICSI	Incorrect	24 80.0%	1.20	Fail	19 63.3%	1.37	Fail
	Correct	6 20.0%			11 36.7%		
What is the benefit of taking fish oil during ICSI	Incorrect	21 70.0%	1.30	Fail	21 70.0%	1.30	Fail
	Correct	9 30.0%			9 30.0%		
What is the benefit of dietary supplement Q-Enzyme 10 during ICSI	Incorrect	24 80.0%	1.20	Fail	21 70.0%	1.30	Fail
	Correct	6 20.0%			9 30.0%		
The most important ways to relieve stress	Incorrect	14 46.7%	1.53	Pass	16 53.3%	1.47	Fail
	Correct	16 53.3%			14 46.7%		
What is the benefit of emotional freedom technique to reduce stress	Incorrect	25 83.3%	1.17	Fail	24 80.0%	1.20	Fail
	Correct	5 16.7%			6 20.0%		
The importance of applying deep breathing exercise	Incorrect	18 60.0%	1.40	Fail	18 60.0%	1.40	Fail
	Correct	12 40.0%			12 40.0%		
What is the benefit of mindfulness	Incorrect	19 63.3%	1.37	Fail	21 70.0%	1.30	Fail
	Correct	11			9		

		36.7%			30.0%		
To reduce negative emotions we use.....	Incorrect	25	1.17	Fail	22	1.27	Fail
		83.3%			73.3%		
	Correct	5			8		
		16.7%			26.7%		

Results in **table (2)** shows the women responses for question concerning their knowledge toward self-care management at pretest for (study and control groups) whereas most they have been fail knowledge.

Table (3) assessment of the Study Sample Responses at the Post-Test for Both Study and Control Groups

Items	Responses	Grouping					
		Study			Control		
		Freq. (%)	Mean	Assessment	Freq. (%)	Mean	Assessment
what is IVF	Incorrect	10	1.66	Pass	14	1.53	Pass
		33.3%			46.7%		
	Correct	20			16		
		66.7%			53.3%		
What are the causes of infertility and late procreation	Incorrect	3	1.90	Pass	14	1.53	Pass
		10.0%			46.7%		
	Correct	27			16		
		90.0%			53.3%		
What are the possible complications of treatment	Incorrect	13	1.56	Pass	18	1.40	Fail
		43.3%			60.0%		
	Correct	17			12		
		56.7%			40.0%		
The success rate of IVF in women aged 30-35	Incorrect	3	1.90	Pass	17	1.43	Fail
		10.0%			56.7%		
	Correct	27			13		
		90.0%			43.3%		
Your commitment with health care provider guidelines	Incorrect	0	2	Pass	8	1.73	Pass
		.0%			26.7%		
	Correct	30			22		
		100 %			73.3%		
The day of the egg retrieval process should be fasting at least..... hours:	Incorrect	0	2	Pass	14	1.53	Pass
		.0%			46.7%		
	Correct	30			16		
		100 %			53.3%		
What is the period of rest and relax after the embryo transfer.....	Incorrect	1	1.96	Pass	18	1.40	Fail
		3.3%			60.0%		
	Correct	29			12		
		96.7%			40.0%		
What is the adequate sleep hours during day	Incorrect	1	1.96	Pass	14	1.53	Pass
		3.3%			46.7%		
	Correct	29			16		
		96.7%			53.3%		
What are the right ways to make your sleep healthy	Incorrect	4	1.86	Pass	18	1.40	Fail
		13.3%			60.0%		
	Correct	26			12		
		86.7%			40.0%		
	Incorrect	2	1.93	Pass	16	1.46	Fail

What are the risks of exercise and hot baths		6.7%			53.3%		
	Correct	28			14		
		93.3%			46.7%		
What chemicals do you avoid during the I.C.S.I	Incorrect	0	2	Pass	11	1.63	Pass
		.0%			36.7%		
	Correct	30			19		
What is the benefit of eating large amounts of fruits and vegetables during the ICSI	Incorrect	4	1.86	Pass	13	1.56	Pass
		13.3%			43.3%		
	Correct	26			17		
How many cups are recommended for drinking water	Incorrect	3	1.90	Pass	22	1.26	Fail
		10.0%			73.3%		
	Correct	27			8		
What foods do we avoid during ICSI	Incorrect	2	1.93	Pass	10	1.66	Pass
		6.7%			33.3%		
	Correct	28			20		
What is the benefit of iron-rich foods such as green leaves and peas during ICSI	Incorrect	3	1.90	Pass	21	1.30	Fail
		10.0%			70.0%		
	Correct	27			9		
What is the benefit of zinc intake during the ICSI	Incorrect	11	1.63	Pass	18	1.40	Fail
		36.7%			60.0%		
	Correct	19			12		
What is the recommended daily amount of whole fat milk that helps boost your fertility	Incorrect	4	1.86	Pass	20	1.33	Fail
		13.3%			66.7%		
	Correct	26			10		
What is the benefit of vitamin D during ICSI	Incorrect	7	1.76	Pass	21	1.30	Fail
		23.3%			70.0%		
	Correct	23			9		
What is the benefit of taking fish oil during ICSI	Incorrect	2	1.93	Pass	19	1.36	Fail
		6.7%			63.3%		
	Correct	28			11		
What is the benefit of dietary supplement Q-Enzyme 10 during ICSI	Incorrect	13	1.56	Pass	18	1.40	Fail
		43.3%			60.0%		
	Correct	17			12		
The most important ways to relieve stress	Incorrect	9	1.70	Pass	16	1.46	Fail
		30.0%			53.3%		
	Correct	21			14		
What is the benefit of emotional freedom technique to reduce stress	Incorrect	6	1.80	Pass	22	1.26	Fail
		20.0%			73.3%		
	Correct	24			8		
	Incorrect	4	1.86	Pass	16	1.46	Fail

The importance of applying deep breathing exercise		13.3%			53.3%		
	Correct	26			14		
		86.7%			46.7%		
What is the benefit of mindfulness	Incorrect	1	1.96	Pass	19	1.36	Fail
		3.3%			63.3%		
	Correct	29			11		
		96.7%			36.7%		
To reduce negative emotions we use.....	Incorrect	4	1.86	Pass	21	1.30	Fail
		13.3%			70.0%		
	Correct	26			9		
		86.7%			30.0%		

Results in **table (3)** shows the women responses for questions concerning their knowledge toward self-care management at post- test for control groups whereas most they have been fail in the test. Study group of all of them (100%) are good in same test in post-test after exposed to instructional sessions.

Table (4) pregnancy test for study and control groups

Pregnancy test results	Statistical Parameters	Grouping	
		Study	Control
positive	Freq.	8	3
	%	26.7%	10.0%
negative	Freq.	22	27
	%	73.3%	90.0%
Total	Freq.	30	30
	%	100.0%	100.0%

Results in **table (4)** shows pregnancy test for (study and control groups) whereas study group (26.7%) positive after increasing knowledge and adhering of instructional program. while the control group (10%) positive.

Table (5) mean difference (independent sample t-test) between the study and control group responses at pre-test and post –test

Periods of measurements	Groups	N	Mean	Std. Deviation	t-value	d.f.	p-value
Pre-test	Study	30	1.378	.103	1.060	58	.293 NS
	Control	30	1.409	.1203			
Post-test	Study	30	1.8533	.07884	13.901	58	.001 HS
	Control	30	1.4427	.14130			

The results of **table (5)** show a highly significant difference which found between the pre-test and post-test of the study group who are participated in the instructional sessions and the control group who did not exposed to any intervention related to knowledge at p-value (0.001).

Discussion

1. Discussion of the Socio-Demographic and reproductive Data related to the Women’s undergoing In Vitro Fertilization / ICSI:

the present study highlights the contributions of some demographic variables for women who review the fertility center in Najaf, most of them aged (25-29 , 30-34 , 35-39) 26% of the

study group and (30-34) 30% of the control group. This result corresponds to the Omu and Alexander (2010) conducted in Kuwait, where it showed that the age of 20-29 years old is the dominant age[10]. .This results may come because women in this age are more likely to be pregnant and this age group is a preferable for pregnancy, so they seeking for fertility treatment. also our study is agree with the study of Dunson and other in 2004 Women aged 19–26 years had significantly higher probabilities of pregnancy than women aged 27–29 years . Women aged 30–34 years were similar to the 27 to 29-year-olds, but women aged 35–40 years had further reductions in their probabilities of pregnancy [11].

Age of male is expected to negatively affect semen quality. Testicular changes in age are associated with a lack of T levels. In this study, a high percentage of the study group was found in control of men between the ages of (30, 34 and 40 +) This is consistent with Mehdi in 2007, indicating a decrease in the parameters of sperm and semen with age, decrease of movement of Sperm in general by 7% / year with a decrease in the size of sperm by 3.1% / year as the volume of semen decreases 10% at the age of 30 years so the patient should be aware of each of the factors mentioned [12].

In terms of residence, the study shows that a high percentage of the study group (60%) and the control group (80%) live in urban areas. This is in agreement with Abdullah in 2016, indicating that 72% of them live in urban areas. This result matches with the result of Saoji (2014) who mentioned that most study group are living in urban residential area, while most control group are from rural area. This result may come due to women who live in urban more vulnerable to pollutants and chemicals such as; polluted air from factories, vehicles and electric generators. In addition, frequent use of detergents, cosmetic and pesticides [13][14].

With regard to the level of education, the study revealed that the highest percentage of the study sample of the two groups control and study are middle school graduates. This may be because most of the women have not been able to complete their education because of the circumstances and the nature of our Iraqi society. In addition, this result may be due to the continuing economy, political crises and wars that our country suffered from the beginning of the 1980s until this time. Asmail and Moussa 2017 noted that highly educated women are more likely to use problem-focused approaches, such as doing something about a problem, identifying the cause, thinking about the situation, and looking for information. relatively high levels of education are associated with positive health behaviors and can lead to the assumption of more adaptive coping strategies [15].

The current study indicated that the highest percentage of women in the study group 86% and the control group 90% are housewives. These results are consistent with those of AbudlAzeed *et al.*, (2019), where the majority of the 82% of women are housewives and have no personal income. These results are related to our communities that encourage females to be housewives and care for their families and their children. This result is due to the lack of government jobs in the country and no other source of financial support. These results coincide with Hamad's (2009) For females are housewives and their husbands are self-employed. For working women, chemicals can be inhaled either through environmental exposure or potential exposure in the workplace [16].

With regard to smoking and passive smoking, most of the study sample of the two groups control and study are non-smokers but are highly exposed to secondhand smoke, and this result agrees with Amirkhani and others. (2014) as well as Abdullah (2016), who stated that "the high percentage of the study group and the control group are passive smokers." The proportion of smokers in women of childbearing age has increased significantly in the last 30 years (WHO, 2007). Unfortunately, most women are unaware of the relationship between smoking and infertility (Ruth and Taylor, 2001). The relationship between smoking and infertility in women has been discussed in many studies. Cigarette smoke

contains many toxic substances known to be related to fertility, endocrine disorders, and onset of early menopause, early ovarian failure, and reduced rate of implantation (ASRM, 2018). Thus, cigarette smoking can lead to a bad diagnosis of assisted reproductive technologies [17][18][19][20].

2. Discussion of the assessment of the study sample responses at the pre-test and post-test for both study and control groups Related to the Women's undergoing In Vitro Fertilization / ICSI:

After implementation of the instructional program for the study group improved their knowledge about self-care management and increased their interest in adjusting their lifestyle to increase the chance of pregnancy. These results are consistent with a study carried out by Neamah and others (2018) in Iraq / Baghdad where Neamah said that results in both groups (study And control) in the pre-test have low knowledge about fertility and artificial insemination. After the implementation of the educational program of the study group, the couple to improve knowledge about artificial insemination. This study shows the importance of the educational program on knowledge of infertile couples who have increased knowledge of infertile couples after the implementation of the educational program [21].

3. Discussion of the Pregnancy Test for Study and Control Groups:

In this study, the adherence to the guidelines of the program on self-care management for women undergoing IVF/ICSI increases the chances of pregnancy and the success of the IVF process. Within a month of follow-up with each woman, the results showed that the group that underwent instruction sessions achieved pregnancy by a percentage of 26.7%. Commitment and instruction have a potential effect of reducing stress and increase the chance of pregnancy potential because the intensity and tension greatly reduces the probability of pregnancy and there are further reviews prove this and this is consistent with the results of Boivin and de Liz and Strauss, which investigated the effectiveness of psychological interventions for infertility also, The results of the systematic review and meta-analysis conducted by Hammerli *et al.*, which analyzed the effectiveness of psychiatric interventions for infertile patients, suggest that psychological interventions such as instruction, educational intervention and relaxation improve the chances of some patients becoming pregnant and having a significant impact on pregnancy rate. The results of a study conducted in Iran in 2017 on 1079 infertile women that there is a positive impact of counseling on pregnancy rate $p : 0.00$ [22][23].

4. Discussion the effectiveness of the instructional program on the knowledge of women undergoing IVF/ICSI self-care management for study and control groups

Table (6) presents highly significant difference between the results of the post- test of the study group and the control group that demonstrates the effectiveness of the instructional program in self-care management for women. The study of self-care was associated with a significant increase in knowledge and positive attitudes in the intervention group, This study was agreed with a study conducted at Kamal Al-Samarae Hospital in Baghdad by Neamah and others in 2018. It explained that the implementation

of the educational program increases and improves the knowledge of infertile couples towards artificial insemination . There is a statistical significance between the knowledge about artificial insemination of the study groups and post-test observation, and in another study conducted in Egypt in 2018 on 100 infertile women as it revealed that 49.0% of women had weak knowledge before intervention. However, 73.0% of them had good knowledge after one month of consecutive intervention. In addition, there was a statistically significant relationship ($P < 0.01$) between the sex function scores of infertile women before and one month of intervention. Also, only 4.0% of the women studied had a positive attitude towards adaptation to infertility before intervention. At the same time, after one month of intervention, the positive attitude changed to 92.0%, respectively[24] .

IV. CONCLUSION:

In the light of this study, we can conclude that there has been a significant improvement in women's knowledge, practices and attitudes regarding self-care management after the instructional program. There was a positive correlation between women's knowledge and attitude before and after intervention. In addition, given the hypothesis of the alternative study to predict the positive affected of the program's effectiveness on self-care management on the women's knowledge undergoing IVF/ICSI, as demonstrated by this effect, there is no evidence of acceptance of the null hypothesis. Otherwise, the alternative hypothesis is accepted.

V. RECOMMENDATIONS:

1. All fertility centers in Iraq should include an instructional program of self-care management for women undergoing IVF
2. Using different types of mass media to increase women awareness about advance maternity treatment for infertility
3. Conduct training programs for all nurses in fertility centers to enable them to educate women about infertility treatments and self-care management.
4. Further studies should be made to find the national prevalence of infertility among Iraqi women for infertility treatment and self-care management.

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Impact of Exercise during Pregnancy on Fetal and Maternal Related Outcomes in Al-Zahraa Teaching Hospital in Al-Najaf City

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DOI: 10.29322/IJSRP.9.08.2019.p9275

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9275>

Abstract- The study is a descriptive and analytic study was carried out to find out the impact of exercise during pregnancy on fetus and maternal outcomes, and to determine the statistical significant differences between exercise and pregnancy outcomes. A purposive sample of (100) pregnant women was selected from Al-Zahraa Teaching Hospital in Al-Najaf Al-Ashraf governorate. Data was collected through the interview of pregnant women. Questionnaire format was designed and contained four parts, demographic variable, reproductive variable, newborn variable, pregnancy physical activity questionnaire for pregnant women. Validity and reliability of the questionnaire were determined by conducting a pilot study. Descriptive and inferential statistical procedures were used to analyze the data. The result of the study revealed that the highest percentage of the age of mother was ranged between (21-25) years, the highest percentage of them were institute graduated and above, most of them were housewives with sufficient economic status. The result indicate that there are significant relationship between exercise and demographic characteristics (age of mother, economic status, level of education, occupation), significant relationship between exercise and reproductive history (parity, mode of delivery, number of alive children), non-significant relationship between exercise and complication during and after pregnancy, and significant relationship between exercise and newborn history (weight of baby).

Objectives: To assess exercise during pregnancy through application of Pregnancy Physical Activity Questionnaire PPAQ, to assess fetal and maternal outcomes, to determine the impact of exercise on fetal and maternal outcomes, and to determine the factors affecting fetal and maternal outcomes such as demographic data and reproductive history.

Recommendation: Encourage the pregnancies women on the exercise during pregnancy especially in the third trimester, and establishing program about sport club to teaching pregnant women the type of exercise during pregnancy that is important to reduce the proportion of caesarean section.

Index Terms- exercise, pregnancy, fetal and maternal outcomes.

I. INTRODUCTION

Every year, 125 million women are pregnant (1). Pregnancy is a period of increased wellness and health care awareness. Thus, Pregnant are more likely to make changes in lifestyle that really can lead to better health behavior. The advantages of these

changes not only impact the mother's health, but also the mode of delivery and the well-being of the newborn (2). Pregnancy is an important stage in women's lives where it is the time when many social, mental, behavioral and physiological changes occur (3). In women's lives, Gestation presents psychologically and physical changes that really can impact the awareness of the individual living standards. Furthermore, several pregnant women feel unappealing and heavy, and could also find it difficult with certain motions and regular daily activities (4). exercise is one of that important factors that helps pregnant women to give birth naturally and enhance the health of the mother and the child, and the exercise can be prepared by pregnant before and during pregnancy (1). Labor is painful, and for most pregnant women the onset is full of fairness. Moreover, women often experience perineum trauma while giving birth. Some studies suggest that the physical activity of the mother may lead to shorter labor, less medical procedures, as well as less labor exhaustion. Been in shape doesn't decrease pain, but it certainly helps to give you the stamina you need to get through labor (5). On the other hand, Women often experience perinea trauma at birth, particularly through their first delivery. The trauma of perineum is defined, either spontaneously or due to an episiotomy, Like any genital harm during childbirth. In its extent, episiotomy is equivalent to a spontaneous perinea tear of the second degree. Perinea trauma is correlated with short-term and long-term morbidity during childbirth. Injure to perinea can lead to urinary and fecal incontinence, painful contact, constant perinea pain, and weakness of the pelvic muscles. It has been shown that an episiotomy is not only un successful but also dangerous at times. Potent proof is now well established to support restricting the use of episiotomy. However, more than half of the females who give birth without the need for an episiotomy still are suffering from a wound which really requires multilayer closing. Treatments are required to reduce the danger of episiotomy and perineal tears. In addition, Females with undamaged perineum recorded fewer perineal pain directly following delivery and enhanced sexual performance three months after delivery (5). Physical activity during pregnancy can make a positive contribution to perineal trauma. Many trials have also shown that a woman or her partner performed a perineal massage a few weeks before delivery to elevate elasticity and minimize the risk of episiotomy trauma or accidental tears (5). There are controversies about the practice of leisure time and the outcome of pregnancy. Some research has shown that exercise during pregnancy can affect maternal outcomes positively (6). Some trials have verified that exercise may lower the risk of cesarean section during pregnancy (6). Over

the previous two decades, there has been growing interest in the potentially positive impacts of regular exercise during childbirth for both mom and children (7). Many writers have noted that exercises can encourage those advantages in reproductive results, such as reduced cesarean sections, reduced gestational diabetes mellitus incidence, and reduced gestational weight gain. Furthermore, fetal advantages include reduced fat mass, increased tolerance of stress and sophisticated neurocognitive development (7). Most women think that when they spend their free time lying down and not Having any habits or physical activity that will positively affect the results of their pregnancy , this issue has stirred up controversy , researchers have conducted studies proving that exercise may positively affect pregnancy outcomes (8). newly many research had suggested to doing daily physical activity during pregnancy, the researchers detect that the exercise has positive effect on the pregnancy outcome especially mild to moderate types during their final month of pregnancy and advice the pregnant women to doing it without any harmful effect (9) . it is still recommended by guidelines for the pregnant women to do some physical activity for 150 min / week . in spite of these recommendations, it is estimated that less than 15% of pregnant women are eager to do that (10).

II. METHODOLOGY

Design of the study: A cross-sectional retrospective study design was conducted to achieve objectives stated before. During the period from 1th February 2019 until 25th February 2019.

Setting of the study: The study was done in Al-Najaf City/ Al-Najaf Health Directorate/ Al-Zahraa Teaching Hospital.

Sample of the study: A non-probability (Accidental Sample) of 100 mothers will include in the study.

The Instrument of the Study: The final form of the instrument of the study consists of four parts:

Part 1: Demographic Data: A socio-demographic data consists of (7) items, which they are age, residence area, occupation, economic status, level of education, body mass index and smoking.

Part 2: Reproductive history: A reproductive history consists of (11) items, which they are age of marriage, infertility period, gravidity, parity, abortion, mode of current delivery, if cesarean section what indication of it, obstructed labor, prolong labor, number of alive children, complication of current pregnancy, chronic diseases during current pregnancy, complication after pregnancy.

Part 3: Clinical data about the current neonate: It is consisting of (4) items, which they are if the baby alive or dead, birth weight, gestational age, APGAR score.

Part 4: Exercise questionnaire (pregnancy physical activity questionnaire): They were (31) question that are used to assess pregnancy physical activity at three domains (at home, going place and exercise for fun or for exercise, at work).

III. STUDY RESULTS:

Table (1) Distribution of study Sample according to Demographic Data

Demographic Data	Rating and Intervals	Frequency / Percentage
Age / years	<= 20	20
	21- 25	30
	26- 30	26
	31- 35	17
	36 and more	7
	Total	100
Residence area	Urban	80
	Rural	20
	Total	100
Occupation	Housewife	68
	Employee	21
	Student	11
	Total	100
Economic status	Sufficient	87
	Sufficient to some extent	11
	Insufficient	2
	Total	100
Levels of education	Doesn't read and write	8
	Read and write	16
	Primary school graduated	20
	Secondary school graduated	22
	Institute graduated and above	34

	Total	100
BMI	Underweight	2
	Normal	63
	Overweight	35
	Total	100
Smoking	Active	17
	Passive	46
	Un exposed	37
	Total	100

Table(1) clarifies the demographic data of a total of (100) pregnant who enrolled in the study the high percentage of women at age group between (21-25) (30%), majority of them (80%) live in urban residential area, housewife (68%), socio-economically are sufficient (87%), Institute graduated and above (34%), normal BMI (63%) , and (46%) of study sample about smoking are passive .

Table (2)) Distribution of study Sample according to Reproductive History

Reproductive history	Rating and Intervals	Frequency / Percentage
Age of marriage / years	<= 15	8
	16- 18	24
	19- 21	40
	22- 24	23
	25+	5
	Total	100
Type of Infertility	None	86
	Primary	9
	Secondary	5
	Total	100
Gravidity	<= 3	73
	4- 6	24
	7+	3
	Total	100
Parity	<= 3	84
	4- 6	14
	7+	2
	Total	100
Number of Abortion	None	75
	1- 2	25
	Total	100
Mode of delivery	Normal delivery	74
	Caesarean section	26
	Total	100
Type of Cesarean section	Emergency	15
	Elective	11
	Total	100
Obstetric labor	No	83
	Yes	17
	Total	100
Prolonged labor	No	85
	Yes	15
	Total	100
Number of a live children	1-3	84
	4-6	14

	7+	2
	Total	100

table (2) shows that the reproductive history of (100) pregnant who enrolled in this study. In related to the age at marriage the high percentage of pregnant women between (19-21) years old where (40%) , the majority of pregnant are (86%) for none Infertility period , (73%) of gravidity are (less than or within 3) , (84%) of parity are (less than or within 3) , (57%) with no abortion, (74%) with normal delivery, (15%) of Cesarean section causes are emergency , (83%) are no Obstetric labor , (85 %) are no Prolonged labor and (84%) of study sample are having (1-3) children.

Table (3)) Distribution of study Sample according to Complications and Chronic Diseases

Complications and chronic diseases	Rating	Frequency Percentage /
Complications of current pregnancy	None	60
	Anemia	7
	Anemia + Oligohydrominious	2
	Anemia + Oligohydrominious + Cervical incompetency	1
	Anemia + Cervical incompetency	3
	Anemia + Antepartum hemorrhage	1
	Anemia +HT+GDM	1
	Anemia + GDM	2
	Oligohydrominious	1
	Oligohydrominious + Cervical incompetency	1
	Cervical incompetency	10
	Cervical incompetency + HT	2
	Cervical incompetency + GDM	2
	Antepartum hemorrhage	5
	Pregnancy induced hypertension	1
	HT + GDM	1
Total	100	
Chronic diseases during pregnancy	None	96
	Chronic hyper tension	1
	DM	3
	Total	100
Complications after delivery	None	75
	Bleeding	17
	Bleeding + Pre-eclampsia / eclampsia	6
	Pre-eclampsia / eclampsia	2
	Total	100

Table (3) show the majority of study subject of complication of current pregnancy are (60%) none , (96 %) not having any chronic disease during pregnancy ,and (75%) not having any Complications after delivery.

Table (4)) Distribution of study Sample according to Neonate Clinical Data

Clinical data	Rating and Intervals	Frequency / Percentage
Baby conditions	A live	100
	Dead	0.0
Baby weight / kg	<= 3	34
	3.01+	66
	Total	100
Gestational age / weeks	<= 31	5
	32- 34	3
	35- 37	20
	38- 40	61
	41+	11
	Total	100
Apgar score	Low	0.0
	Moderate	20
	High	80
	Total	100

Table (4) clarifies the neonatal clinical data , where most of them (100%) of baby condition are live, the majority of neonate are (66%) for baby weight are (3.01 and above) kg, (61%) of gestational age are within (38-40) weeks, and (80%) are high level of apgar score .

Table (5) assessment of exercises

Main domain	Levels of exercises	Frequencies / percentages
At home	Mild Exercise	51
	Moderate Exercise	30
	Hard exercise	19
	Total	100
Going Places	Mild Exercise	100
	Moderate Exercise	0.0
	Hard exercise	0.0
	Total	100
At Work	Mild Exercise	97
	Moderate Exercise	2
	Hard exercise	1
	Total	100

table (5) summarizes that the assessment of each domain in the exercise scale for the pregnancy every domain assessed as mild exercise.

Table (6) overall assessment of exercises

Main domain	Levels of exercises	Frequencies / percentages
Overall assessment of pregnancy exercises	Mild Exercise	93
	Moderate Exercise	3
	Hard exercise	4
	Total	100

Table (6) shows that the overall assessment of exercise for pregnant women is mild with the percentage (93%).

Table (7) relationship between the overall assessment of exercises and the mothers' demographic data

Demographic data	Chi-square Value	d.f.	p-value
Age / Years	22.038	8	.005 HS
Residence Area	5.108	2	.078 NS
Occupation	12.814	6	.046 S
Economic Status	18.095	4	.001 HS
Levels Of Education	18.719	8	.016 S
BMI	5.975	4	.201 NS
Smoking	6.316	4	.177 NS

Table (7) presents highly significant relationship between exercise and the age and economic status at p-value less than 0.01, and significant relationship between exercise and level of education and occupation at p-value less than 0.05, On the other hands there is a non-significant relationship with other demographic data.

Table (8) relationship between the overall assessment of exercises and the mothers' reproductive history

Reproductive history	Chi-square Value	d.f.	p-value
Age Of Marriage	6.837	8	.554 NS
Gravidity	9.946	4	.041 S
Parity	19.710	4	.001 HS
Number Of Abortion	2.509	2	.285 NS
Mode Of Delivery	7.232	2	.027 S
Obstetric Labor	1.542	2	.463 NS
Prolonged Labor	1.328	2	.515 NS
Number Of A Live Children	19.710	4	.001 HS

table (8) presents a highly significant relationship between the exercise and the parity, number of a live children at p-value less than 0,01 , and significant relationship between the gravidity, mode of delivery at p-value less than 0.05, On the other hands there is a non-significant relationship with other reproductive data.

Table (9) relationship between the overall assessment of exercises and the complications and chronic diseases

Complications and chronic diseases	Chi-square Value	d.f.	p-value
Complications of the current pregnancy	37.027	30	.176 NS
Chronic Diseases	.314	4	.989 NS
Complications after delivery	4.226	6	.646 NS

Table (9) presents no significant relationship between exercise and the complication and chronic disease during pregnancy.

Table (10) relationship between the overall assessment of exercises and the neonate clinical data

Clinical data	Chi-square Value	d.f.	p-value
Baby Weight / kg	6.158	2	.046 S
Gestational Age / weeks	6.899	8	.548 NS
Apgar Score	.420	2	.811 NS

table (10) presents a significant relationship between exercise and the baby weight at p-value less than 0.05, On the other hands a non-significant relationship with other neonate clinical history.

Table (11) Correlation between the mothers' exercises and some significant associated variables

Overall assessment of exercises	Number of a live children	Gravidity	parity	Baby weight
Pearson Correlation	.369**	.325**	.369**	.094
p-value	.000	.001	.000	.353
N	100	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).				

Table (11) presents a highly significant correlation between the exercise and the Number of a live children , Gravidity, parity at p-value (0.001),and significant correlation between exercise and baby weight at p-value (0,01).

Table (12) mean difference (independent sample t-test) of the pregnant exercises and the mode of delivery

Mode of delivery	N	Mean	Std. Deviation	t-value	d.f.	p-value
Normal	51	35.5882	9.60245	1.254	98	.213 NS
CS	49	33.3265	8.36508			

Table (12) shows that there is a non-significant difference in exercise according to the mode of delivery at p-value more than 0.05. but regarding to the mean difference that study results indicate that the pregnant with normal delivery perform exercise more than those pregnant with CS.

IV. DISCUSSION:

5.1. Demographic data of the pregnant women: The current study included a total number of (100) pregnant women who participate in this study, their percentage age was 30% with the most age group of the participant were (21-25) years, same result by (11) who did find that ages between (21-25) are the most age group among participants . Furthermore, most percentage 80% of participants were living in an urban area, this result matches with the result of (12) who mentioned that most participant are living in urban residential area. Moreover, most of participant was housewives by 68%. This result comes along with (13) housewives were the major group of the participant. Regarding socio-economic status, high percentage of study sample are with Sufficient socio-economic status by 87%. this result

matches with the result of (14) who stated that the majority of the participants having sufficient socio-economic status. In addition, the levels of education for 34% of the participants was Institute graduated and above. Body mass index for the 63% of the pregnant women is between (20-25) which is considered normal (15). in their study which indicated that the majority of participant are with normal weight. And about smoking of 46% of the pregnant women is passive. This result agrees with (13) who reported that "High percentage of participants are passive smokers"

5.2. Data related to reproductive history of the pregnant women: Highest percentage 30% of age of marriage is between (21-25) years, in addition the most of the participants were non infertility period by 86%. Moreover, to that most of participant show the majority of the gravidity was less than or within 3; less than or within 3 parity. These results are supported by (14) their

results show that most of the subjects of the study are multigravida and multipara. In addition, this study shows that most study samples do not have abortions by 75%. This result supported by (13) they state the highest percentage of participated women are without case of abortion. In addition, the majority of the last delivery method for these participants was vaginal delivery compared with caesarean sections by 74%. This result agrees with (16) they mentioned that the majority of study sample was normal vaginal delivery. In addition, the majority of these participant was non-obstetric labor by 83%, and the majority of these participant was non prolonged labor by 85%. Moreover, to that most of participant show the majority of the number of a live child 1-3 by 84%.

5.3. Data related to Complications and Chronic Diseases: Majority of the participants are with no complications of current pregnancy such as (Anemia, Oligohydramnios, cervical incompetence, Antepartum hemorrhage, Pregnancy induced hypertension, Gestational diabetes mellitus) by 60% as of what has been found by this study, which in consistency to (17),(18) these studies found that their pregnant women have no complications during pregnancy period. Moreover, to that the majority of these participants are with no chronic diseases during pregnancy such as (Thyroid disease, Chronic hypertension, Heart disease, Asthma, Diabetes mellitus) by 96%. This result comes along with (18) they stated that the majority of participants are with no past medical history In addition, the majority of these participant are with no Complications after delivery such as (Bleeding, Pre-eclampsia or Eclampsia, End organ, Embolism) by 75%.

5.4. Data related to Neonate Clinical Data: Study results show that all neonate is alive by 100%, in addition, the majority of baby weight are above (3.01+) by 66%, and the majority of Gestational age are from (38 to 40) weeks by 61%. these results agree with (19) in their study which indicated that the majority of gestational age more than 36 weeks, all of birth are alive, and birth weight from 2.5-4.5, moreover, the majority of the Apgar score of the neonate is 80% high.

5.5. Assessment of the exercise of the pregnant women: From the (31) question about the pregnancy physical activity questionnaire, these questions are divided into 3 domain and the assessment of each domain in the exercise scale for the pregnancy every domain assessed as mild exercise.

5.6. The overall assessment of exercise : The overall assessment of pregnancy exercises is mild with percentage 93% as what mentioned earlier, the reason of this result is maybe due to that the majority of participants(68%) were house wives and they are doing housekeeping works and the lower level of education is the most important factor as the majority of the women were (66%) secondary school graduated and lower level of education so that is a reasonable result Fell, et al., 2010 ; Mudd, et al., 2010 ; Peterson, et al., 2006 ; Ning, et al., 2004 ; Rutkowska, et al., 2003, these researchers are agree and had conclude same point that the lower level of education is an important and effective factor participating in mild level of exercise (20),(21),(22),(23),(24) .

5.7. The relationship between the overall assessment of exercises and the mothers' demographic data: There is a high significant relationship between the exercise and the age of mothers, previous studies supported this result, these studies indicated that high level of exercise was associated with younger

age (25),(22) . There is significant relationship between exercise and occupation of the pregnant women's, this result is supported with some previous studies, like cross-sectional study which find that in comparison women who were not employed were more likely to be meeting exercise guidelines according to employed women (22) . On the other hand, a different study concluded that the women who are housewives and don't have a job are less practicing aerobic exercises than professionals' women in addition, professional women are practicing aerobic exercises for about twenty mints and more for 2 days per week and the percentages were about (42% for professionals women vs 22% for nonprofessionals women) (26) . The rest researches find no relationship between exercise and employment. (20), (27) found there is no relationship between exercise and occupation of the pregnant women. There is a high significant relationship between exercise and socioeconomic status , a study by (28),(22),(23),(29) found that there is appositve relationship between exercise and the economic status , referred that pregnant with high income households are more likely to be active. There is a significant relationship between exercise and the level of education , the pregnant women who have Institute graduated and above doing exercise during pregnancy , this is supported by some study (20), (22),(23),(21)(24) concluded that Increased level of education (e.g., high school, college or university) has been found to be an important predictor of increased participation in exercise. There is non-significant relationship between exercise and BMI of the pregnant women, this supported by some study (28),(27),(23),(30) found that there is no relationship between exercise and weight or BMI of pregnant women.

5.8. The relationship between the overall assessment of exercises and the mothers' reproductive history: There is a significant relationship between exercise and gravidity, also there is a high significant relationship between exercise and parity, this supported by some study, (28) find that higher level of exercises can be predicted and found if the women has at least one child in the house. There is a significant relationship between exercise and mode of delivery. This supported by a study, which it concluded that physical exercise increase frequency of the normal vaginal delivery and it will be more effective when the exercise is in the second and the third trimester for that It can be prescribed for health women while it was pregnant or not (31). There is a high significant relationship between exercise and number of alive children, this supported by a study that find the women have children in home are using and spending higher level of energy than the women who have no children especially in the fourth and seventh months of pregnancy. (28)

5.9. The relationship between the overall assessment of exercises and the neonatal clinical data: Wiebe et al., 2015 shows that there is a significant relationship between the exercise and the baby weight, (32) study concluded that exercise and activity provide protect infant birth weight from being overweight or low birth weight.

5.10. The correlation between the mothers' exercises and some significant associated variables: There is a high significant correlation between the exercise and the Number of a live children, there is significant correlation between exercise and baby weight, (32) researchers concluded that using scheduled exercise will have great and effective on the birth size and weight.

5.11. The relationship between the overall assessment of exercises and the mode of delivery: There is a non-significant difference in exercise according to the mode of delivery, but with respect to the mean difference that study results indicate that the pregnant with normal delivery perform exercise more than those pregnant with CS. This supported by Rajabi A *et al.*, 2018, study results clarify that exercises and activities are participating greatly in normal vaginal delivery and reduces the probability of cesarean section in addition, these result have great deal in providing a solid base for convincing staff members of health care system to provide a standard and regular physical activity and exercise (33).

V. CONCLUSION

1.The study confirms that the majority of pregnant women are from (21-25) years , urban residency, occupation is a housewife level of education is graduated from institute and above, sufficient economic status and normal body mass index, the study confirm that the majority of pregnant women are having 3 and above children and the majority of mode of last delivery is the vaginal delivery, also the majority of baby weight and APGAR score is normal , There were high significant relationships between The age of mother and exercise, there were high significant relationships between the economic status of pregnant women and exercise, there were significant relationship between the level of education of pregnant women and exercise, there were significant relationship between the occupation of pregnant women and exercise, there were non-significant relationship between the exercise and the body mass index of the pregnant, there were high significant relationships between the exercise and the number of parity and number of a live children, there were significant relationships between the exercise and the number of gravida and mode of delivery, there were significant relationships between the exercise and the baby weight, there were a non-significant difference in exercise according to the mode of delivery at p-value more than 0.05. but with respect to the mean difference that study results indicate that the pregnant with normal delivery perform exercise more than those pregnant with CS.

VI. RECOMMENDATION

Encourage the pregnancies women on the exercise during pregnancy especially in the third trimester.

Establishing program about sport club to teaching pregnant women the type of exercise during pregnancy that is important to reduce the proportion of caesarean section.

Further studies should be made to find the national prevalence of pregnant women made exercise during pregnancy and effect on outcomes

Emphasizing on a collaborative work between Iraqi ministry of youth and ministry of health to include this exercise curriculum a knowledge regarding type of exercise during pregnancy such as yoga ball .

Using different types of mass media to stimulate public awareness about benefit of using exercise during pregnancy.

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Being Minang In Surabaya City Ethnopedagogy Studies

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DOI: 10.29322/IJSRP.9.08.2019.p9276

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9276>

Abstract

This article is based on the thesis of the Surabaya State University Social Sciences Education Science Master's Program (2019), "*Implementation of Minang Culture Local Wisdom Dima Bumi Dipijak, Disitu Langit Dijunjuang: Ethnopedagogy Studies Of The Minang Diaspora In The City Of Surabaya.*" This research is qualitative in nature with an ethnographic approach that was carried out for three months (August-October 2018) to Minangkabau migrants in the city of Surabaya. The aim of the study was to understand how the application of Minang Culture Local Wisdom values "*Dima Bumi Dipijak, Disitu Langit Dijunjuang*" (where he earth is stepped on, there the sky is upheld) in the Context of Ethnopedagogy by Perantau Minang in the City of Surabaya. The results of the study show that there are at least five Minangkabau cultural values that are very important to be included as part of the ethopathic material. The nine cultural values are:

- a) Caring for and maintaining Mother Language.
- b) "*Dima bumi dipijak, disitu langit dijunjuang*".
- c) "*Nan elok dek awak katuju dek urang; Lamak dek awak lamak dek urang; Sakik dek awak sakik dek urang*".
- d) "*Karatau madang di hulu, Babuah babungo balun; Marantau Bujang dahulu, Di rumah baguno balun*".
- e) "*Baraja ka na manang, mancontoh ka nan sudah*"; dan "*Takuruang nak dilua, taimpik nak diateh*".
- f) "*Yang buta penghembus lesung, yang pekak pelepas bedil, yang lumpuh penghuni rumah, yang kuat pemikul beban, yang bodoh untuk disuruh-suruh, dan yang pintar lawan berunding.*"
- g) "*Hiduik baraka, baukue jo bajangko*".
- h) "*Nan tuo dihormati, nan ketek disayangi, samo gadang bawo bakawan, ibu jo bapak diutamakan.*"
- i) "*Adat basandi syarak, syarak basandi kitabullah*"

Keywords: *ethnopedagogy, local wisdom, Minangkabau culture.*

I. Introduction

Every society in any culture has a life philosophy as local wisdom which becomes a reference in thinking, acting and behaving in its social life. The Minangkabau community in West Sumatra has been known to adhere to a kinship system according to the matrilineal kinship system. One of the cultural consequences is requiring men to migrate starting after graduating from junior high school or senior high school. Going around is the most ideal way to achieve maturity and success. By wandering not only to gain wealth and knowledge but also to gain prestige and personal pride (Hastuti, 2015: 3).

As nomads, they must implement Minang cultural values, especially "*Dima bumi dipijak, disitu langit dijunjuang*" (where the earth is stepped on, where the sky is upheld). Where and wherever the Minangkabau migrate must react and adapt the local social environment. Other cultural consequences of the matrilineal kinship system, each *kamanakan* (children of the maternal line) must be guided by *mamak* (a mother's brother) especially in terms of care, education, and all other aspects of life. Fathers only function and play a role in supervising their children: children on the lap, *kamanakan* guided (Amir: 2014; Amir: 2000; Thaher: 2006; Kato: 2005).

The problem of this study is: how to apply the values of the Minang Cultural Local Wisdom "*Dima bumi dipijak, disitu langit dijunjuang*" in the Context of Ethnopedagogy by Minang Diaspora in the City of Surabaya?

The aim of the study: to understand how the application of cultural wisdom to the local wisdom of the Minang culture "*Dima bumi dipijak, disitu langit dijunjuang*" in the Ethnopedagogy context of Minang Diaspora in the city of Surabaya.

II. Theoretical Framework

1. Definition of Cultural Philosophy "*Dima bumi dipijak, disitu langit dijunjuang*".

The cultural philosophy "*Dima bumi dipijak, disitu langit dijunjuang*" and a proverb "elok-elok manyubarang, jan sampai titian patah, elok di rantau urang, jan sampai babuek salah": "*baso-basi, malu jo sopan*" and "*tenggang raso*" (Demina, 2016: 8) (do good in people's countries not to do wrong, do not have words or behavior that can offend or hurt people's feelings). All social ethics are very closely related to the values of Islamic teachings originating from the Al-quran and Hadith, namely "*adat basandi syarak, syarak basandi kitabullah*" (Rahim, 2017: 64-72).

2. Parenting Theory and Educating Children.

Cummins and McMaster (2006), as quoted by September (2015: 1), say that "The wealth of a nation is the health of children". The resilience of the nation's future depends on the quality of the children who at this time must obtain care, guidance, protection, and education and are of the right quality. All of these are the duties and obligations of parents.

The Indonesian government has issued Law No. 23 of 2002, in article 26 concerning Child Protection, that: (1) Parents are obliged and responsible for: caring for, nurturing, educating and protecting children; grow children according to their abilities, talents, and interests; and prevent the occurrence of marriage at the age of children. (2) In the event that a parent does not exist, or is not known to exist, or for some reason, is unable to carry out his obligations and responsibilities, then the obligations and responsibilities referred to in paragraph (1) can be transferred to the family, which is carried out according applicable legislation.

Article 26 in Law no. 23/2002 paragraph (1) stated normatively that the purpose of caring, protecting and educating children is to fully develop the abilities, talents, and interests of children. These goals, in September's view (2015: 2-3), basically mean that the duties and obligations of parents in the context of parenting are so that each child has cognitive, emotional, and social quality competencies.

These three things are influenced by (1) family income sources; (2) style of parenting; and (3) family education level. September said that parenting style has a fundamental influence on children's development and their interactions between parents and children during the early stages of child development (ECD, early childhood development). This view generally applies to the people who adhere to the kinship system following the male and female lines (patrilineal and matrilineal kinship system).

Some of the results of previous studies indicate that at present there is a shift and change regarding the function and role of the *mamak* towards his nephew which is no longer in accordance with the cultural values or customs of the Minangkabau (Derby, 2017: 12). Another study concluded that a father who was initially more instrumental and functioning as a *mamak* in guiding his nephew from the mother's family had experienced a shift, namely acting and being responsible for his own family (Usmarni and Rinaldi, 2014: 48).

Another study is a change in the pattern of communication among family members (especially between children and parents - father and mother, and vice versa) that is strongly influenced by the use of new media (internet, and other social media). This change in turn affects the parenting style of both parents, meaning that the planting of values to children is no longer solely carried out by their parents, but shifts to the new media (Yunarti, Rahmadani, 2017: 64).

The *mamak* from the Minang nomads in the city of Surabaya geographically do not gather with their *kamanakan*. This condition causes the role and function of the *mamak* in the context of nurturing, guiding, educating, and the like that cannot be done fully. Therefore, family roles and functions are important to fill the empty roles and functions. According to Galovan's family systems theory (2016: 2-3), the quality of father-child relationships correlates with the quality of parental marriage relationships. Quoting the opinion of Baumrind (1967) and Maccoby and Martin (1983), Dinn and Sunar (2017: 111), states that this quality must be seen from the way parents apply parenting and mentoring and educate their children whether it is authoritative (authoritative), authoritarian (authoritarian), or permissive and neglecting.

According to Chrisiana (2006), as quoted by Handayani (2016: 63) there are at least five types of personality that can be formed through family education, namely: (1) trustworthiness; (2) fairness; (3) caring; (4) respect; (5) responsibility. Furthermore, Ayu, et al (2012) states that the formation of good morals in children needs to be considered from the beginning. Family support is important for children in the learning process. Parental assistance can foster confidence and self-esteem of children by praising the efforts they have done without seeing the results.

There are two approaches to discussing parental care for their children: (1) typology approach, namely demandingness and responsiveness; and (2) social interaction approach, namely the relationship between parents and children as part of a whole (Lestari, 2013: 16).

3. Ethnopedagogy Theory.

Although the personality of a person (child) can be formed through education, but the process of care and education in children should not be placed in a socio-cultural vacuum. In the context of ethnopedagogy, the pattern of care and education strategies developed by Minang migrants in the city of Surabaya should pay attention to aspects of the local wisdom of the Minang culture. Sarbaini (2015: 3), citing Alwasilah et al. (2009), states that in principle ethnopedagogy pays special attention to local genius and local wisdom by expressing local cultural values.

For the people of Minang, the cultural philosophy “*dimana bumi dipijak, di situ langaik dijunjuang*” greatly influences the patterns of care and education strategies that must be applied. Other local wisdom values, such as stories, legends, traditional tales can also color the formation of character and personality of children (Eliza (2017: 162). Zuriyah (2014: 176) explained that to realize ethnopedagogical education must explore and re-reveal the values of local wisdom as a source of innovation in the field of education and empowerment through adaptation of local knowledge, including reinterpreting local wisdom values, and revitalizing them contemporary conditions.

Alwasilah (2008 and 2009) considers that knowledge or local wisdom (local knowledge, local wisdom) in ethnopedagogy as a source of innovation and skills that can be empowered for the welfare of society. Local wisdom is a collection of facts, concepts, beliefs, and public perceptions about the world around. This includes how to observe and measure the environment, solve problems, and validate information.

III. Research Methods

This research is qualitative, with an ethnographic approach. The consideration, all the data needed requires translation and qualitative explanation, using deductive thinking during the research process (Creswell, 2015: 59). Data collection is done by observation and depth interviews. The research location is in the city of Surabaya. Implementation in the field for three months starting August to October 2018. Data analysis techniques refer to the opinion of Wolcott (1994: 36) and Miles and Huberman (1992).

IV. Results and Discussion of The Implementation of Minang Culture Philosophy

1. Strategy and Pattern of Parenting and Education for Children.

In the Minang community, the cultural philosophy “*dima bumi dipijak, di situ langaik dijunjuang*”, has a significant influence on the patterns of care and the education strategies of their children. The field research by Eliza (2017: 162) mentions that stories, legends, traditional tales are important for the formation of children's character or personality.

Minangkabau culture regulates child care including educating, guiding and the like is the responsibility of *mamak*. But in the lives of Minang migrants in the city of Surabaya, the role and function of *mamak* is partly taken over by the parents, in the sense that it is not solely by the father but the mother also takes part, including the children themselves. This is the smart strategy of the Minang diaspora in Surabaya in accordance with Law No. 3 of 2002, specifically article 26 paragraph 1, concerning Child Protection.

a) The function and role of the *mamak* are not ignored.

The roles and functions of informants as parents (father and mother) are important to fill in the roles and functions of *mamak* that are not optimal because they are geographically domiciled in other places. This was acknowledged by all informants. That is, parents (fathers and mothers) who are currently on overseas are obliged to care for and educate their children. However, specifically for matters relating to inheritance of inheritance and determining potential partners for their children, parents must consult with *mamak* and must follow his suggestions and advice.

The role and function of *mamak* must be involved optimally for women. The role and function of *mamak* towards male *kamanakan* is more consultative and guidance in order to be able to preserve the heritage and later to be able to inherit the function of *mamak* as a leader in his family (Marzali, 2000; Naim, 1994; and Kato, 2005).

Despite the role and function of overseas parents, parents still need to consult with *mamak* in the village to pay attention and consider their advice and suggestions. All of this is an implementation of Minang cultural values. “*Nan tuo dihormati, nan ketek disayangi, somo nan gadang bawo bakawan, Ibu jo bapak diutamokan*” (the older ones are respected, the small ones are loved, as well as friends, mother and father are preferred).

b) Follow *mamak* advice.

Two informants, Irham and Bakirafdi, said that when they have to determine the choice of prospective daughter-in-law. Irham's sons and Bakiraf's daughters happen to be together to get a mate, not a Minang person. This condition requires deep consideration from the *ninik mamak* and other relatives in the village. Some important aspects must be considered and discussed together with *mamak*, which is about hereditary origin, education, character, and personality of prospective daughter-in-law.

The problem of marriage will determine the quality and continuity of kinship in the next generation. In the context of the lives of Minang migrants in Surabaya, the matrilineal kinship system remains strictly enforced. However, the dimension of togetherness in kinship, or the spirit of mutual respect and mutual respect in kinship relations still gets the main space. In the Minang community, unknown family life is authoritarian, everything must be discussed together so that a consensus is reached: “*bulek aie dek pambuluah, bulek kato dek mufakaik*” (round water because of vessels, round word for consensus)

For matters of inheritance, it is not enough to consult and ask for guidance from the *mamak* only through telephone contact but must meet directly with the *mamak*. That is to avoid and anticipate misunderstandings, and as an implementation of courtesy ethics respect and respect *mamak*. Every time the Minang nomads in the city of Surabaya return to their villages, it is always used to establish a relationship between themselves and their children with *mamak*.

This indicates that the kinship relations in the Minang community have never broken up, remain well-maintained, even though they have a very strong cultural tradition of migrating. Customs or traditions of maintaining this kinship relationship

are clearly found in the saying: "*adat nan tak lakang dek paneh, nan tak lapuak dek hujan*". (adat which is not hot, and is not weathered or fragile by rain).

Usually the way that informants do in the pattern of care and education strategies in the ethnopedagogical context of their children is to take advantage of children's free time after school or after studying at night. At times like that the Minang nomads told about what the Minang proverb *dima bumi dipijak, disitu langik dijunjuang*.

2. Contributing to the Practice of Minang Cultural Values in Social Sciences Learning (IPS) in accordance with the Ethnopedagogy Principles.

In ethnopedagogy theory, there is a connection between cultural processes and education. Therefore, it is very important to consider local genius and local wisdom (Rohman, 2017: 35; Sarbaini (2015: 3); Alwasilah et al., 2009). In the context of ethnopedagogy, the pattern of care and education strategies carried out by Minang migrants in the city of Surabaya towards their children is very concerned about aspects of Minang's local wisdom culture (local wisdom or local genius).

By instilling the values of local culture (local wisdom or local genius) in education is one way for children to continue to respect their ancestral heritage in the form of beliefs and values that are contained in it to then be applied in daily life. Furthermore, this will foster an attitude of love for culture itself, and in a wider scope, automatically fostering a sense of love for his country. Efforts to cultivate local cultural values can be done through formal and non-formal education including education carried out in the home or family (Sulistiani, 2017: 269).

Based on the results of research in the field there are nine Minang local cultural values that have been implemented by Minang migrants in Surabaya as a contribution to the learning of Social Sciences (IPS) in accordance with ethnopedagogy principles, namely:

a) Consistent with the local language.

One of the cultural characteristics of the Minang people is always using the Minang language in interacting with fellow Minang people wherever they are and meeting. Minang people really don't like Minang people who use other languages, for example Indonesian, when communicating verbally with fellow Minang people. That person must have been ridiculed (ridiculed) with a very loud and painful allusion that is in the form of a sentence: "*babahaso Minang sajo, kabau!*". That is, talking about using the Minang language, *buffalo!* This satire shows that the person is considered arrogant, does not want to claim to be a Minang person, so it is no longer appropriate to be called a Minangkabau, except *kabau* or buffalo.

The consistency of Minang migrants using the Minang language, has proven that they have practiced ethnopedagogical principles in their families effectively. In the ethnopedagogy context: understanding, mastering, and understanding Minang language as wisdom of local culture is a factor that plays a very important role in the formation of children's character in the family, and on a larger scale the character of the nation (see Fajarini, 2014: 124).

b) Tolerant, not exclusive, and not selfish.

The Minang cultural philosophy that reflects tolerant, not exclusive, and unselfish attitudes and behaviors is contained in the saying "*dima bumi dipijak, disitu langik dijunjuang*". The substantive philosophical meaning is to teach that every Minang person wherever he is must be smart and able to adapt or adapt to the customs of the local community.

In other words, every Minang person must be able to show tolerant attitudes, not exclusive, and not selfish. In anthropological terminology, this attitude and behavior is referred to as cultural relativism or avoiding ethnocentrism.

According to the informant's confession, Bakirafdi, who was also justified by Irham and other informants, this cultural philosophy has been considered the most important value in the life of the Minang community. Therefore, as a migrant they and their families are obliged to apply these cultural philosophical values. Not only that, they also felt obliged to teach, instill, and transfer these noble cultural values to their children and grandchildren so as not to lose their identity as Minang people.

c) Empathy

Learning the ethics of manners by Minang migrants in the city of Surabaya to their children about empathy must understand this proverb: "*Nan elok dek awak katuju dek urang; Lamak dek awak lamak dek urang; Sakik dek awak sakik dek urang*" (What is beautiful to me, so beautiful to people; Delicious to me, so good to people; Pain to me, and pain to people). By teaching these cultural values, the goal is that their children be more careful in their relationships, both in terms of speech, behavior, and actions, not to offend others.

d) Independent

According to the Minang culture, every boy who has a teenager must start learning to live independently. That's why they have to migrate, get out of the village. The philosophy of the Minang culture that teaches being able to live independently is the proverb "*Karantau madang di hulu, Babuah babungo balun; Marantau Bujang dahulu, Di rumah baguno balun*". Meaning: "to go back and forth in the upstream, bear fruit with flowering yet, wander the bachelor first, at home is useful yet".

In the development of a highly competitive society, independence into social capital is very important for everyone to survive. Hanging life to others, not a smart solution can even be said to be unproductive. Sooner or later, it will be eroded by increasingly sharp competition.

e) Never give up.

Two proverbs that are the grip of the life of Minang migrants in Surabaya, namely 1) *Baraja ka nan manang, mancontoh ka nan sudah*; and 2) *Takuruang nak dilua, taimpik nak diateh*. The meaning of these two proverbs means never giving up. Since childhood, Minang people have been lined up and educated to be strong people, enduring all obstacles in life.

The first proverb teaches, when wandering experiences obstacles or failures, they must learn from people who have succeeded in how to achieve success. It is also important to follow the example of people who have experienced the same failure. They must learn why people also fail and learn how to overcome those failures. The second proverb, means that despite having problems, Minang people must try to overcome them then rise again. With an unyielding spirit, Minang nomads can survive wherever they are.

f) Functions and roles according to ability.

Minang people must understand the functions and roles according to their abilities and duties. Mustansyir and Munir (2009: 170) who cite from (Navis, 1986: 59), state that the Minangkabau community is also known as a group of people who imitate the harmony of the natural legal system. That is, they can be likened to all-natural elements with different levels and roles. These elements are interconnected, but not mutually binding, collide with each other, but do not eliminate each other, and group together but, do not merge with each other.

This cultural value is revealed in the proverb which means "*Yang buta penghembus lesung, yang pekak pelepas bedil, yang lumpuh penghuni rumah, yang kuat pemikul beban, yang bodoh untuk disuruh-suruh, dan yang pintar lawan berunding* (the dimmer of the dimple, the screeching, the paraplegic of the householder, the strong bearer, the ignorant to be told, and the smart opponent to negotiate). The meaning of this proverb is Minang culture assume that everyone has functions and roles according to their abilities and duties (Munir, 2018: 99).

As migrants, parents consider their children to be provided with ethics that everyone has a function and role in accordance with their abilities and duties. This, according to the informants, is important so that their children are not easily discouraged when they see other people succeed, while they fail. Or vice versa, quickly feel satisfied and then be arrogant when they get success that their friends don't get. This ethical value is considered as a filter for these attitudes and behaviors.

g) Make a clear plan.

As migraant, the informants were very aware that what was done today was a provision to welcome the future. To anticipate this, they must be able to make good, clear and measurable planning. "*Baukue jo bajangko, hiduik baraka, mati baiman*", meaning: in work must be based on clear planning, so that life becomes blessing, and when death remains faithful (to Allah SWT). The other meaning is that every stage in the life cycle must have a goal, that is, during life, it must always be faithful, so that if it dies it brings faith. Everything must be based on a clear plan of work, thinking of what is to be achieved in the future must be truly concrete not just wishful thinking, but must be achieved logically.

h) Respect for the older.

The ethics that must be instilled in Minang migrant children is respecting and respecting older people: "*nan tuo dihormati, nan ketek disayangi, samo gadang bawo bakawan, ibu jo bapak diutamokan*", meaning: the old are respected, the little ones are loved, the same great for friends, mother and father preferred).

All informants consider this ethics to be very important, especially because they are migrants who live in harmony with other cultures. Minang's cultural values are very strict in regulating relationships or kinship relations based on age categorization. Although this is not explicitly reflected in the use of language as in Javanese, it is reflected in the designations used.

In accordance with rules that apply culturally, a *kamanakan* must respect and obey his uncle, compared to his biological father. own. In the Minang culture, the child is in the lap, the *kamanakan* is buried. That is, a *mamak* must be responsible for the life of *kamanakan*, therefore the *kamanakan* must obey, obey, and respect the *mamak* rather than his parents (his father) himself.

At the core of all that, the attitude and behavior of a younger child must respect older people. This ethic of manners must be obeyed by all Minang people, including the children of the nomads who are now domiciled in the city of Surabaya.

i) Based on religious values.

Minang people are very obedient to their religious beliefs (Islam). All attitudes and behavior must be guided by customs and customs must be based on *syarak*, and *syarak* must be guided by the Book of Allah ("*Adat basandi syarak, syarak basandi kitabullah*").

The process of obedience of Minang people to Islamic rules has begun since the children were still young. They have to go to *surau* to recite (study Islam). Boys must stay in the sea until they reach adulthood as a matrilineal kinship system. That is why, every action and behavior of Minang people everywhere is still guided by the values of Islamic rules.

Minang migrants firmly admit that they have never neglected their obligations as Muslims. Irham, one of the informants explained that when he arrived at the agency Minang people were always looking for a mosque as a temporary stopover place, until they got a better shelter. This proves that the Minang people are always close to the mosque as a place to carry out their religious services (Islam).

V. Conclusion

1. Strategy for the pattern of care and education for children is carried out by Minang migrants in the city of Surabaya. Because of locality and geographical constraints. Nevertheless, the cultural values in the matrilineal kinship system that provide the role, function, and responsibility of the *mamak* to the *kamanakan* are still considered, not completely eliminated.

2. Practicing Minang Cultural Values related to the Principles of Ethnopedagogy have found at least nine cultural values that need to be considered and considered, namely:

- a. The importance of maintaining and maintaining Regional Language (Local Language) consistently. Thus, all the substantive meanings of the philosophy of Minang culture can be better understood and avoid misunderstanding.
- b. Values that teach tolerant, non-exclusive, and unselfish attitudes and behaviors that are substantively reflected in the cultural philosophy “*dima bumi dipijak, disitu langit dijunjuang*”.
- c. Value that teaches attitude and tolerant behavior as contained in the proverb “*Nan elok dek awak katuju dek urang; Lamak dek awak lamak dek urang; Sakik dek awak sakik dek urang*”.
- d. Values that teach independent attitudes and behavior. This is reflected in the saying “*Karatau madang di hulu, Babuah babungo balun; Marantau Bujang dahulu, Di rumah baguno balun*”.
- e. Values that teach unyielding attitudes and behavior. “*Baraja ka na manang, mancontoh ka nan sudah*”; dan “*Takuruang nak dilua, taimpik nak diateh*”.
- f. Values that teach attitudes and behaviors that each person has a function and role in accordance with their respective abilities. “*Yang buta penghembus lesung, yang pekak pelepas bedil, yang lumpuh penghuni rumah, yang kuat pemikul beban, yang bodoh untuk disuruh-suruh, dan yang pintar lawan berunding.*”
- g. Values that teach attitude and behavior must be able to make clear plans and measurable. “*Hidui baraka, baukue jo bajangko*”.
- h. Values that teach attitudes and behaviors respecting and respecting older people. “*Nan tuo dihormati, nan ketek disayangi, samo gadang bawo bakawan, ibu jo bapak diutamakan.*”
- i. Values that teach attitude and behavior are always based on religious values. “*Adat basandi syarak, syarak basandi kitabullah*”

V. Recommendation

Because local wisdom-based education (ethnopedagogy) is a process of enculturation of cultural values that become a foundation in a way of character that must be carried out in an ongoing process. The realization is done through education in the household environment, in the community, and in schooling (Sunaria, 2016: 53), so it is very important to recommend the nine Minangkabau cultural values included as part of the ethnopedagogic material in a way adapted to local cultural values *

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In Criminal Law Formulation Policy Management of Corruption Criminal in Indonesia

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DOI: 10.29322/IJSRP.9.08.2019.p9277
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9277>

Abstract: Indonesia as a sovereign state, has the ideals of creating general welfare as the primary basis for any policy makers, including legislative policy to constantly seek to improve people's lives. This is a constitutional right of every citizen, however, the desired goals rather late diterjal corruption that become mental illness menghempit Indonesian society. And these days continues to grow very rapidly, to damage the joints of the nation. Corruptions are not only detrimental to the finances or the economy of the country, but also damage the economy of the people, as well as being a threat to national and international stability. Therein required for the formulation of policies specifically in the field of law to tackle criminal crimes occurring in the present. On this condition, this study focused on two main points: how the policy formulation of the law against the rules of criminal law on corruption issues as stipulated in the legislation sdang current and pembaharuanya the legal system in force in the future.

The study on this issue using normative juridical approach, with the conceived law as the rule of the norm and the basis for human behavior, and the main source is a matter of legislation in force, because the life when viewed from the juridical, sociological and normative for the prevention of corruption in Indonesia, there are still weaknesses side. This study is required in order to reform the existing legal system in order to suppress criminal acts that could harm the state. The element of "harming the state". Implies a state's rights protected by the state in which all citizens are in it, the conception of thought is directed to harmonize rules of criminal criminalize corruptions both the Criminal Code as a primary source and rule of law that regulates the crime of corruptions , It is considered necessary for the improvement of our existing system for the life of the upcoming legal institutions.

Keywords: policy formulation, for the Prevention, corruption

I. INTRODUCTION

The establishment of an Indonesian state with a noble purpose, namely to encourage the creation of public welfare in the umbrella of the Unitary State of the Republic of Indonesia based on Pancasila. The objectives and ideals are reflected in the opening of the 1945 Constitution of the Unitary State of the Republic of Indonesia in the fourth paragraph (four) mentioned, then than that to form an Indonesian State Government that protects the entire Indonesian nation and all of Indonesia's bloodshed and to promote public welfare, educate the nation's life and participate in carrying out world order based on freedom, eternal peace and social justice, Welfare for all people is the main foundation for every policy maker, including legislative policy being its main task. The aim is to improve the standard of living of the people, which is basically a constitutional right of every Indonesian citizen. The welfare of the people of Indonesia today, is merely a dream, without being accompanied by real efforts by state administrators in carrying out the mandate of the constitution. One of the concrete actions is by formulating a good legislation, aimed at protecting the entire nation and spilling blood from all abuses including arbitrariness of people's economic rights.

Protection of all nations is an absolute thing, but followed by a good foundation and legal framework, then the applicable law is absolutely realized, not only with the words "protecting the whole nation and spilling blood" if it turns out that there is still suffering felt by the people in the form of imbalances in economic rights and reflecting the inhumanity of all the people of Indonesia. This condition of disability is created by a system of government that is not socially just for all the people of Indonesia, because it still allows for the existence of government practices in which power is exercised arbitrarily and does not take sides with the people. It is necessary to elaborate in more legal detail, so that the constitutional obligations are truly carried out properly, by creating government practices that are open, transparent and always responsible for the interests of the community at large, which is the real prosperity for the wider community based on the principles of social justice based on the Almighty Godhead. Thus protecting all of the Indonesian people and all of Indonesia's bloodshed can also mean hard and real efforts for the liberation of all the Indonesian people from real suffering. To realize these noble ideals, what is needed is a good legal system for the eradication of criminal acts of the corruption that manifests as the welfare of all Indonesian people, for a renewed legal system, a guideline for the Implementation of a Clean and Corruption Free Country, Collusion and Nepotism as desired in Law Number 28 of 1999.

In the law contains the principles or principles of legal certainty, the Order of State Administration, Public Interest, Openness, Proportionality, Professionalism, and Accountability, as described in the explanation of Article 3 as follows: (1) Principle of legal certainty, namely the principle a legal state that prioritizes the basis of legislation, propriety and fairness in every policy of the State Administration; (2) The Principle of Orderly State Administration, namely the principle that becomes the basis of order, harmony and balance in the control of State Administration; (3) Principles of Public Interest, namely principles that prioritize public welfare in an aspirational, accommodative and selective manner; (4) Principle of Openness, namely the principle that opens itself to the right of the community to obtain correct, honest and non-discriminatory information about the administration of the state while taking into account the protection of personal rights, groups and state secrets; (5) Principle of Proportionality, namely the principle that prioritizes the balance between the rights and obligations of the State Administrator; (6) Principles of Professionalism, namely principles that prioritize expertise based on a code of ethics and the provisions of applicable laws and regulations; (7) Accountability Principle, which is the principle which determines that every activity and end result of the activities of the State Administrator must be accountable to the public or the people as the highest holder of state sovereignty in accordance with the applicable legislation.

Guidelines regarding the Implementation of a Clean and Corruption-Free Country Collusion Nepotism is important and very necessary to avoid the practices of Collusion, Corruption and Nepotism not only involving officials but also their families and cronies, which if left unchecked, the Indonesian people will be in a very disadvantaged position. According to Marzuki Darusman, the spread of Corruption, Collusion and Nepotism has become so widespread that it can be said to be a corrupt radical. The practices of Corruption, Collusion and Nepotism itself are the provision of facilities or preferential treatment by government officials / State-Owned Enterprises / Regionally-Owned Enterprises to an economic unit / legal entity owned by related officials, relatives or cronies. So if these practices remain allowed, the people as the owners of state sovereignty do not get their constitutional rights, namely the right to justice and prosperity. To better guarantee the implementation of clean and free corruption, collusion and nepotism, the Law Number 31 of 1999 was established as updated by Law Number 20 Year 2001 concerning the Eradication of Corruption Crime, in lieu of Law number 3 of 1971.

The birth of this law is expected to accelerate the growth of people's welfare, with a response to the evil nature contained in corruption. Corruption is an act that can not only harm the country's finances but also can cause losses to the people's economy. Barda Nawawi Arief argues that corruption is a very despicable act, damned and highly despised by most people; not only by the people and nation of Indonesia but also by the peoples of the nations of the world. Therefore, it should be, as a nation that has the spirit to create prosperity equally and fairly able to avoid any form of corruption. Simple and unconscious forms of corruption often carried out by certain people are expected to be a common enemy that must be suppressed and eliminated from the surface of Indonesia. The forms of corruption intended by Syed Hussein Alatas as quoted by Nyoman Serikat Putra Jaya have divided them into 7 types of corruption, namely:

1. Transactive corruption (transactive corruption). Here shows the reciprocal agreement between the giver and the recipient for the benefit of both parties and actively pursues the benefits of both;
2. Extortive corruption is a type of corruption where the giver is forced to bribe to prevent losses that are threatening him, his interests, or the people and things he values;
3. Investment corruption is the behavior of victims of corruption with extortion. Corruption is in the framework of self-defense, such as the provision of goods or services without direct linkages with certain benefits, in addition to the benefits imagined to be obtained in the future;
4. Nepotistic corruption is the unauthorized appointment of friends or relatives to hold positions in government, or actions that give treatment that prioritize in the form of money or other forms, to them, in contravention of the norms and regulations apply;
5. Defensive corruption here the giver is innocent but the recipient is guilty. For example: a businessman who cruelly wants someone's property, does not sinfully give to the ruler a portion of the assets to save the rest of his assets;
6. Autogenic corruption is a form of corruption that does not involve other people and the perpetrators are only alone;
7. Supportive corruption here does not directly involve money or other forms of compensation. The actions taken are to protect and strengthen existing corruption.

These forms of corruption, especially in the form of bribery, are a very acute disease for the Indonesian people, because almost every bribery of public service institutions has become commonplace, which in the end there are difficulties in detecting corruption, and prevention is also increasingly difficult, and corruption continues to grow, spreading in every aspect of life. It should be noted and pondered what Habib-ur-Rahman Khan said that "the modern world is fully aware of this acute problem.

II. RESEARCH METHODS

The method used in this study is empirical juridical research with the nature of descriptive research that uses primary and secondary data sources with library research techniques using primary legal materials, secondary legal materials and tertiary legal materials. Primary legal material is legal material whose contents are related to government regulations or other institutions that have authority. Secondary legal sources are materials in the form of books and other printed materials, as well as software, which are the needs of this research.

III. RESULTS AND DISCUSSION

A. legislative policy for the Eradication of Corruption Crimes

The development of corruption in Indonesia is still high, while the eradication is still very slow, Romli Atmasasmita stated that corruption is also related to power because with that power the authorities can abuse their power for their personal, family and crony interests. Agreeing with Romli Atmasasmita, Nyoman Serikat Putra Jaya explained that it must be acknowledged, currently Indonesia in accordance with the results of research conducted by Transparency International and Political and Economic Risk Consultancy based in Hong Kong, always occupies a vulnerable position as far as corruption is concerned. It is recognized that corruption in Indonesia has been systemic and endemic so that it not only harms state finances, but also violates the social and economic rights of the community at large. Further said by Nyoman Serikat Putra Jaya, corruption in Indonesia has seeped into all aspects of life, to all sectors and all levels, both at the central and regional levels, the cause of which is that corruption has been allowed to take place decades ago without adequate action taken from legal eye. So it seems clear, both expert opinions directly or indirectly that corruption cannot indeed be released from power. Robert Klitgaard by basing Webster's Third New International Dictionary states that corruption is an invitation (from a political official) with undue considerations (such as bribery) to commit violations.

Evi Hartanti emphasized that, corruption is a symptom in which officials, state agencies misuse authority with bribery, forgery, and other irregularities. Here is illustrated the opportunity and closeness of corruption with a position in the government. Because corruption is very much related to power, corruption can cause a very detrimental effect on the people. Robert Klitgaard details a number of things caused by corruption including:

1. Bribery causes funds for the construction of low-cost housing to fall into the hands of the unauthorized.
2. The Commission for those responsible for the procurement of goods and services for the regional government means that the contract falls into the hands of a company that does not meet the requirements.
3. The police often because they have been bribed pretend not to know if there is a crime that should be investigated.
4. Local government employees use community facilities for personal gain.
5. To obtain permits and licenses, residents must give facilitation payments to officers and sometimes even have to give bribes so that the permit or license can be issued.
6. By giving bribes, citizens can do whatever they want to violate the rules of work safety, health regulations, or other regulations that pose a danger to the rest of the community.
7. Local government services are provided only if residents have paid an additional amount of money outside the official fee.
8. Decisions regarding land use in cities are often influenced by corruption.
9. Tax officers extort citizens, or more conspire with taxpayers, provide tax breaks to taxpayers in exchange for bribes.

This condition seems to be very in line with the spirit of lawmaking, namely through legislative policy by stipulating law number 31 of 1999 as amended by law number 20 of 2001 concerning the Eradication of Criminal Acts of Corruption in which materiel. This is as formulated in a general explanation which confirms that in order to reach various modus operandi of state finance deviations or increasingly sophisticated and complex state economies, the criminal acts regulated in this law are formulated in such a way that includes actions that enrich themselves or other people or a corporation "against the law" in formal and material terms. With this formulation, understanding against the law in criminal acts of corruption can also include despicable acts which, according to the feeling of justice, must be prosecuted. In addition to basing on unlawful nature, law Number 31 of 1999 as amended by Law Number 20 of 2001 concerning Corruption Crime also formulates acts of corruption as Formil offenses, namely offenses whose formulation is emphasized on prohibited acts. The formulation of the formal offense can be seen in the word "can" before the phrase harms state finances or the economy of the country, this shows that the existence of a criminal act of corruption is sufficient to fulfill the elements of action which are formulated not with the emergence of consequences. So corruption does not always wait for an effect, but as long as there is a potential for the state to be harmed by actions that are against the law, it can be said that there is a criminal act of corruption.

The affirmation of the formal offense is also reflected in Article 4, which affirms the return of state financial losses or the state's economy does not eliminate the criminal perpetrators of criminal acts as referred to in Article 2 and Article 3. However, the awareness of the importance of violating the material law must fail through the Constitutional Court ruling Number 003 / PUU / 2006, which states that the unlawful nature of the material contradicts Article 28D paragraph (1) of the 1945 Constitution of the Republic of Indonesia, so that the material against the material law is considered not to have binding legal force. In addition to the issue of the Constitutional Court's ruling, the formulation of criminal acts of corruption is still partial and spread in several laws, while the imposition of sanctions such as the death penalty is only aimed at certain circumstances. With the aforementioned problems, it is necessary to consider the formulation of criminal law policies in the context of overcoming corruption.

B. The Need for Penal Policy to Prevent Corruption Crime

As a crime that endangers social life, corruption is always associated with the culture or social conditions of the community. According to Robert Klitgaard, the main cause of corruption is the giving of gifts which are already customs. Along with this opinion, Umi Kulsum argues that the crime of corruption in Indonesia is an act that has taken root in various aspects of human life, so that it seems as if it is considered a culture. The term prize which later developed into bribery (as if it were cultured) is a very dangerous thing for further corruption development, so then there is an adage "if a person is suspected of corruption and then examined by law enforcement, the law enforcer has started corruption when the examination is carried out, because on the inspection there was a bribe against the examiner.

This is suspected as a culture that grows due to the mental state officials who are not good. The condition is certainly not without reason, because according to Koentjoroningrat, one of the mental characteristics of Indonesian people is the attitude to achieve goals as soon as possible, without much willingness to try step by one step It is this mental attitude which then encourages state administrators or precisely law enforcement to carry out non-commendable actions, namely bribery. This definition shows that corruption as an evil behavior is not a culture, it can even be said that corruption is essentially an anti-cultural act (anti good habits that should be behavior that can be inherited from generation to generation). As a crime, in essence corruption is produced from a learning process, according to Sutherland, through his famous theory, namely the theory of differential association which confirms that a crime (including corruption or in the language White collar Crime) is a crime obtained by studying, with propositions:

- a. Crime behavior is negatively learned behavior which means that this behavior is not inherited).
- b. Crime behavior is learned in interaction with others in a communication process. communication can mainly be verbal or use sign language).
- c. The most important part of the process of studying this crime behavior occurs in intimate personal groups. Negatively, this means that communication is not personal, relatively does not have an important role in terms of the occurrence of crime).
- d. If crime behavior is learned, what is learned includes (a) the technique of committing a crime, (b) certain motives, impulses, justification reasons including attitudes).
- e. The motives and encouragement are learned through the definitions of legal regulations. In a society, sometimes someone is surrounded by people who simultaneously see what is regulated in a legal regulation as something that needs to be considered and obeyed, but sometimes he is surrounded by people who see the rule of law as something that gives an opportunity to commit crime).
- f. a person becomes a delinquent because of access to thought patterns that see the rule of law more as an opportunity for crime to be committed than those who see the law as something that must be considered and obeyed).
- g. Differential Association varies in terms of frequency, time period, priority, and incensity).
- h. the process of studying the behavior of crimes obtained through relations with patterns of crime and anti-crime involving all the mechanisms that normally occur in each learning process in general).
- i. Meanwhile crime behavior is a statement of general needs and values, but this is not explained by the general needs and values, because non-crime behavior is also a statement of the same needs and values)

Further developments, corruption is not only a crime that can be committed by the White collar Crime but also by professionals, which according to Muladi, includes accountants, engineers, legal counsel, doctors and so on and this criminal category always involves his expertise in action, both in form of intentional, negligence, dolus eventualis (a kind of recklessness), or in the form of disciplinary violations. Furthermore, according to him, this crime is very interesting because several dimensions of thought are as follows: (1) perpetrators of crime are members of legitimate professional organizations. (2) by other members of the organization, their actions are considered beyond the pale and unacceptable forms of behavior. (3) however, their actions are often carried out conspiring with other professions. (4) perpetrators always consider themselves (self concepts) not criminals, because they carry out services to legitimate and commendable public interests. (5) crimes committed are usually difficult to detect or if prosecution can be detected it requires proof that is not easy in addition to its nature as an ambulance case. (6) often members of other professional organizations in certain cases are ambivalent.

To ward off corruption crimes as a crime that is dangerous for social life, a culture change is needed, however, cultural change is a very big change and not an easy job, even according to Satjipto Rahardjo these changes require careful study and research. These changes can also be made through a restructuring of the criminal law system which regulates corruption, which is expected to be able to influence the attitude of the Indonesian people without exception.

Changes in culture through structuring the law by Soerjono Soekanto are referred to as social engineering or social planing, namely ways to influence the community with a regular and planned system. Social engineering is closely related to the function of law, according to D. Schaffmeister that the law has a creation function if the legal norms deviate from social norms and thus humans will behave differently than before. To create social change through structuring the legal system, good social engineering is needed, where the law to be used must truly reflect protection against the public interest. As an illustration, this is why efforts are needed through reasoning policy. According to Marc Ancel, reasoning policy is a science that has a practical purpose to enable positive legal regulations to be better formulated and to provide guidance not only to legislators, but also to courts that apply laws and also to administrators or implementers of decisions. court.

This definition is very identical with the meaning of "straf rechts politiek" defined by A. Mulder as a policy line to determine: a). how far the applicable criminal provisions need to be changed or renewed; b). what can be done to prevent criminal acts. In line with the opinion of A. Mulder, Sudarto formulated the politics of law as an attempt to realize the rules that are good in accordance with the situation and situation at a time. Barda Nawawi Arief also emphasized that, studying criminal law policies basically studies the problem of how best criminal law should be created, structured and used to regulate / control human behavior, especially to combat crime in order to protect and prosper society.

In connection with changes or legal reforms aimed at the welfare of the community, it is inseparable from efforts to criminalize, namely the process of determining a person's actions as an act that can be punished. This process ends with the formation of a law in which the act is threatened with a sanction in the form of criminal. According to Sudarto, the criminalization must have criteria:

- a. the use of criminal law must pay attention to the objectives of national development, namely to create a just and materially and spiritually prosperous just society based on Pancasila; In connection with this, (the use of) criminal law aims to combat crime and impose a counter-action on the remedy itself, for the welfare and protection of the community
- b. actions that are attempted to be prevented or dealt with with criminal law must be "undesirable actions", namely actions that bring harm (material and or spiritual) to citizens;
- c. the use of criminal law must also take into account the principle of "costs and results";
- d. the use of criminal law must also pay attention to the capacity and capability of the work force of law enforcement agencies, namely that there should be no oversight of duties.

In line with what Sudarto said, according to Bassiouni, the decision to criminalize and decriminalize must be based on certain policy factors that consider various factors, including: 1) the balance of the facilities used in relation to the results to be achieved; 2) cost analysis of the results obtained in conjunction with the objectives sought; 3) assessment or assessment of the objectives sought in relation to other priorities in allocating human resources; 4) the social influence of criminalization and decriminalization related to (in terms of) secondary effects.

Thus, the ultimate goal of legal renewal is to tackle crime and public welfare, for which the placement of public interests or community interests must be a top priority, with reasoning policy there will be "legal smoothing" which according to Scholten legal refinement aims to use provisions that are public more precisely and fairly. Moreover, the issue of corruption greatly affects the economic interests of the community, so justice is something that must be realized in the interests of the public or the public. In line with this, Baharudin Lopa states that preventing collusion and corruption is not so difficult, if we consciously place public interest above personal and group interests.

Good legal arrangement through reasoning policy or legal politics by taking into account the criteria for criminalizing as described above, it is hoped that social inequality will no longer occur. According to Indriyanto Seno Adji, that the quality and typology of crime is increasing in a country due to economic development and development Of course this increase in development is also a development that is not well planned so as to cause social inequality. These social inequalities then give birth to social injustices felt by society in general and ultimately give birth to crime. In order for social order to run in accordance with the foundation of social justice, it is necessary to have changes to the formulation of criminal acts concerning corruption as stipulated in Law No. 31 of 1999 jo. Law 20 of 2001 insofar as it meets the needs of the community and aims to create public welfare or public welfare. In essence, public welfare will be easily achieved if corrupt behaviors can be prevented through better legal arrangements.

C. Policy on Criminal Law Formulation in the current Corruption Crime Response

1. Formulation of criminal acts of corruption and its scope based on the Indonesian Corruption Eradication Act

The policy on the formulation of criminal law for efforts to tackle the current criminal acts of corruption has actually experienced various changes in which the changes were made in view of the rapid development of corruption. In fact, according to some criminal or criminology experts or lawyers as previously explained, corruption is described as a disease which in its development not only damages or harms the country's finances and economy, but has exceeded those limits which are detrimental to the people's economy.

The development of corruption, especially in the scope of abuse of power and bribery, has mastered every aspect of people's lives, which in the end each society is faced with difficulties when dealing with state officials who should be able to serve every need of the community without having to pay to these officials. Such conditions then lead to legal policies regarding the corruption of developments in the direction of criminalization and decriminalization. Changes in criminal law policy for the prevention of criminal acts of corruption, thus developing rapidly in accordance with the needs of the community aimed at improving social welfare, are illustrated in the consideration of several laws regarding the eradication of criminal acts of corruption, for example as follows:

1. Consideration of Law Number 3 of 1971: a) that acts of corruption are very detrimental to the financial / economic state and hamper national development; b) that Law No. 24 Prp. In 1960 concerning Investigation, Prosecution and Corruption Criminal Investigations related to the development of the community was insufficient to be able to achieve the expected results, and therefore the law needed to be replaced.
2. Consideration of Law Number 31 of 1999: a) that criminal acts of corruption are very detrimental to the State's or the country's economy and hamper national development, so that it must be eradicated in order to realize a just and prosperous society based on Pancasila and the 1945 Constitution; b) that the consequences of criminal acts of corruption that have occurred so far in addition to harming the state's finances or the country's economy, also hamper the growth and sustainability of national development that demands high efficiency; c) that Law Number 3 of 1971 concerning the Eradication of Corruption has no longer been in line with the development of legal needs in the community, because it needs to be replaced with the new Law on the Eradication of Corruption, so that it is expected to be more effective in preventing and eradicating criminal acts corruption.
3. Consider Law No. 20 of 2001: a) that corruption that has been widespread has not only been detrimental to state finances, but has also been a violation of the social and economic rights of the community at large, resulting in corruption it needs to be classified as a crime whose eradication must be done extraordinarily; b) that in order to better guarantee legal certainty, avoid the diversity of legal interpretations and provide protection for the social and economic rights of the community, as well as fair treatment in combating corruption, it is necessary to amend Law Number 31 of 1999 concerning Eradication of Criminal Acts Corruption; c) that based on the considerations as referred to in letter a and letter b, it is necessary to establish a Law concerning Amendments to Law Number 31 of 1999 concerning Eradication of Corruption Crimes. The consideration of the need for the formulation of criminal acts of corruption, as expressed in the considerations in the above legislation, shows the existence of concerns over criminal acts of corruption that have harmed state finances and hampered national development. then changes in the formulated corruption can be seen from the formulation of criminal acts of corruption in Article 1 paragraph (1)
4. Law Number 3 of 1971 as follows: a) the person who is against the law commits an act of enriching himself or another person, or an Agency, which directly or indirectly harms the state's finance and or the country's economy, or is known or it should be suspected by him that the act is detrimental to the state's finances or the country's economy; b) whoever has the purpose of benefiting himself or another person or an Agency, who misuses the authority, opportunity or means thereof because of his position or position, which can directly or indirectly be detrimental to the country's finances or the country's economy.

The formulation of corruption in Law No. 3 of 1971 laid corruption as material offenses. The consequence of this formulation is that corruption must be proven in advance whether it has harmed the country's finances or not. The formulation with this model resulted in the ineffectiveness of the handling of criminal acts of corruption, especially those carried out by state officials. The ineffectiveness of eradicating corruption was based on the formulation of material offenses, then gave birth to a new corruption eradication policy by formulating corruption as a formal offense. The principle of forming a law for the eradication of criminal acts of corruption also seems to be encouraged by the movement of criminal acts of corruption which not only harm the country's finances or economy but have damaged social rights and economic rights of the people. this condition then changed the criminal law policy, in which the criminal acts of corruption which were originally formulated based on material offenses were changed to formal offenses. This can be seen in Article 2 and Article 3 of Law Number 31 of 1999 jo. Law Number 20 of 2001 concerning the Eradication of Corruption Crime acts as follows: Article 2 paragraph (1): Every person who violently violates an act enriches himself or another person or a corporation that can harm the state's finance or the country's economy. Article 3 Any person who aims to benefit himself or another person or a corporation, misuses the authority, opportunity or means available to him because of a position or position that can harm the state's finance or the country's economy.

Both formulations place corruption as formal offenses, where acts of corruption remain punished even if there is no loss to the country's finances or economy. This is in accordance with the explanation of Article 2 paragraph (1) of Law No. 31 of 1999 that the word "can" before the phrase "detrimental to the financial and / or economic state shows that criminal acts of corruption are formal offenses, namely the existence of criminal acts of corruption sufficiently fulfilled the elements of action which have been formulated not with the emergence of consequences. Corruption acts as formulated in Law Number 31 Year 1999 jo, Law Number 20 Year 2001, there are several scope of corruption, and according to Hendarman Supandji the scope is divided into 5 (five) groups, namely: 1). offense relating to losses of state finances. 2). Delegation groups related to bribery and gratuity. 3) Delegation groups related to embezzlement in office, 4). Delegation groups associated with extortion in office, 5). Delegation groups related to chartering, suppliers and partners . In detail, these groups can be seen in Law Number 31 of 1999 in conjunction with Law Number 20 of 2001 of 2001 concerning Eradication of Corruption Crime, as follows:

1. Groups of offenses in the event of loss of State finances, This group is as confirmed in Articles 2 and 3 (as described above).
2. Delegation groups related to bribery and gratuity.

Included in this group are as outlined in: Article 5 paragraph (1) letter a) give or promising something to civil servants or state administrators with the intention that the civil servants or organizers of the state do or do not do something in their positions, contrary to their obligations, b) give something to public servants or state administrators because or relating to something that is contrary to obligations, carried out or not done in his position.

Based on Article 5 (paragraph 2) For civil servants or state administrators who receive gifts or promises as referred to in paragraph (1) letter a or letter b, Article 6 paragraph (1); a), giving or promising something to the judge with the intention of influencing the case decision handed over to him to be tried; or b). give or promise something to someone who, according to the provisions of legislation, is determined to be an advocate to attend a court hearing with the intention of influencing the advice or opinion to be given in connection with a case submitted to the court for trial. Article 6 paragraph (2) For the judge who receives the gift or promise as referred to in paragraph (1) letter a or the lawyer who receives the gift or promise as referred to in paragraph (1) letter b, shall be punished with the same criminal offense as referred to in paragraph (1)

Article 11 A state employee or state official who receives a gift or promise even though it is known or reasonably suspected, that the gift or promise is given because of the power or authority related to his position, or in the mind of the person giving the gift or promise is related to his position. Article 12 civil servants or state administrators who receive gifts or promises, even though it is known or reasonably suspected that these gifts or promises are given to mobilize to do or not do something in their position, which is contrary to their obligations; a) a civil servant or state administrator who receives a prize even though it is known or reasonably suspected that the gift is given as a result or caused by having done or did not do something in his position that is contrary to his obligations; b) a judge who receives a gift or promise, even though it is known or reasonably suspected that the gift or promise is given to influence the case decision handed over to him for trial; c) someone who according to the provisions of the legislation is determined to be an advocate to attend a court hearing, receive a gift or promise, even though it is known or reasonably suspected that the gift or promise to influence the advice or opinion to be given, in connection with the case submitted to the court for trial.

Article 12 B Every gratuity to a civil servant or state organizer is considered as giving a bribe, if it relates to his position and which is contrary to his obligations or duties. Article 13 Every person who gives gifts or promises to civil servants bearing in mind the power or authority attached to his position or position, or the giver of the gift or promise is deemed to be attached to the position or position.

3. The offense group associated with embezzlement in office

The offense in the scope of embezzlement in office is formulated in the following articles: Article 8 civil servants or persons other than civil servants who are assigned to run a public office continuously or for a while, deliberately embezzling money or securities held for their position, or allowing money or securities are taken or darkened by other people, or help in carrying out these actions. Article 9 Civil servants or persons other than civil servants who are given the task of running a public office continuously or for a while, deliberately falsifying books or lists specifically for administrative examinations. Article 10, civil servants or persons other than civil servants who are given the task of running a public office continuously or for a while, intentionally: a) embezzling, destroying, damaging or making usable goods, deeds, letters, or lists that are used to convince or prove before an authorized official, who is controlled because of his position; or b) allowing other people to eliminate, destroy, damage or make use of these items, deeds, letters or lists; or, c) help other people eliminate, destroy, damage or make use of these items, deeds, letters or lists.

4. Delict groups related to acts of extortion in office

Extortion in the position as referred to in the law on corruption, is formulated in the following article: Article 12, a) Civil servants or state administrators with the intention of benefiting themselves or others against the law, or by abusing their power forcing someone to give something, pay, or accept payment by piece, or to do something for himself; b) civil servants or state administrators who at the time carry out their duties, request, receive, or deduct payments to other civil servants or state administrators or to the general cash, as if the public servants or other state administrators or the general cash have debts to them, even though it is known that this is not a debt; c) civil servants or state administrators who, when carrying out their duties, ask for or accept jobs, or hand over goods, as if they were a debt to themselves, even though it is known that this is not a debt;

5. Delict groups related to chartering, suppliers and partners

Regarding criminal acts of corruption relating to chartering, suppliers and partners, formulated in Article 7 and Article 12, which confirms that: Article 7, a). contractor, a building expert who at the time of building, or a building material seller who, at the time of submitting building materials, commits fraudulent acts that could endanger the security of people or goods, or the safety of the state in a state of war; b) every person in charge of supervising the construction or surrender of building materials, intentionally allows fraudulent acts as referred to in letter a; c) any person who at the time of delivering goods for the needs of the Indonesian National Army and / or the National Police of the Republic of Indonesia commits fraudulent acts that could endanger the safety of the state in a state of war; or d) everyone who is in charge of supervising the supply of goods for the Indonesian National Army and or the National Police of the Republic of Indonesia deliberately allows fraudulent acts as referred to in letter c. Article 7 paragraph (2) For people who receive the surrender of building materials or people who receive the delivery of goods for the Indonesian Armed Forces and or the National Police of the Republic of Indonesia and allow fraudulent acts as referred to in paragraph (1) letter a or c, be punished with criminal offenses the same as referred to in paragraph (1). Article 12 civil servants or state administrators who, at the time of carrying out their duties, have used state land on which they have the right to use, as if in accordance with laws and regulations, have disadvantaged the rightful person, even though he knows that the act is contrary to the laws and regulations; or a) civil servants or state administrators, directly or indirectly, deliberately participate in chartering, procurement, or leasing, which at the time of the act, for all or part of them is assigned to manage or supervise it. In more detail, Barda Nawawi Arief details the scope of the criminal acts of corruption as follows:

1. Law Number 3 of 1971: Article 1: (1) a), Whoever: is against the law; enrich yourself, others, or a body; which directly or indirectly harms the country's finances and or economy; or it is known or deserved to be suspected by him that the act is detrimental to the country's finances or economy. b) Whoever: for the purpose of benefiting themselves, others, or a body; misusing the authority, opportunity, or means available to him because of a position or position that directly or indirectly can be detrimental to the country's finances and or economy. c) Whoever: commits a crime in Article 209, 210, Article 387, 388, Article 415 up to article 420, Article 425 and Article 435 of the Penal Code; d) Whoever: gives a gift / promise; to Civil Servants in Article 2; keeping in mind the power or authority attached to his position or position, or the giver is deemed inherent in his position or position. e) Whoever: without reasonable reason; in the shortest possible time after receiving a gift or appointment; given to him as mentioned in Article 418, 419, and Article 420 of the Criminal Code; not report the gift or promise to the authorities. f) Anyone who conducts an experiment or agreement to commit a crime is in paragraph (1) a, b, c, d, e, f of this article.
2. Law Number 31 of 1999: Corruption Crime (Chapter II, Article 2 to Article 20); 1) Article 2 (derived from Article 1 sub-article 1a of Law Number 3 of 1971): Everyone: who is against law, committing acts enriching oneself, others or corporations, which can harm the country's finances or economy. 2) Article 3 (originating from Article 1 sub 1b of Law Number 3 of 1971): Everyone: for the purpose of benefiting himself, another person, or a corporation, misusing the authority, opportunity or means available to him because of his position or position, can harm the country's finances or economy. 3) Article 4 (new article): the return of financial or economic losses to the state does not eliminate the punishment of Article 2 and Article 3. 4) Article 5 (originating from Article 1 sub 1c of Law Number 3 of 1971 jo. Article 209 of the Criminal Code). 5) Article 6 (originating from Article 1 sub 1c of Law Number 3 of 1971 jo. Article 210 of the Criminal Code). 6) Article 7 (derived from Article 1 sub-section 1c of Law Number 3 of 1971 jo. Article 387 and Article 388 Criminal Code 7) Article 8 (derived from Article 1 sub 1c of Law Number 3 of 1971 jo. Article 415 of the Penal Code). 8) Article 9 (originating from Article 1 sub-section 1c of the Act Number 3 1971 jo. Article 416 of the Criminal Code). 9) Article 10 (originating from Article 1 sub 1c of Law Number 3 of 1971 jo. Article 417 of the Criminal Code). 10) Article 11 (derived from Article 1 sub 1c of Law Number 3 of 1971 jo. Article 418 of the Criminal Code). 11) Article 12 (derived from Article 1 sub-section 1c of Law Number 3 of 1971 jo. Article 419, Article 420, Article 423, Article, 425 and Article 435 of the Penal Code). 12) Article 13 (originating from Article 1 sub-section 1 of Law Number 3 of 1971): 13) Article 14 (new article): violation of the provisions of a law expressly declared as Corruption Crime, the provisions of this law apply (Act -Anct Number 31 of 1999). 14) Article 15 expansion of Article 1 sub 2 of Law Number 3 of 1971, namely not only "trial" and "bad agreement" but also "assistance is punished with the perpetrators of Corruption Crime. 15) Article 16 (new article): every person outside the territory of the Republic of Indonesia; who gives assistance, opportunities, facilities, or information for the occurrence of a Criminal Act
3. Law Number 20 Year 2001, Changing the formulation of Corruption Crimes in Article 5 up to Article 12 of Law Number 31 Year 1999 by not referring to the articles of the Criminal Code, but directly mentioning the elements of the offense concerned, Inserting / adding articles -new article into Law No. 31 of 1999: 1) Article 12 A (1) Criminal provisions in Article 5 to Article 12 do not apply to Corruption Crimes which are worth less than Rp 5,000,000.00 (five million rupiahs)) (2) Corruption Crime, which is worth less than Rp. 5,000,000.00 (five million rupiahs), shall be sentenced to a maximum of 3 (three) years of imprisonment and a fine of a maximum of Rp. 50,000,000 (fifty million rupiahs). 2) Article 12 B (gratuities) : (1) Gratification to a Civil Servant / State Operator is considered giving a bribe, if: related to his position, and contrary to his obligations / duties with the following provisions: a. the value is Rp. 10,000,000.00 (ten million rupiahs) or more where proof (as not a bribe) is with the recipient (defendant); b. the value is less than 10,000,000.00 (ten million rupiahs), then proof (as a bribe) in the public prosecutor.

The scope of corruption is quite extensive, as stipulated in Number 31 of 1999 jo. Law Number 20 of 2001, in its essence is quite good. However, the Law still has juridical problems in the formulation of criminal acts of corruption, where the problems make it difficult for the operation of the Criminal Code as the parent system in bridging the eradication of criminal acts of corruption. These problems include: 1). Law Number 31 Year 1999 jo Law Number 20 Year 2001 concerning Corruption Crime has not yet been formulated juridical boundaries or juridical understanding regarding criminal acts of corruption concerning conspiracy, while the evil consensus contained in the Criminal Code Article 88 is a term regulated in Chapter IX is impossible to operationalize considering Article 103 of the Criminal Code requires that the provisions in Chapters I to Chapter VIII apply to acts which are subject to criminal provisions under other laws. Likewise regarding the term "assistance" which is a juridical term, it has not been regulated in this law. 2). Law Number 31 Year 1999 jo Law Number 20 Year 2001 concerning Corruption Crime does not include offense qualifications whether as "violations" or "crimes" so that the Criminal Code cannot be operationalized against corruption in particular regarding trial offenses, because in the Criminal Code only trials against crimes that can be punished.

In addition to these juridical issues, according to Barda Nawawi Arief, in the Law the eradication of acts of corruption makes the crime of money laundering a crime of corruption. This assertion was conveyed at the National Seminar "to welcome the renewal and establishment of a law to eradicate corruption, collusion and nepotism", in cooperation with the Faculty of Law, General Sudirman University and Bappenas, in Baturaden, Purwokerto, January 30, 1999, when discussing plans to amend the Number Law. 3/1971 (which later became Law Number. 31/1999), and at the National Seminar on "Eradicating and Mitigating Corruption with the Reversed Proof System", Seblas Maret University Law School, Quality Hotel, Surakarta, July 10, 2001, while discussing the Draft Act Amendment to Act Number. 31/1999 (which later became No. 20/2001). According to him that: In the Number Law . 3/1971 and Law No. 31/1999 there are only two groups of corruption acts, namely: the TP-K group (Corruption Crime) and the TP-BDK group (Corruption Related Corruption). So there is no third group, which I call the term "Crime After Corruption" (abbreviated as "TP-SK"). In this third group it is proposed the inclusion of money laundering.

Based on the thoughts of Barda Nawawi Arief, corruption is not only in the case of acts or initial crimes, but also acts related to corruption and further actions, namely acts after corruption is committed, or the results of acts of corruption. Regarding the money laundering crime, it has been formally formulated in Article 2 of Act Number 25 of

2003 concerning Crime of Money Laundering, with the formulation as follows: The proceeds of a crime are Wealth Assets totaling Rp 500,000,000.00 (five hundred million rupiah) or more or equivalent value, which is obtained directly or indirectly from a crime: a. corruption; b. bribery; c. smuggling of goods; d. labor smuggling; e. immigrant smuggling; f. banking; g. narcotics; h. psychotropic; i. slave, female and child trade; j. illegal arms trade; k. kidnapping; l. terrorism; m. theft; n. referee

In the formulation, it is stated that assets totaling at least Rp. 500,000,000.00 (five hundred million rupiahs) or equivalent resulting from criminal acts of corruption and bribery (letter ad. B) as acts of money laundering. Corruption is essentially a form of financial crime. As an inter-crimes crime, money laundering will almost certainly be carried out or at least money laundering must be done immediately. Between corruption and bribery with money laundering there is a series of crimes, where corruption and bribery can be said as predicate offense while money laundering is a follow-up crime. Crimes and proceeds of these crimes can be categorized as a series of corruption that should be included in corruption.

Even further, UNCAC recommends that Money Laundering be included in the legislation of corruption, as reflected in the following Article 14 and Article 23: Article 14. Measures to Prevent Money Laundering, 1. Each State Party obligatory): (a) Establish a comprehensive internal regulation and supervision regime for banks and non-bank financial institutions, including individuals and legal entities that provide official or non-official services for remittances or value and, where appropriate, other bodies that are especially vulnerable to money laundering, within their authority, to detain and detect all forms of money laundering, which regime is obliged to emphasize the requirements for the customer and, as appropriate, identification of the recipient of the rights, document storage and reporting of suspicious transactions) (b) Without ignoring Article 46 of this Convention, ensuring that bodies are authorized g in the administrative, regulatory, law enforcement, and other fields aimed at eradicating money laundering (including, where appropriate under national law, judicial bodies) have the ability to cooperate and exchange any information at the national and international levels with conditions which is determined by its national law and, for that purpose, must consider the establishment of a financial intelligence unit that functions as a national center for the collection, analysis and dissemination of information about money laundering that may occur). 2. States Parties shall consider taking appropriate measures to detect and monitor the movement of cash and securities instruments that cross their borders, are subject to safeguards to ensure reasonable use of information and without blocking any legitimate capital movements. Such actions can include the requirement that individuals and business entities report large amounts of cross-border cash transfers and appropriate securities instruments). 3. States Parties shall consider carrying out reasonable and appropriate measures to require financial institutions, including money senders): (a) To include in forms for electronic transfers of funds and messages - related messages, careful and valuable information about their origin); (b) To store such information throughout the payment sequence; and (c) To apply high accuracy to the transfer of funds that do not include complete information about their origins). Article 23. Washing of the Results of Crime regulates:

1. Each State Party must take, in accordance with the basic principles of its national law, legislative and other measures deemed necessary to establish criminal offenses, if done intentionally: (a) Conversion or transfer of wealth, knowing that (i) the wealth is the proceeds of the crime, for the purpose of hiding or disguising the origin of unauthorized wealth or helping people who are involved in carrying out the original crime to avoid the legal consequences of their actions); (ii) Concealment or disguise of the nature, source, location, release, movement or actual ownership of or rights relating to wealth, knowing that the wealth is the proceeds of crime). (b. Based on the basic concept of the legal system: (i) the acquisition, ownership or use of wealth, knowing, at the time of receipt that the wealth is the proceeds of crime); (ii) Participating in, relating to or conspiracy to commit, attempts to commit and assist, conspire, facilitate and encourage the implementation of any crimes committed in accordance with this Article).
2. For the purpose of implementing or applying paragraph (1) of this Article): (a) Each State Party shall endeavor to apply paragraph (1) of this Article in the broadest sense of original crime); (b) Each State Party shall include as origin crime at least a comprehensive series of criminal offenses established in accordance with this Convention); (c) For the purposes of sub-paragraph b above, original crimes include crimes committed both inside and outside the jurisdiction of the State Party concerned. However, crimes committed outside the jurisdiction of a State are original crimes if the act constitutes a criminal offense based on the national law of the State where the action is carried out and is a criminal offense under the national law of the State Party implementing or implementing this Article when such action carried out there); (d) Each State Party must submit a copy of its law that applies this Article and subsequent changes to the law or an explanation thereof to the Secretary General of the United Nations); (e) If required by the basic principles of the national law of a State Party, it can be determined that the crimes referred to in paragraph (1) of this Article do not apply to people who committed an original crime).

The affirmation of the UNCAC Convention in articles 14 and 23 is a sign that criminal law policy related to criminal acts of money laundering will be more effective if it is included as a criminal act of corruption which is a comprehensive series of crimes (comprehensive range of criminal offenses). These include those who participate, conspiracy, trials, assistance, advocacy (Participation in, association with or conspiracy to commit, attempts to commit and proceed, abetting, facilitating and counseling the commission of any offenses).

D. Spread the formulation of criminal acts in various laws and regulations in Indonesia.

In addition to juridical issues as outlined above, there are also problems regarding the scope of corruption that is spread in other legislation outside of Law Number 31 Year 1999 jo. Law Number 20 Year 2001 concerning Eradication of Corruption Crime, namely:

1. Law Number 11 of 1980 concerning Bribery Crime The nature of criminal acts of corruption is bribery as stipulated in Law Number 11 of 1980, in this law it was formulated that: Article 2, whoever gives or promises something to someone with the intention of persuading so that the person does something or does not do something in his duty, which is contrary to his authority or obligations concerning the public interest. Article 3 Anyone who accepts something or promises, while he knows or deserves to be able to guess that the giving of something or an appointment is intended so that he does something or does not do something in his duty, which is contrary to his authority or obligation concerning public interest. After the enactment of Law Number 31 Year 1999 jo. Law Number 20 of 2001 concerning the eradication of acts of corruption, practically the law regarding criminal acts regarding bribery is not operationalized, because every bribery is always subject to sanctions as stipulated in the law on combating corruption. Seeing the effectiveness of this law should be revoked, so as not to create the impression of bribery as stipulated in Law No. 11 of 1980, is a criminalization that does not have the meaning of a real criminal act, or with other words of criminalization of bribery in law. the law is only a political need, not a legal arrangement as an answer to the legal needs of the community.
2. Law on banking.

The formulation of criminal acts in Law Number 10 of 1998 concerning Banking is contained in Article 49 paragraph (2) which states that "Members of the Board of Commissioners, Directors, or bank employees intentionally: request or accept, permit or agree to receive a reward , commissions, additional money, services, money or valuables, for personal gain or for the benefit of his family, in order to obtain or attempt to obtain for others in obtaining advances, bank guarantees, or credit facilities from banks, or in the context of purchasing or discounting by the bank on money orders, promissory notes, checks, and trade papers or other proof of liability, or in the framework of giving approval to others to carry out withdrawals of funds that exceed their credit limit at the bank; The formulation of Article 49 paragraph (2) letter a states that members of the board of commissioners, directors, or bank employees who "request or accept, allow or agree to receive a reward, commission, additional money, service, money or valuables, for their personal benefit or for the benefit of his family ". If examined more closely, the formulation is a form of corruption in the scope of bribery, or gratification as stated in the law on corruption.

3. Law concerning taxes
The formulation of criminal acts in the taxation environment is set forth in Article 36A of Law No. 16 of 2000, affirming that "If the tax officer in calculating or stipulating tax is not in accordance with the applicable tax law so that it is detrimental to the state, the tax officer concerned may be sanctioned according with the provisions of the applicable legislation. "Explanation of Article 36A of Law Number 16 Year 2000, states that:" In order to improve services to taxpayers and improve the ability of tax officers to tax officers who calculate or determine tax that is not appropriate with the tax law to cause state losses, be subject to sanctions in accordance with the provisions of the applicable legislation "The formulation as outlined in Article 36A of Law Number 16 Year 2000, is identical to the formulation of criminal acts of corruption, in which the elements mentioned a it is "detrimental to the state", Along with the development and needs of the community, then Law Number 16 Year 2000 concerning Taxes is amended by Law Number 28 of 2007. In Article 36.A undergoes the following changes: (1) Tax officials are due to negligence or intentionally calculating or stipulating taxes not in accordance with the provisions of tax laws subject to sanctions in accordance with the provisions of legislation. (2) Tax employees who in their duties intentionally act outside of their authority stipulated in the provisions of tax laws and regulations , can be filed with an internal unit of the Ministry of Finance that has the authority to carry out inspections and investigations and if proven to do so is subject to sanctions in accordance with the provisions of legislation. (3) Tax officials who are proven to have extorted and threatened taxpayers to benefit themselves against the law dian cam with the criminal as referred to in Article 368 of the Criminal Code (4) A tax official with the intention of benefiting himself illegally by abusing his power forces someone to give something, to pay or receive payment, or to do something for himself itself, threatened with criminal as referred to in Article 12 of Act Number 31 of 1999 concerning Eradication of Corruption and its amendments.

Amendments to Article 36A of Law Number 28 of 2007 only confirm that only paragraph (4) is a criminal act of corruption, so that Article 12 of Law Number 31 Year 1999 jo. Act No. 20 of 2001, wherein the law This law constitutes a criminal act of extortion in a position regulated in Article 12 letter (e) which affirms that: "a civil servant or state administrator which is intended to benefit himself or others against the law, or by abusing his power forces someone to give something, pay, or accept payment by piece, or to do something for themselves. "It is very unfortunate that Article 36A paragraph (1) is not affirmed as a criminal act of corruption, even though the element of" negligence "or" intentional "in tax calculation can result in losses in "Financial or economic state", which is a criminal act of corruption.

Article 36A paragraph (1) of Law No. 28 of 2007 should maintain the formulation of Article 36A of Law Number 16 of 2000, where the element "detrimental to the state" becomes an essential element, this is intended to avoid multiple interpretations of the formulation so that it can avoiding contradictions regarding whether or not sanctions can be applied in accordance with Law Number 31 of 1999 in conjunction with Law Number 20 of 2001, even though the law on the eradication of criminal acts of corruption as intended can be applied for tax violations in accordance with Article 36A paragraph (1) Law Number 28 Year 2007, where Article 14 of Law Number 31 Year 1999 jo. Law No.

20 of 2001, affirms that "Everyone who violates the provisions of the Law which expressly states that violations of the provisions of the Act as acts of corruption apply the provisions stipulated in this Law".

E. Policy on Criminal Law Formulation in the Prevention of Future Corruption Crimes

The policy on formulating the Criminal Law in the context of the coming up of corruption in the future has actually been pursued, namely through the drafting of a law on the Eradication of Corruption Crime (August 2008 Manuscript). which was confirmed in the consideration stating that "the ratification of the United Nations Convention Against Corruption, 2003 (United Nations Anti-Corruption Convention 2003) with Law Number 7 of 2006, then Law Number 31 of 1999 concerning Eradication of Corruption Crimes has been amended with Law No. 20 of 2001, it is necessary to adapt it to the 2003 United Nations Anti-Corruption Convention. "The draft law on the Eradication of Criminal Acts of Corruption provides definitions or use of terms regarding certain matters in Chapter I (general provisions) as berikut: Article 1 In this Act what is meant by:

1. Corporations are organized groups of people and / or wealth, both legal entities and non-legal entities.
2. Public Officials are: a. every person who holds a legislative, judicial or executive position appointed or elected permanently or temporarily paid or not paid regardless of the seniority of that person; b. everyone who carries out public functions including for the benefit of a public agency or public company or one that provides public services based on legislation; c. every person designated as a public official in the laws and regulations.
3. Foreign Public Officials are: a. every person who holds the executive, legislative or judicial office of a foreign country either based on appointment or election, including all levels and parts of his government, b. any person who performs public functions for the benefit of a foreign country, including public agencies or foreign public companies; or c. every official or representative of an international public organization.
4. Officials of the Public International Organization are any international civil servants or any person authorized by the organization to act on behalf of the organization.
5. Wealth is any form of assets, whether corporate or nonporporal, movable or immovable, tangible or intangible, and legal documents or instruments that prove the rights or interests of these assets.
6. Foreclosure is a series of actions by investigators to take over and / or save under the control of movable or immovable objects, tangible or intangible for the purpose of investigation, prosecution and justice.
7. Deprivation is the permanent takeover of wealth with the decision of a court or other authorized body.
8. Origin Crime is any crime that results in a criminal act that is the object of another criminal offense.
9. The Result of Criminal Actions is any wealth obtained directly or indirectly from a crime.
10. Gifts or Promises are any form that provides benefits or pleasures for those who receive.

The meanings as stipulated in Chapter I (general provisions) above seem to adjust to the editorial of the 2003 UNCAC Convention as follows: Article 2 Use of Terms for the purposes of this Convention: (a) Public officials "means: (i) everyone holding a legislative, executive, administrative, or judicial office of a State Party, whether appointed or elected, either permanently or temporarily, whether paid or not paid, regardless of the person's seniority; (ii) everyone carrying out public functions, including for a public institution or public company, or providing public services, as referred to in the national laws of the State Party and as applicable in the appropriate legal field of that State Party; (iii) each person referred to as a "public official" in the national law of the State Party.

For the purposes of certain efforts listed in chapter II of this Convention, "public official" may mean any person carrying out public functions or providing public services as referred to in the national laws of the State Party and as applicable in the appropriate legal field of that State Party. (b) Foreign public officials "means everyone who holds a legislative, executive, administrative, or judicial office from a foreign country, whether appointed or elected, and every person who carries out public functions for a foreign country, including for public institutions or public company;) (c) every international civil servant or every person authorized by the organization to act on behalf of the organization;) (d) Wealth "means any form of asset, whether corporate or non-corporal, moves or does not move, is tangible or intangible, and legal documents or instruments that prove the rights or interests in these assets;) (e) proceeds of crime "means any wealth originating from or obtained, directly or indirectly, through the implementation of a crime;) (f) freezing" or " seizure "means the temporary prohibition of transfer, conversion, release or transfer of wealth, or temporary supervision or control of wealth based on an order issued by a court or other authorized body;) (g) Deprivation" which includes imposition of fines if applicable, means permanent seizure of wealth by order of the court or other authorized body;) (h) Prosecution tan origin "means any crime by which the results obtained can be the subject of a crime.)

The definition or use of the term specifically concerning the term "public official" as mentioned above is essentially an odd term if used in juridical terms, because in Indonesian law these terms are not known. Based on legislation in Indonesia, several juridical terms are known, for example "State Administrators" term which contains Law Number 28 of 1999 concerning the Implementation of Clean and Free Community Service, "Civil Servants" the term contained in Law Number 31 Year 1999 jo Act No. 20 of 2001 concerning the Eradication of Corruption Crimes. So the term "Public Official" is a general term and not a juridical term, so it needs to be adjusted first so that it becomes a juridical term. In addition to the use of the aforementioned terms, the formulation of corruption in this bill also seems to be adapted to the editors of the UNCAC Convention which are regulated in the following articles: Article 2 (1) Any person who promises, offers, or gives directly or indirectly to Public Officials an undue advantage for the benefit of the official itself, another person, or the Corporation, so that the official does or does not do something in carrying out his job duties, (2) Public Officials who request or receive a direct or indirect benefit improperly for the benefit of the official himself, another person, or the Corporation, so that the Public Official does or does not do anything in carrying out his office duties.

The formulation of criminal acts in Article 2 of the Draft Law on the Eradication of Criminal Acts above constitutes editorial adjustments in Article 15 of the UNCAC Convention, the editorial of which is as follows: (a) Promises or offers to public officials, directly or indirectly, improper benefits, to public officials in the capacity of their official duties or other persons or bodies so that the official acts or stops acting in carrying out their official duties); (b) Requests or receipts by public officials, directly or indirectly, undue benefits, for such public officials in the capacity of their official duties or for other persons or entities so that the official acts or stops acting in the execution of official duties).

Article 3 (1) Any person who promises, offers, or gives directly or indirectly to a Foreign Public Official or Public International Organization Officer an undue advantage for the benefit of the official himself, another person, or the Corporation, the official acts or do nothing in carrying out his office duties, or to obtain, retain business or other unauthorized profits related to international business, (2) Foreign Public Officials or Public Public Organization Officials who request or receive directly or indirectly an undue advantage for the benefit of the official himself, another person, or the Corporation, so that the official does or does not do anything in carrying out his office duties. Article 3 of the Draft Law on the Eradication of Corruption Crime above is an adjustment of the editorial of Article 16 UNCAC: (1). If done intentionally, promises, offers or gifts to foreign public officials or officials of public international organizations, directly or indirectly, the benefits improperly for the public official in the capacity of his official duty or other person or body so that the official acts or stops acting in carrying out his official duties, to obtain or maintain business or other improper benefits related to the conduct of international business), (2) . if done intentionally, requests or receipts by foreign public officials or officials of international public organizations, directly or indirectly, undue benefits, for those officials in the capacity of their official duties or for other persons or entities, so that the official acts or stops acting in the implementation of tug their official duty).

Article 4 (1) Any person who promises, offers, or gives directly or indirectly to a Public Official or other person an improper advantage, so that the official or other person misuses the influence because of his position, with the aim of obtaining an undue advantage from government agencies or public authorities, (2) Public Officials or other people who request or receive directly or indirectly an undue advantage so that the official or another person misuses the influence due to his position, with the aim of obtaining an undue advantage from the agency government or public authority.

The formulation of the above article is an adjustment from the editorial of Article 18 UNCAC regarding "trading influence", as follows: if done intentionally: (a) promises, offers or gifts to public officials or anyone else, directly or indirect, undue benefits that public officials or such persons misuse their real or perceived influence with the intention of obtaining from the administrative or public authority of an undue benefit State Party for the benefit of the actual agitator of the action or for others who also;) (b) Requests or receipts by public officials or anyone else, directly or indirectly, undue benefits for themselves or for others so that public officials or such persons misuse their influence that is real or deemed to exist in order to obtain from administrative or public authorities from a State Party, an undue benefit.)

Article 5 Public officials who misuse their function or position do or do not do something that is in its function against the law, with the intention of obtaining an undue advantage for the benefit of themselves, others, or the Corporation. The formulation of Article 5 of this bill is an editorial adjustment of Article 19 of the UNCAC Convention concerning "Abuse of functions" as follows:....if done intentionally, misuse of function or position, namely, implementation or failure to implement actions, which violate the law, by public officials in carrying out their functions, with the intention of obtaining an undue benefit for themselves or for another person or entity.). Article 6 Public officials who enrich themselves in the form of significantly increasing their wealth and unable to prove improvement it was obtained legally.

The formulation of the article above is an editorial adjustment of Article 20 of UNCAC regarding "Illicit enrichment" (Illicit enrichment), as follows: ... if done intentionally, actions enrich themselves, that is, a significant increase in the wealth of public officials who cannot naturally explained in relation to his legal income.). Article 7 (1) Anyone who in an economic, financial or commercial activity promises, offers, or gives directly or indirectly to someone who occupies any position in the private sector an undue advantage for the benefit of himself or others, so that the person acts or does not do something that is contrary to his obligations, (2) Public Officials who request or receive directly or indirectly from someone who occupies any position in the private sector an undue advantage for the benefit of himself or for another person so that he do or do not act contrary to their obligations.

The formulation of the Article above is an editorial adjustment of Article 21 UNCAC regarding "Bribery in the private sector" as follows: If done intentionally in the context of economic, financial or trade activities :) (a) Promises, offers or giving, directly or indirectly, undue benefits to anyone who manages or works, in any position, to a private sector body, for himself or for someone else, so that he, by violating his duties, acts or stops acting;), (b) Requests or receipts, directly or indirectly, of undue benefits to anyone who manages or works, in any position, to a private sector body, for himself or for someone else, so that he, in violation of his duties his duty, act or stop acting.)

Article 8 Every person in any position in the private sector conducts embezzlement of wealth in any form, private funds, securities, or other valuable items entrusted to him based on his position. The formulation of the Article constitutes an adjustment of Article 22 of the UNCAC Convention concerning "Darkening of Wealth in Private Sector", as follows: If carried out intentionally, in the context of economic, financial activities or trade, embezzlement by someone who manages or works, with any position, on a private sector body, for any wealth, private funds or securities or any other valuable item entrusted to him based on his position.)

Formulation of corruption as described above, there is no single formulation of corruption that focuses on the element of "detrimental to the country's finances or economy". This is different from the formulation of corruption in the Law Number 31 Year 1999 jo. Law No. 20 of 2001 which is currently still in effect. The absence of an

element of "detrimental to the country's finances or economy" in the formulation of corruption in the Draft Law on the Eradication of Corruption Crimes shows that the state's financial or economic losses based on the UNCAC Convention are not Romli Atmasasmita said that according to the anti-corruption convention, losses are not absolutely state-owned but also belong to the community.

It needs to be understood that, even though the element of loss to the state is absolute, the emphasis on "harming the country's finances or economy" in the formulation of corruption is very important, because if there is a loss to "state finances or economies" the country will experience difficulties or cause delays countries in fulfilling services to the public interest, which means that the state cannot carry out its obligations in the welfare of society, which is its constitutional obligation.

In addition to the problems described above, the Draft Law on the Eradication of Corruption Crime still has problems similar to Law Number 31 of 1999 in conjunction with Law Number 20 of 2001 concerning the Eradication of Corruption Crimes, namely: a) no affirmation of "corporation" as subject to offense, b) there are no specific provisions regarding probation, assistance, and evil negotiations; c) there is no determination of offense qualifications (as "crime" or "violation"). As a criminal law policy step in dealing with corruption, the 2006-2008 Criminal Code Concept, formulates criminal acts of corruption in Chapter XXXII concerning corruption, with editorial as following:

a. Scope of Bribery

Article 680 (a) Giving, promising something, or giving gratuity to a civil servant with the intention to do or not do something in his position that is contrary to his obligations; or (b) Giving something to a civil servant because of or relating to something that has been done or not done in his position that is contrary to his obligations.

Article 681 (1) Every person who gives, promises something, or gives gratuity to the judge with the intention to influence the verdict of the case being examined (2) If the award or promise as referred to in paragraph (1) is carried out with the intention that the judge impose a sentence. Article 682 Any person who gives or promises something to a foreign public official or a public official of an international organization with the intention of obtaining or maintaining a trade business or other improper profit in relation to international trade.

b. Scope of Abuse of Authority that Harms State Finance

Article 683 Anyone who unlawfully commits an act enriches himself or another person or a corporation that can harm the country's finances and economy. Article 684 Every person who benefits himself or another person or corporation misuses his authority, opportunity, or means to him because of a position or position that could harm the country's finances or economy. Article 686 The return of state finances or the economy of the country does not erase the participation of the maker of a criminal act as referred to in Article 683 and Article 684.

Article 687 Any person who gives gifts or promises to a civil servant by remembering the power or authority inherent in his position or position, or by the giver of a gift or appointment is deemed inherent in his position or position. In other parts of the category as a criminal act of corruption, it is also regulated in the 2006-2008 Criminal Code Concept concerning Criminal Offices regulated in CHAPTER XXX as follows: Article 655 Civil servants or other people assigned to run a public office permanently or temporarily, which embezzling money or securities deposited because of his position, or allowing to be taken or darkened by others.

Article 658 Civil servants who receive gifts, promises or gratuities even though it is known or reasonably suspected that the gifts, promises or gratuities are given because of the power or authority related to his position or according to the mind of those who give gifts, promises or gratuities related to his position . Article 659 Civil servants who:

- a. accept gifts, promises or gratuities even though it is known or reasonably suspected that gifts, promises, or gratuities are given to mobilize to do or not do something in his position that is contrary to his obligations; or
- b. accept gifts, promises, or gratuities even though it is known or reasonably suspected that gifts, promises, or gratuities are given as a result or caused by having done or not done something in a position that is contrary to their obligations.

Article 660 Judges who: a). accept gifts, promises or gratuities even though it is known or reasonably suspected that gifts, promises, or gratuities are given to influence the case decisions submitted to their consideration; or b). receive gifts, promises, or gratuities with full awareness that gifts, promises, or gratuities are given to him in order to impose a sentence on the opponent of the gift giver or promise in the case that is left to his consideration.

Article 662 Civil servants are against the law with the intention of benefiting themselves or others, forcing someone to misuse their power in order to give something, make a payment, receive payment by being partially deducted, or do something for personal needs. Article 663 Civil servants are unlawfully with the intention of benefiting themselves or others, and by abusing their power, using state land on which there is a right to use the land.

Article 664 Civil servants who directly or indirectly participate in chartering, procurement of goods, or leasing rights, even though they are required to take care of and supervise part or all of the time when this is done. In essence the formulation of criminal acts of corruption with the scope formulated in the 2006-2008 Criminal Code Concept is sufficient to provide deterrence or countermeasures against criminal acts of corruption, especially for the White collar Crime involving state officials, including law enforcers, as outlined in Article 660 of the Criminal Code Concept. Even in the case of receiving a gift or gratuity "can" be imposed before or after the act is carried out, this is confirmed in Article 659 of the Criminal Code Concept, with the formula: "accept gifts, promises or gratuities even though it is known or reasonably suspected that gifts, promises or gratuities given to mobilize to do or not do something in his position that is contrary to his obligations; or accept gifts, promises, or gratuities even though it is known or reasonably suspected that gifts, promises, or gratuities are given as a result or caused by having done or not done something in a position that is contrary to their obligations ".

The formulation will be able to reach the application of criminal law in preventing criminal acts of corruption committed by White Collar Crime through its functions both in special prevention and general prevention. The formulation will also make it easier for the public to exercise social control, against irregularities both carried out by society in general, and by state servants or public servants in their capacity as civil servants. On the other hand, the formulation will be able to show clearly the boundaries given by the law to the authorities in carrying out or carrying out their duties and functions inherent in their positions. Noting the formulation that has been regulated in the 2006-2008 Criminal Code Concept as described above, and seeing the increasingly difficult challenges in tackling future criminal acts of corruption, where corruption can be said to always develop from time to time, then criminal law policy in the context of overcoming acts corruption, should make the 2006-2008 Criminal Code Concept a criminal law policy for eradicating corruption that will come. The concept of the Criminal Code in 2006-2008 as a criminal law policy in the upcoming handling of corruption is expected to not conflict with the aspirations of the people, especially in terms of answering the legal needs of the community in dealing with corruption, on the other hand the KUHP Concept 2006-2008 is the result of legal ideas based on national cultural values (which is certainly different from the current conditions of the Criminal Code), and in accordance with what is meant by the reasoning policy which is interpreted by Marc Ancel, as a science as well as an art which ultimately has a practical purpose to enable positive law regulations to be better formulated and to provide guidance not only to legislators, but also to courts that apply laws and also to administrators or implementers of court decisions.

IV. CONCLUSION

1. The policy on the formulation of criminal law, especially concerning the formulation of criminal acts of corruption at this time, has a number of fundamental weaknesses, thus affecting the effectiveness of corruption eradication which includes; weaknesses in the formulation phase (in abstracto) of the law and at the application stage and execution (concret).
2. Weaknesses in the formulation of corruption currently are: a) criminal law policy by not qualifying a case as "offense" or "crime". In addition, it does not provide a juridical understanding or limitations on the consequences that must be received in consequence b) criminal law policies in terms of eradicating non-corruption, are still spread in several laws, this can cause problems especially in aspects of justice. The absence of rules/guidelines regarding minimum criminal provisions specifically and substitute for criminal penalties for companies.
3. Due to the weakness of the case handling system, there should be a criminal law policy on corruption in the future, taking into account the following: a) the formulation of corruption should still emphasize the element of "financial or economic disadvantage" providing a juridical understanding of "The consensus of a prisoner not to repeat his actions. b) makes money laundering a criminal act of corruption, including criminal acts of corruption, especially in the context of" bribery "and extortion carried out by law enforcement against cases of lawsuits being examined.

V. RECOMMENDATIONS

Based on the conclusions of this study, the authors recommend the following:

1. criminal law policy in terms of eradicating future criminal acts of corruption, qualifying violations is needed, and providing an understanding of the juridical limits of "bad agreements", and accepting the consequences that must be accepted.
2. Formulation of acts of corruption still emphasizes the element "financial or economic loss of the country, in order to save the country's assets.
3. Include criminal charges within the scope of "bribery" and "extortion in the office environment".
4. Making money laundering a criminal act of corruption.
5. The concept of the 2006-2008 Criminal Procedure Code was immediately used as a criminal law policy to become the basis for eradicating corruption.

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An Exploratory Study of Dignity with a Conceptual Model

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DOI: 10.29322/IJSRP.9.08.2019.p9278

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9278>

Abstract- The study adopts qualitative research paradigm for studying the concept of dignity from different perspectives from the Indian workforce. In-depth interviews were conducted with 20 personnel representing different occupations to encapsulate their concept of dignity emanating from their experience. Interesting patterns emerged through content analysis of the interview scripts. Based on the analysis of the results a 3N model of dignity has been developed.

Index Terms- Dignity, Dignity at the workplace, 3N Model, Human Dignity,

Kantian perspective, he explains that an essential situation of dignity is being “*treated as an end in oneself, at least in part, and not merely as a means to someone else’s ends or as substitutable for someone else*” (Sayer 2007, p. 568). Despite that achievement of dignity is little difficult as an employee generally got hired for the fulfillment of some instrumental role the achievement of dignity becomes inherently problematic in employment relationships.

Dignity as a word most used in contemporary work. Hodson (2001) identifies four means or practices which contribute towards the experience or denial of dignity at work. These include *mismanagement and abuse, overwork, incursions on the autonomy and contradictions of employee involvement.*

I. INTRODUCTION

Dignity is a common word frequently used by people, but its connotation is not the same. People often amalgamate the meaning of dignity with self-respect or human rights. Dignity is all about people and is not only intrinsic but also relational and is created between and among people. Most people dismiss and ignore it or pay attention to it despite violence against women like rape, which affect their dignity (Sharma et.al, 2014).

Poor working environment, workplace bullying, ill-treatment and harassment, long hours, have a direct relation with dignity and making *dignity* as a complex phenomenon (Hodson,2001; Rayman,2001;TUC, 2003). Dignity has crucial significance that has divided upon—both implicitly and explicitly — just to recognize the environment of labor and work (Bolton 2007; Sayer 2007). Given on emphasizing ILO (1947) placed it on the constitution and positioned it as a fundamental human right. “*All human beings, irrespective of race, creed or sex, have the right to pursue both their material well-being and their spiritual development in conditions of freedom and dignity, of economic security and equal opportunity*”. Although putting Dignity into a definite framework and giving one definition is difficult to work and because of these difficulties, it lacks a specific definition (Lee 2008; Sayer 2007). Therefore, Dignity as a phenomenon is an important area of study as it varies culturally and occupationally. Hodson (2001) connect “*Dignity as an ability which helps in establishing a sense of self-respect and self-worth and to realize the respect of others*” (p. 3). Lee (2008) offers a similar definition “*the state of being treated with respect or honor, with a sense of self-worthiness and self-esteem resulting there from*” (p. 5). In today’s world when the working hour and pressure are so high, the employee spent major time either at the workplace or thinking towards work. In this situation achieving dignity at work become, indispensable for self-worth (see also Bolton 2007). Although the achievement of dignity is not simple. Citing a

II. RESEARCH OBJECTIVES

- a) To study different perspectives of workplace dignity in the Indian context.
- b) To analyze the meaning of dignified person and dignified work in the Indian Context.

III. RESEARCH QUESTIONS

1. How people in different occupations conceptualize and experience dignity.
2. When one calls oneself as a dignified person and one's work as the dignified work.

IV. SAMPLE

After consulting a number of people the following occupations were chosen for sample selection. From these occupations, random sampling was done for the selection of the final sample. Army Personnel, Doctors, Social worker, Businessman, Manager, Student, Acid attack survivor, Contract Waiter, and Labor. A sample of 20 was randomly selected from different occupations. The sample comprised 50% female, 50% male participants. The further breakup, of the female sample constituted 2 doctors, 3 acid attack survivors, 3 students, 2 labors. The male sample comprised of 2 businessmen, 2 managers, 1 waiter at the hotel, 2 social workers, 2 soldiers and one labor from the construction site.

V. PROCEDURE

A combination of inductive and deductive approach where the researcher used both structured and semi structured

interview to collect data from each respondent on dignity. Qualitative research is more suitable when there is a need for unfolding what surrounds a phenomenon (Carson et al., 2001). Interview questions were developed through dignity literature. A set of questions was generated and checked by experts, so none of the important factors could be missed. The questions were designed to be open-ended and interviewers had the flexibility to follow-up and probe further using additional non-scripted questions whenever new themes or information appeared. The questions were designed to solicit information related to each of the major content areas of the study. During the beginning of the interview demographic data were collected.

VI. DATA COLLECTION

At the outset, the participants were made aware of the objectives of the study. Their informed consent was taken. Researcher established rapport before the interview and all the respondents were secure that their responses would be held in reserve.

During the interview, researcher asked each participant to identify the most painful part of their life. When permission was granted, interviews were audiotaped. To get into the real context all the interviews were conducted in face to face situation. Each interview lasted for approximately 30 minutes.

VII. ANALYSIS OF RESULTS

KMS uses as a technical/ rational artifact, a depository system which can be used for codifying, retrieve, store and distribute their knowledge (Alavi & Leidner, 2001). Knowledge management systems (KMS) is a type of information system used by employers to create, distribute and utilization of knowledge, which finally could impact on the organizational competitiveness (Alavi & Leidner, 2001; Alavi et al, 2006; Kulkarni et al, 2007). Though, research says up to 70% of KMS does not meet up organisational objectives (Malhotra, 2005). A few studies have shown that culture plays a major role when KMS are deployed outside Western countries (Voelpel & Han, 2005; Ardichvili et al, 2006). These cultural issues are quite common as KMS generally reveal the Western values of the designers (Nonaka & Takeuchi, 1995). Considering the above and keeping in view the importance of context in pursuing the objectives of the study, manual analysis has been conducted by the authors, which was considered to be most appropriate for the largely descriptive interview data. Also, any qualitative software focuses on the words and thereby ignores the context; therefore, the software was not used at this stage. Besides, the aim of the study was to capture the context in the study of dignity and dignified work therefore, context should not be ignored. Thus, for enriching the output, context needed to be captured and this was done through manual analysis.

There are majorly 3 types of content analysis in use, Conventional, Directed, and Summative content analysis. During

the current study, we rely on conventional analysis; in this case, the aim was to know how one perceives dignity in his/ her work life. Conventional analysis has been used mainly in the studies which do not have existing theories and also a limited research. (Kondracki & Wellman, 2002), alternatively allowing the categories and names for categories to flow from the data. Researchers submerge themselves in the data to permit original insights to appear (Kondracki & Wellman, 2002), in addition explained as an inductive category development (Mayring, 2000).

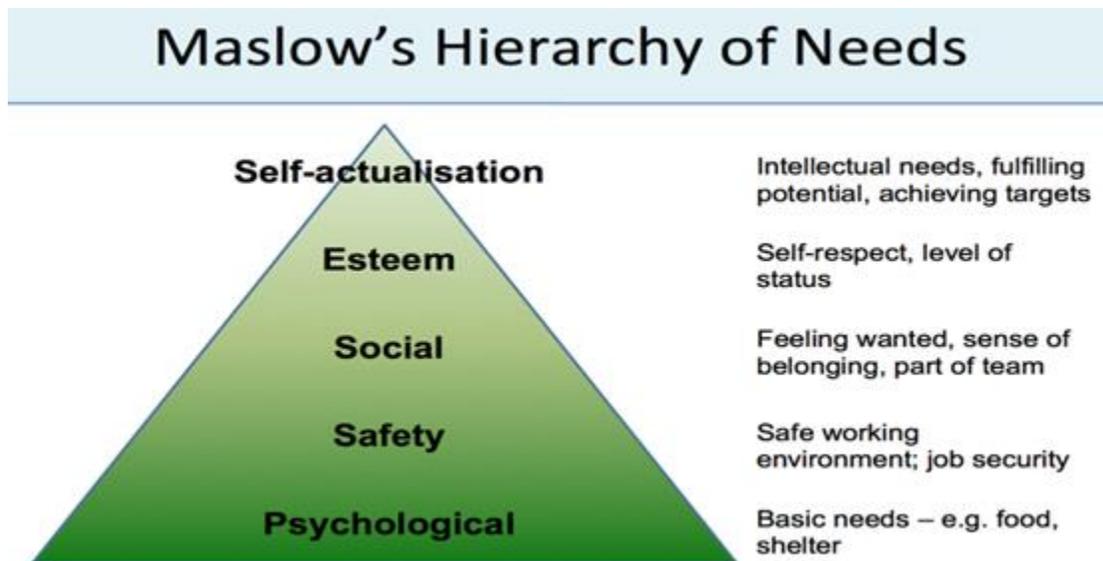
VIII. EVOLVING A CONCEPTUAL MODEL: 3N MODEL OF DIGNITY

Based on the literature, we identified majorly two types of dignity 1, intrinsic 2, extrinsic (Brennan and Lo, 2007; Hodson, 2001). However, intrinsic one is defined which has no outer connection and extrinsic has defined with the support of the extrinsic environment. The whole interview process was based on these two concepts. All the concept of dignity has been linked with the Maslow's need theory as well. Based on characteristic we divided the 5 basic needs into two parts. Likewise, psychological, social and safety needs on one group and name as Extrinsic need, the last two as self-actualization and esteem needs in one group called as intrinsic dignity. Based on this separation, we re-conducted our interview in a semi-structured way. But after the interview, the whole model changed and emerged as a 3N Model. This model is a pure outcome of interview analysis. Firstly, our data were tabulated; the essence of the interview was conceptualized and coded to draw a meaningful implication regarding the meaning of dignity.

Data Analysis < Insert table 1 >

The Outcome of Interview analysis < Insert table 2 >

After taking views of 8 working segments of the society we divided it into three parts on the basis of "Maslow's hierarchy of Needs" (Figure 1). **3N express as, N- Nascent Dignity, N- Nether Dignity, N- Noble Dignity.** However Nascent describes the basic need which consists of food, shelter, and cloth. We connect these needs to the psychological and safety need of the Maslow's models may also be called as the dependent dignity. The dignity of labor, waiters, and Acid attack Survivors fall under this. The students, businessmen, managers major parts fall under Nether dignity as it consists of social and esteem needs from the Maslow's hierarchy also called as the developed dignity. The last part is Self-actualization, which consists of social workers and Army personnel. These professional groups of the society have a noble view of dignity as 'helping others' which in their view is the most dignified work also called as nether or independent dignity (Figure 2).



Themes emerging from the Data <Insert table 3 >

3 N model of Dignity



Figure 2
 Source: Developed by the authors

IX. DISCUSSION AND FUTURE RESEARCH

The most surprising fact which we got throughout the interview, that dignity is a dynamic word which keeps changing its connotation. Everyone relates dignity with one's current work: a student has a connection with a teacher, a doctor has a connection with the patient, and low wage worker has a connection with the owner. So for a different societal group, the

definition of dignity is different. For the labor class getting a fair wage comes as a dignity. For the educated group, dignity is coined as the self-respect, satisfaction, achievement, happiness, and trust. It is equivalent to the human right as well. For those who are fighting for their survival, dignity means, how society is accepting them, and getting equal treatment or not? if they perceive the fair and equal treatment, they call themselves dignified but if they do not perceive it their dignity is at a

vulnerable stage. So the common themes which emerged were equality, in terms of equal pay or equal treatment, trust, happiness, and satisfaction. The results of the exploratory study reveal that culture has been one of the major factors which could give another shade to the definition of dignity. This paves the way for future research in the field of dignity. The study has a sample size as one of the limitations, besides interview as a methodology and cultural context. A larger sample and other methods of data collection would lead to greater generalizability of results. Nevertheless, the study has explored an emerging area of study which is pivotal for the sustainable growth of organizations and the society and had developed a 3N model of dignity.

The whole research has been placed in one culture in another way culture could enrich the color or meaning of dignity, the status in the society may also have an impact on it one needs to search and do further research on it.

X. CONTRIBUTION AND CONCLUSION

When we analyze the data it emerges as three needs and these three needs falls into the Maslow's hierarchy and there for the contribution of this paper is to convert 5 needs into the three needs. Dignity is an integral part of one's life, but many compounds it with human rights. Kant had a provided philosophical perspective, but it needs to be operationalized for organizations and society. The present study has developed a need-based 3N conceptual model of human dignity. As an area of scholarship, it is at the nascent stage and needs to be explored and developed.

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Data Analysis Table 1

Occupations	Description	Codes
Social worker 1.	Making yourself Proud, Self-motivation,	
Social worker 2.	Social justice, Righteousness, The importance of once life,	Wholesomeness.
Businessmen 1	Achieve it from others, continuous improvement, earn your self-respect, hard work pay, Society enrichment.	
Businessmen 2	Respect in other eyes, Satisfaction, Seeing others happy, Family happiness.	Satisfaction
Businessmen 2	Gain respect, big empire, More employees, output achievement, Spending more on CSR activities. The accomplishment of mission and vision	
Manager 1	Self Trust, Peer group Trust, Acceptance, Appreciation, integrity.	
Manager 2	Supervisor Trust, Acknowledgement, Target Achievement.	Credence
Army personnel 1	Code of conduct, Pride in Nation Flag, Nations Welfare, Fight for the nation,	Pride

<p>Army Personnel 2</p>	<p>Support system at the time of emergency, Save society, respect within and outside organization.</p>	
<p>Waiter</p>	<p>Persuade promise, full payment, Respectful behavior, timely payment. 365 days of work, full money, shelter, nutritious food.</p>	<p>Empathy</p>
<p>Labor 1</p>	<p>Break during the work, get the opportunity to feed our children, some freedom, equal pay.</p>	
<p>Labor 2</p>	<p>Equal job opportunity, shelter, respect.</p>	<p>Fair-minded</p>
<p>Labor 3</p>	<p>It's a two way process, patient satisfaction, respect in the eyes of the patient.</p>	
<p>Doctor 1</p>	<p>Successful treatment gives us immense pleasure and happiness, the joy of giving, delightful experience.</p>	<p>Happiness</p>
<p>Doctor 2</p>	<p>Acceptance of your decision, Equality, get an opportunity to work together, a sign of acceptance,</p>	
<p>Manager at café (Acid Attack survivor 1)</p>	<p>Job opportunity, acceptance of our services, equal pays for equal work, learning opportunity.</p>	<p>Adoption</p>

<p>Worker at café (Acid Attack Survivor 2)</p>	<p>Teamwork, Freedom of expression, Freedom to use resource.</p>	<p>Sensitivity</p>
<p>Supervisor at café(Acid Attack survivor 3)</p>	<p>Respect, appreciation of efforts, hard work, hand-holding.</p>	
<p>Student 1</p>	<p>Listening, appreciate my thoughts, understand my constrain, the freedom of learning, freedom of thoughts, Trust on</p>	
<p>Student 2</p>	<p>me, convince myself, Decision taking, work can't be dignified but the journey is dignified. Authenticity in your work, Truthfulness.</p>	
<p>Student 3</p>	<p>Successful outcome, Acceptance by teachers, Respect for my work.</p>	

Source: Developed By Authors

Table 2 Outcome of Interview analysis

Occupation	Emerged Themes
Army Personnel	Pride
Social worker	Wholesomeness.
Businessmen	Satisfaction
Manager	Credence
Waiter	Empathy
Labor	Fairness
Doctors	Happiness
Acid Attack survivor	Acceptance
Students	Sensitivity

Source: Developed By Authors

Maslow's Need	Themes	Occupation	Needs/ Dignity
{ Self-Actualization } { Esteem } { Social } { Safety } { Psychological }	Pride, Wholesomeness	Army personnel, Social Worker	Noble
	Satisfaction, Credence, Sensitivity.	Managers, Doctors, Businessmen, Student.	NETHER
	Fair-Minded, Empathy, Adoption	Acid Attack survivor, Labor, Contract waiter.	NASCENT

Themes emerging from the Data

Source: Developed By Authors

Analysis of Information System Conversion Using SAP

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DOI: 10.29322/IJSRP.9.08.2019.p9280

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9280>

Abstract- This research was conducted at PT. Duraquipt Cemerlang which engaged in the trading of pumps for petroleum companies. The purpose of this research is to analyze the application of information system before conversion, knowing the process and stages of system conversion and describes the benefits after the system conversion using SAP at PT. Duraquipt Cemerlang.

There are several issues that cause the company to convert its system, such as the lack of integration of the system between the related parties that causes the business process interrupted. The method used is a phase-in conversion. From the conversion process there are several advantages, such as the integration of system between related sections and improve the productivity of employees who use the SAP system. Based on the results of the research, the authors conclude that the implementation of information systems before using SAP is running well but no integration between parties and the decision made to convert the system using SAP is for effective and efficient business process.

Index Terms- Analysis; Conversion; Accounting Information System; SAP

I. INTRODUCTION

The development of technology has brought a major change, especially for the management of a company. All information systems continue to be developed to achieve the goals of the company. Changes in the use of types of information systems used are also of particular concern to companies. Information systems that can support each type of work and facilitate implementation, monitoring and evaluation for company leaders are strong reasons why information systems are needed.

The application of information systems in a company is carried out to support the company's business strategy, business processes, structure and corporate culture in order to increase the business value of the company. Strategic support from the application of information systems in the company in the form of increasing efficiency and effectiveness in the implementation of various tasks or daily activities of the company.

Identification of Problem

PT. Duraquipt Cemerlang is a company engaged in the supply of pumps for oil and gas companies as well as maintenance and assembly of pumps themselves. PT. Duraquipt Cemerlang has experienced rapid development since it was founded in 2000. Because of its development, the system used can no longer be done manually. All business activities begin to be developed using

information systems built by the company. But in the era of information technology that is now increasingly rapid, PT. Duraquipt Cemerlang decided to convert the old system that they had built using an ERP system, namely SAP (System Application and Product).

One of the factors that makes this company convert the system by switching to SAP is the company's needs in terms of business activities that increase in volume. The optimal contribution of an information system will be achieved by a company by implementing a computerized information system (automated). Changes in the use of conventional information systems that are more manual to information systems that automatically have a tendency in many companies to encounter obstacles.

One obstacle is that employees as users (end users) are less able to adapt in carrying out the information system functions because they have been using the system for a long time. To overcome this problem, usually the way that is done by the company is to conduct training (training) to its employees by using the services of other parties or information technology vendors (IT), such as SAP who has experience in their fields.

There are several other ways, such as adapting one of the four operating system conversion strategies or models, both direct, parallel, pilot, and stepwise conversion strategies. System conversion is one of the aspects that determine success in implementing a new information system. In this conversion phase, non-technical aspects including approaches, methods, managerial strategies related to work systems and user organizations are the attention of developers in addition to the technical aspects of information system development because users are involved in all lines directly. The choice of each company depends on the needs and conditions in the field. It could also be for reasons of minimizing risk but requires a lot of costs or vice versa.

Research Questions

Based on the description of the background and the formulation of the problems to be solved are as follows:

1. What is the accounting information system at PT Duraquipt Cemerlang currently?
2. What is the process or stages of system conversion at PT Duraquipt Cemerlang?

Research Purpose

The purpose of this research are:

1. Knowing the accounting information system at PT. Duraquipt Cemerlang currently.
2. Knowing the process or stages of system conversion at PT.Duraquipt Cemerlang.

II. THEORITICAL FRAMEWORK

Definition of System

According to Mulyadi (2001:2), the system is basically a group of elements that are closely related to one another, which function together to achieve certain goals.

Definition of Information

According to Chusing dan Romney (2001), information can be interpreted as processing results that are organized, meaningful and useful for those who receive it. While according to Krismiaji (2005), information is data that has been organized and has uses and benefits.

Definition of System Conversion

System conversion is the stage used to operate a new system in order to replace the old system or the conversion process from the old system to the new system. The degree of difficulty and complexity in converting from the old system to the new system depends on a number of factors.

If the new system is a canned software package that will run on a new computer, the conversion will be relatively easier. If the conversion utilizes new customized software, new databases, new computer devices and control software, new networks and drastic changes in procedures, then the conversion becomes rather difficult and challenging.

The Process of Information System Conversion

There are 4 (four) methods that can be used by companies in converting old information systems to new information systems.

The four methods are:

- a. Direct Conversion;
- b. Parallel Conversion;
- c. Phase-In Conversion;
- d. Pilot Conversion

Conversion Plan

System conversion as one of the factors that is very influential in the success of the implementation of a new system, then the process should have been carefully planned. Success in the conversion process can be said to be the beginning of the success of the implementation of the new system for the company.

Failure in the conversion process will result in no useful development of new information systems for the company, and will cause significant losses for the company.

One of the system conversion planning models is a template made by the Department of Information Technology-Government of Maryland. The template that explains the phase of system conversion is as follows:

- a. Introduction
- b. Conversion Overview
- c. Conversion Support

Enterprise Resource Planning (ERP)

ERP is a reliable Communication Information Technology device, consisting of a collection of modules, such as manufacturing, finance, HRD, material management, sales, and distribution connected to a shared database. Through cross function integration, companies can increase productivity and service to customers (Yajiong Xue et al. 2005).

ERP is a company information system designed to coordinate all resources, information and activities needed for a complete business process. ERP is software that integrates all departments and functions of a company into a computer system that can serve all of the company's needs, both from the sales department, HRD, production or finance. ERP combines various needs in one software in a logical database, making it easier for all departments to share information and communicate (Haryo, 2006).

O'Brien (2002) wrote, ERP is a corporate cross-functional system driven by an integrated software suite module that supports the company's basic internal business processes. ERP provides a real-time view of integrated business processes such as production, order processing, and inventory management that are integrated by ERP application software and general databases. Explicitly, O'Brien (2002) said that ERP provide significant business benefits for the company, such as:

- a. Quality and Efficiency

ERP creates a framework for integrating and enhancing the company's internal business processes which results in significant improvements in quality and efficiency in customer service, production and distribution.

- b. Decrease in Costs

Reducing the costs of transaction processing and hardware, software and IT support employees.

- c. Decision Support

ERP provides information about cross-functional business performance that is very important quickly for managers to be able to increase their ability to make decisions in a timely manner across the company's overall business

- d. Company Agility

ERP systems break down the walls of departments and functions of various business processes, information systems and information resources. (produce organizational structures, managerial responsibilities, and more flexible work roles).



Figures 2.1 Main Component of ERP

System Application and Product (SAP)

SAP (System Application and Product) is a software developed to support an organization in carrying out its operational activities more efficiently and effectively. SAP is also an Enterprise Resources Planning (ERP) software, which is an IT and management tool to help companies plan and carry out various daily activities. SAP consists of a number of modules or applications that have the ability to support all transactions that need to be done by a company and each application works in conjunction with one another (Seto, 2013).

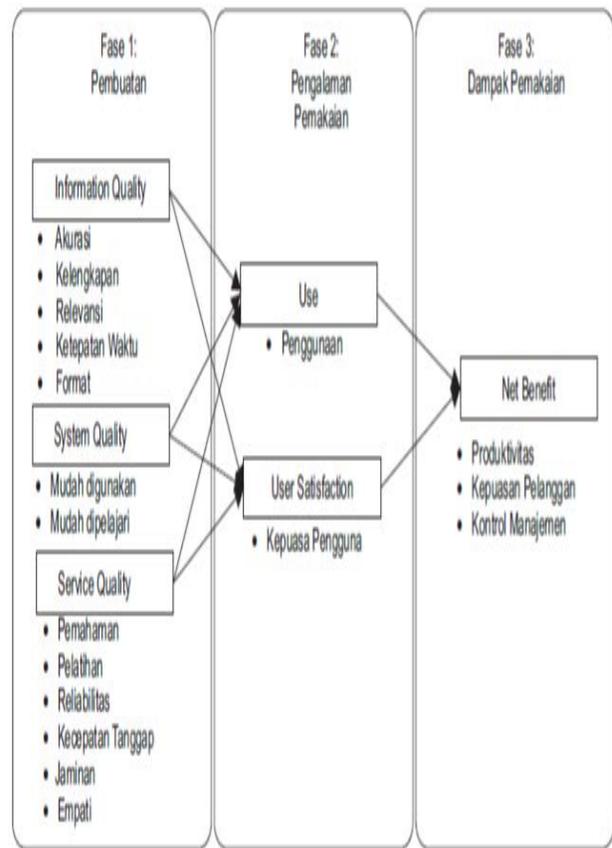
SAP has several advantages including:

- a. SAP consists of a number of modules or applications that have the ability to support all transactions that need to be done by a company and each application works in conjunction with one another.
- b. SAP has a netweaver platform, which supports development and logistics software
- c. SAP have ABAP or programmer, which facilitates developers to implement business logic
- d. Supports the integration of business processes of large companies
- e. All information stored in SAP can be accessed by parts of the organization when needed (Seto, 2013).

The DeLone and McLean Information System Success Model

This model is built from three components, namely the making of the system, the use of the system, and the impact of system usage

(Delone and McLean, 2003). The components are arranged in a measurement sequence as follows. First, information systems are made and their quality is measured by three dimensions of quality, namely information quality, system quality, and service quality. Second, information systems are used and their usage experience is measured in two dimensions, namely, dimensions of use and dimensions of user satisfaction. Third, the impact of usage as measured by two dimensions, such as individual impact and organizational impact (net benefit). The DeLone and McLean Information System Success Model can not only be used for research with a variable measurement approach, but also can be used for qualitative study-oriented research, with a sequence of studies in the manufacturing phase, usage experience phase, and phase of the impact of the use of information systems.



Figures 2.2 The DeLone and McLean Information System Success Model (Qualitative Study)

III. RESEARCH METHODOLOGY

A. Data Collection Methods

Library Research

The methods of data collection is done by studying and reviewing the literature related to the issues, to be discussed as well as to understand the material and theories related to the Enterprise Resource Planning system (ERP) and System Application and Products (SAP) to be used by PT. Duraquipt Cemerlang.

Field Research

The data used by author is primary data. The author used Field Research methods by visiting company to gather information that needed, such as giving questionnaires, known as data collection by giving a set of questions or written statements to respondents in this case the employees of the relevant part of PT. Duraquipt Cemerlang so that respondents answered about the factors that caused the company to convert the system.

B. Data Used

The data used in this study are:

a. Primary data

Data obtained directly from the company that will be further processed by the author, such as interviewing the relevant parts of PT. Duraquipt Cemerlang.

b. Secondary data

Data obtained from the company in the form of documentation such as the history of the company's establishment, organizational structure, company activities, and other completeness data. As well as written sources or literature studies or from electronic media.

C. Analysis Tools

The analytical tool used by author is a qualitative descriptive analysis, is the analysis that uses data obtained by author, then compared with theories. Descriptive is the presentation of data generated from research by giving an idea of what it is or in accordance with reality. In the process of collecting data, it is done by using a set of instruments that have been prepared by the author to obtain information through interviews, observation, and documentation.

IV. RESULT AND DISCUSSION

Case Analysis

PT. Duraquipt Cemerlang is a developing pump repair and maintenance company in the oil and gas industry. In its development, PT. Duraquipt Cemerlang is increasingly known especially in oil and gas companies. Because of this, the demand or order of goods increases significantly. The more orders, the more complex the use of application systems to improve the efficiency and effectiveness of the company.

Before deciding to use SAP, PT. Duraquipt Cemerlang uses its own system built by the company's IT department. The system that has been built has disadvantages in terms of integration between related parts. For example, purchase orders that have been made by the purchasing department cannot be directly accessed by the receipt of goods. Where should the PO database number (Purchase Order) be a key that can be accessed by the receipt of goods. Of course that becomes ineffective when another part asks for progress from the PO. Because the receipt of goods must ask for data first to the purchasing department for the next process.

Another example is in the finance department where the process of payment to vendors is often not timely because in the old system there is no automatic "due date" feature. This makes the employee have to manually record when the payment is due. Of course this wastes time and results in bad relationships with vendors because often the payment process is not on time.

In addition, in terms of collection of receivables, there is also no sales term that automatically provides information about when the receivables are due. This has caused the receipt of receivables to be choked up because often there are many receivables that are "overdue". Thus, this greatly affects the profits and assets turnover obtained by the company.

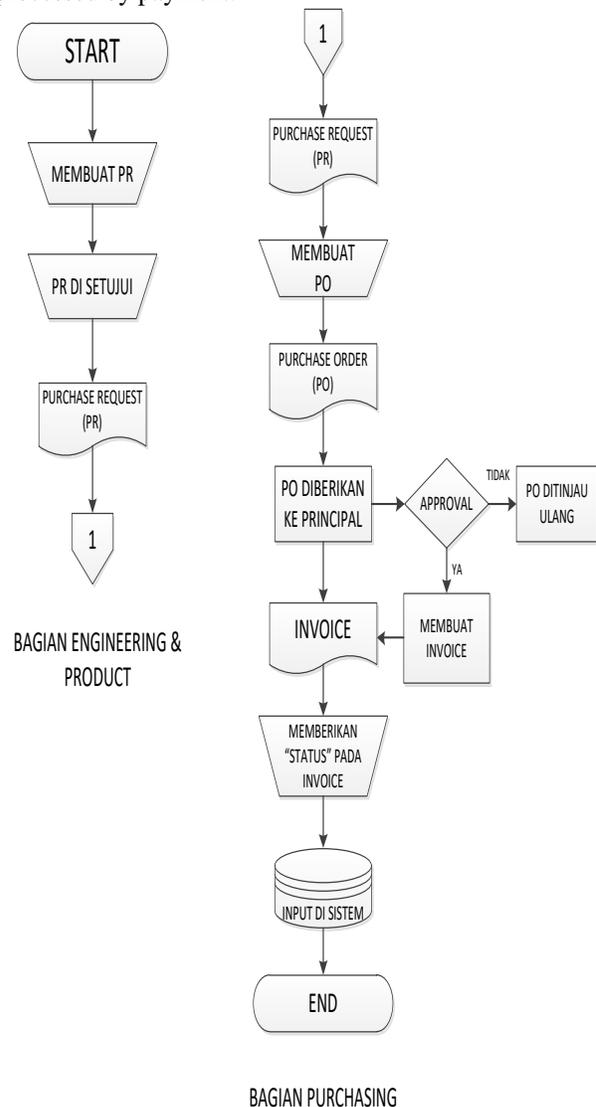
From the things mentioned above, PT. Duraquipt Cemerlang decided to convert the old system using SAP. The method used is the Gradual Conversion method. This stepwise conversion method is done by replacing a part of the old system with a new system. If

something happens, the new part will be replaced with the old one. If there is no problem, then the new modules will be paired again to replace the other old modules. With this approach, eventually all old systems will be replaced by a new system.

a. Purchasing Information System

The process of purchasing goods is done first in the Engineering and Product Department. They make a Purchase Request (PR) that will be approved by the Head of the Engineering and Product Department. After approval, the PR is given to the Purchasing section to make a Purchase Order (PO).

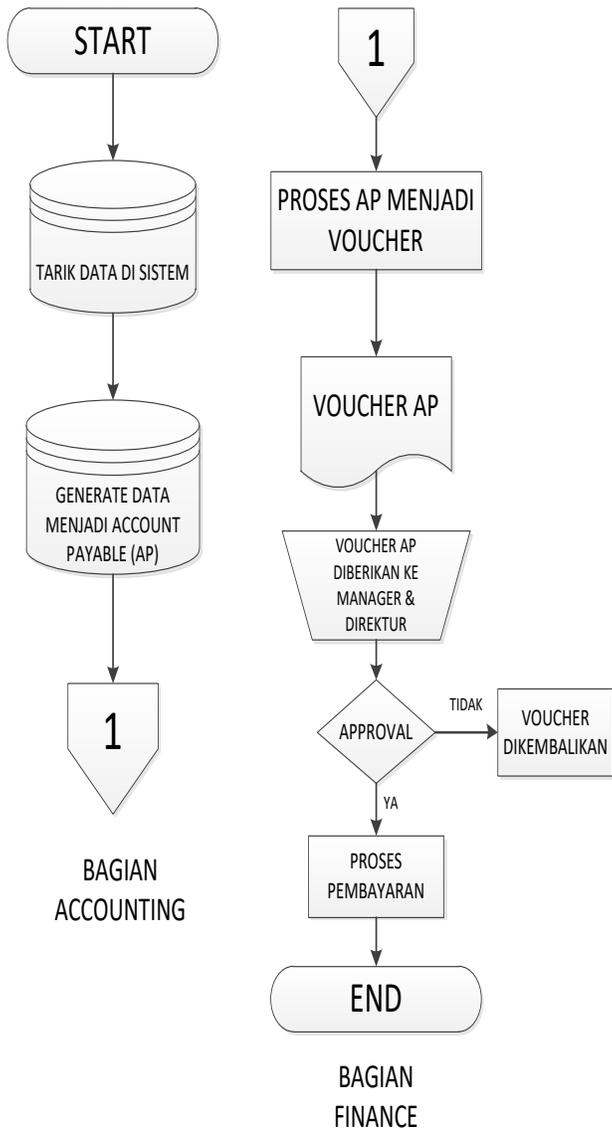
After that the Purchasing section sends the PO to the Principal for approval. If the Principal agrees, an invoice or bill is given to process the payment. Before the payment process, the Purchasing section will give "Status" to the invoice, whether the item has been received or according to the PO value. Then the invoice is entered into the system. After inputting into the system, the Accounting section will withdraw data from the system so that it can be processed by payment.



Figures 4.1 Flowchart Purchasing Information System PT. Duraquipt Cemerlang

b. Payment Information System

Payment systems occur in the Finance and Accounting Department. The first step is the Accounting section will pull data from the system that was previously inputted by the Purchasing section. After that, the data is generated to be processed into Accounts Payable (AP). After the data has become an AP, the Finance section will make a voucher to be paid. The next step is AP vouchers must be approved by the Finance Manager and Director. Then after gets approval, the payment will be executed.

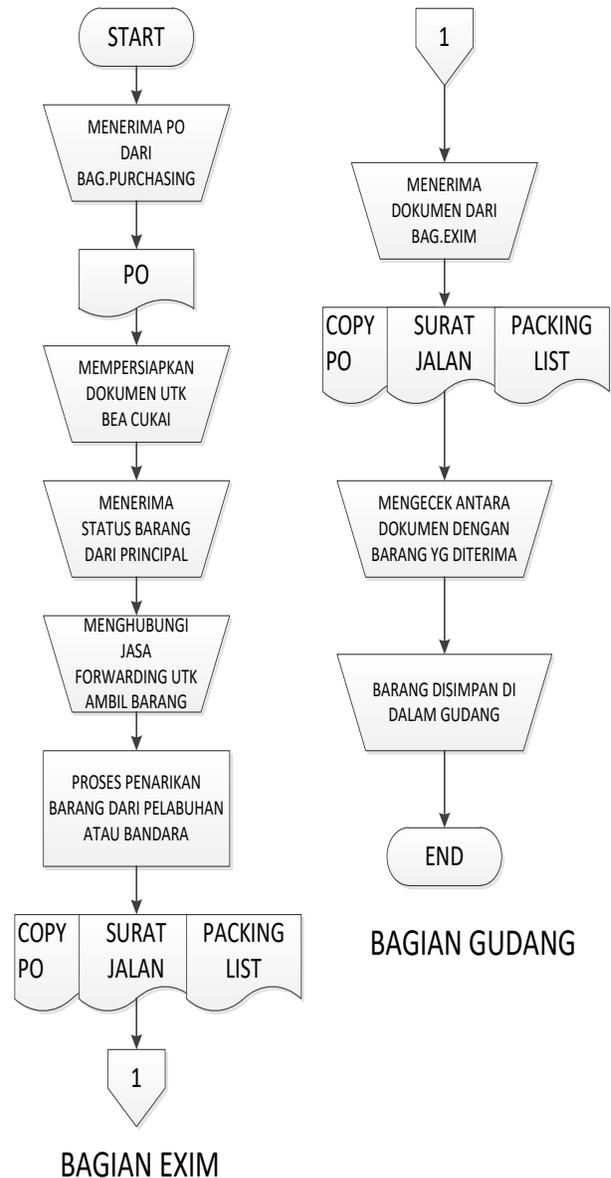


Figures 4.2 Flowchart Payment Information System PT. Duraquipt Cemerlang

c. Goods Receipt Information System

Goods receipt occurs in the Warehouse section. However, before the warehouse received the goods, the process of receiving goods occurs in the Export and Import section. If the purchase of goods occurs domestically or locally, there is no need to process in the export and import section and the goods are immediately received by the warehouse section. If the item is from abroad, it will be processed first in the Export and Import (Exim) section.

The Exim section accepts the PO from the Purchasing section to check when the item will be ready to be received and what terms apply. Then the Exim section prepares what documents are needed for the process at customs. After that, the Exim section will receive the status of goods from the Principal to then be withdrawn from the port or airport. Then the Exim section will arrange for the process of withdrawing goods by using forwarding services. When the item has been withdrawn by forwarding services, the item will be received by the warehouse. Then the warehouse will check between documents and items received. Then the items will be stored in the warehouse.



Figures 4.3 Flowchart Goods Receipt Information System PT. Duraquipt Cemerlang

System Conversion Planning

a. Introduction

PT. Duraquipt Cemerlang decided to convert the system using SAP. SAP is an ERP application to support the growing needs of the company. The main purpose of choosing SAP as an application or replacement system that is running in the company, namely

SAP provides a lot of convenience in terms of data integration between departments.

The SAP product used is SAP Be One. SAP Be One was chosen because it fits the type of small to medium-sized companies, where PT. Duraquipt Cemerlang is a growing middle-sized company.

The advantages of SAP Be One are among them can be integrated with external systems where companies can combine and develop all applications that exist and are needed by the company. Another advantage is that SAP Be One connects all production lines and all departments in the company, and modules that are in SAP Be One are integrated but can be broken down according to the needs of the company.

During the conversion process, SAP Be One provides a team for in-company training regarding SAP products and modules that the company will use.

b. Conversion Overview

In the process of conversion at PT. Duraquipt is brilliant, not necessarily the old or running system is stopped and replaced with SAP. The company decided to convert in stages by running two systems at once.

Some employees are given SAP applications and some still use the old system that is running. The goal is that when the SAP system is run and an error occurs, it can re-use the old system. This is done so that business processes in the company are not disrupted.

c. Conversion Support

Conversion support in question is the hardware used, software that needs to be upgraded, what facilities are used during the conversion process and the personnel or support staff from SAP. In this case, the hardware has no changes, meaning that it still uses existing devices. Then the software to support this SAP system also needs to be improved in terms of internet connection. Because in the SAP module high internet connectivity is required for realtime processes.

During the conversion process, there will be several SAP expert personnel who will provide training on SAP. Training will be conducted for one month and if there is an error in the future, the SAP expert personnel will be ready to improve.

System Conversion Method

a. Making Phase

In this phase the company prepares administratively and then makes a mapping of business processes that will be integrated into SAP. The manufacturing phase consists of Information Quality Dimensions, System Quality Dimensions and Service Quality Dimensions. The dimensions of information quality are measured in terms of Accuracy, Completeness, Timeliness, Relevance and Format. While the dimensions of system quality are measured in terms of Easy to Use and Easy to Learn. And the dimensions of service quality are measured in terms of Speed of Response, Guarantee, Reliability and Empathy.

The user's perception of the quality of information from SAP is dominantly positive. But in the Exim section there is still a need for additional features such as outstanding goods and updating items to be processed for shipping to the warehouse. The outstanding goods feature is needed to find out the items that have been processed for payment but cannot be sent so that they can be given a warning or reminder to the vendor. While updating items

is needed to process information to customs if the item is not purchased domestically.

The user's perception of the dimensions of system quality shows a positive thing. Staff of Finance and Accounting, Purchasing and Exim can use SAP easily and quickly after 3 months accompanied by a trainer.

The user's perception of the dimensions of service quality all shows a positive thing. Basically, every user feels the good service quality of the SAP system. Thus, it will increase the good performance of users because they get satisfactory service quality.

b. Usage Experience Phase

The phase of user experience is measured in terms of dimensions of use and user satisfaction. From the results of the Usage dimension research it can be stated that each SAP system user is not fully dependent on the SAP system. This is because there are still old systems running and still being used during SAP system conversions. While from the User Satisfaction Dimension it can be concluded that the user's perception of user satisfaction is positive. This can be seen from user satisfaction on a system that is smoothly integrated into the current transaction. Makes it easy for every staff to carry out related tasks on current transactions.

c. Phase Impact of Use

The impact phase of usage is measured in terms of Net Profit Dimensions whose parameters are Productivity, Customer Satisfaction and Management Control. From the results of interviews with PT.Duraquipt Cemerlang's financial managers, who stated that employees work more productively and more efficiently, customers are satisfied with regular goods delivery and collection of receivables can be settled in accordance with the terms of sale and payment due after using SAP.

V. CONCLUSIONS AND RECOMMENDATION

Conclusion

Based on the results of the analysis and discussion that the author has done in the previous chapter, the conclusions that can be drawn in this study are:

1. The application of information systems before using SAP has been going well, but there are several important functions that do not work as they should. Such as authorization from the relevant section regarding the current transaction and the payment function with an automatic due date system.
2. PT. Duraquipt Cemerlang decided to convert information systems by using SAP for effective and efficient business processes. The conversion method used is the Staged Conversion method, because if something happens, the new part will be replaced with the old one. If there is no problem, then the new modules will be paired again to replace the other old modules. During the conversion process for approximately three months, SAP runs very well and the users are satisfied when using SAP.
3. The advantage of old system conversions with SAP is, first, management can find out how much revenue from accounts receivable will be collected so that it automatically increases company profits. Second, systems of authorization in SAP systems which allow purchasing parts not to release orders if there is no approval from the SAP system and the integration

between each parts of organization makes it easy to carry out transactions. Third, SAP have an effect on the productivity of their users, making business processes run smoothly and programmed also monitored effectively and efficiently.

Recommendation

Based on the conclusions above, the authors intend to give suggestion that can be taken into consideration by the company. The suggestion is that the company remains consistent in continuing the implementation of SAP because it is more effective and efficient in running business processes.

ACKNOWLEDGMENT

We give thanks to God Almighty for His Grace, so that we can finish writing this journal well.

Making this journal is one of the requirements to obtain a Master Degree in Management Accounting Information System at Gunadarma University.

In completing this journal the author gets help, guidance, and prayer from various parties. So in this occasion the author would like to say thank you in particular to Dr. Izzati Amperaningrum, SE., MM. as a supervisor who directs and helps and spends her time in giving guidance to the author.

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Impact of Rajarata University, Management Graduates' English Language Proficiency On Employability

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DOI: 10.29322/IJSRP.9.08.2019.p9281

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9281>

Abstract- English language has already become the lingua franca of twenty first century and by now English is playing a pivotal role in Education sector as well as in service industry. Competency in English facilitates the graduates in entering in to both the private and public sectors. The graduate who is a master in English language will enter to the world of work-readiness with confidence.

The purpose of this study was to fathom out the impact of English language proficiency of Management graduates, Rajarata University of Sri Lanka on employability.

The research was conducted through quantitative and qualitative methods. A survey with structured questionnaire was conducted covering a sample of 80 graduates and they were asked questions about English language teaching at university, English language test at University, Attitudes towards English language and employability. The section B of the questionnaire was given to 25 Companies from small, medium, large and multi-national and questions about employer's perspective was asked.

Responses of the survey were statistically analyzed using correlation, linear regression analysis, multiple regression analysis, scatter plot and Anova test using 20.0 version of SPSS software. Hypothesis was tested on 0.05 significant level and the results were driven out of them. All the alternative hypothesis were accepted and thus the study revealed that there is a positive correlation between English language proficiency and employability.

Interviews were conducted among 10 graduates and 10 Companies and they were transcribed to gather information and it was concluded that they are on the view that there is a significant impact of English language proficiency on employability.

Recommendations were made to improve the competency level of English language among graduates and to enlighten the workplace needs.

Index Terms- English Language proficiency, Employability, Lingua Franca, Education sector

I. INTRODUCTION

Tertiary education is often viewed as a guaranteed pathway to employment. The university is perceived now as an engine of change in the economy and as a means of effecting social change, especially in the field of developing human capital".

(Noor, 2009, p.1)The key to a promising career is to develop the competency factors and English has become the vehicle in driving these competency factors.

English has become the medium of instruction in most of the Sri Lankan higher educational institutes and Rajarata University is not an exception. The curriculum for English Language Teaching at Rajarata University determines to fulfill the timely requirements of the undergraduates and it is designed according to the standards prescribed in UTEL-A benchmark table. "The benchmark determines to address the needs of the employability skills in local graduates". (Kulasingham et al., 2011,p.3)

Although English language teaching fulfills the timely requirement, as per the discussions had with the lecturers and the graduates. The fact was highlighted that the graduates encounter difficulties in coping up the work simply because they are incompetent with the English language.

II. PROBLEM STATEMENT

National university education had been able to raise the level of aspiration of most of the Sri Lankans of providing a secured path of higher employability. While promising a good career path for the graduates it is necessary to look in to the objectives of the Sri Lankan education with special reference to University education. "The university education has to respond to the social aspirations for higher education and be responsive to social changes according to the economic review". (Ariyawansa, 2008, p.91) Furthermore Ariyawansa (2008,p.92) highlights the facts that almost all the families in Sri Lanka are craving for university education with the notion that it ensure their children's employability.

The core of the problem lies with employability as the graduates have to wait for a long period of time to be employed or once they employed they find difficulties in proving a better output due to the fact that they are incompetent with English language. Wickramarachchi (2008) bring out the fact that most of the graduates, having obtained a degree with a class pass, they are unable to find a suitable employment. They leave the university without the assurance for better employment.

The current job market is getting competent and the graduates are expected to face the challenges that lie before them. Most of the glorifying and internationally recognized companies have identified English as a "global unifying language and a bonding force which is found in a variety of domains."(Wijewardene,2014,p.138) Thus the employers are on

the lookout for graduates who are able to communicate lucidly with counterparts and customers in English. As per the discussions held with Human Resource managers of some companies, it was evident that they expect the graduates to be ready for the “world of work which is the arena where they will practice all that they have assimilated in their years of study at the study”. (Wijewardene,2014,p139) They are expected to display their nonspecific qualities coupled with their subject-specific knowledge. Hence English language will be the driving force which all help them to display their colors. But unfortunately most of the management graduates fail to display their talents.

Hence as per the discussions held with lecturers and graduates it is proved that the graduates who are in the threshold of finding

III. SIGNIFICANCE OF THE STUDY

“English language competency has become instrumental in university education today because unlike the early decades of university education, today undergraduates are expected to be trained to be employers replacing the expectation of early decades to broaden the minds of graduates or to engage in the discourse of contemporary issues”. (Jayasinghe et al, Wijethunga,2015,p.80) English has become life time skill that determines the career path of the graduates of management.

The study aims at a population of university graduates, with special reference to management graduates of Rajarata university of Sri Lanka. Hence the research will be an eye opening to the reader. The research assesses the expectations of employers so that the undergraduates will nurture themselves as all-rounded graduates. A graduate who is facilitated with English language will be released to the market with the help of this research.

The main objective of this study is to assess the impact of Management graduates’ English Language proficiency on employability. Hence once the output comes, the researcher can enlighten the respective university and other respective parties regarding the employability and the requirements expected by the employers.

Since the main objective of the study aims at assessing the impact of English language proficiency of management graduates on employability, the respective university will find the research an asset. The respective academics will be enlightened with the expectations of Employers and they will integrate the timely requirements of the business world into the curriculum.

Management graduates and undergraduates from state and private universities of Sri Lanka will be enlightened by this study. Since English language proficiency is a discipline which is underestimated by most of the students, this research will become an eye opening for the students to look into the impact which it has on employability because today English language proficiency has become a pivotal criteria when deciding if a graduate is employable or not.

a job will not get employed if they are not proficient in English. Thus the scope of the study has given space for two issues to be taken under consideration and they are as follows. Graduates of management faculty find it difficult to cope with the work once they are employed and they have to wait for a long period to be employed because of the fact that they are incompetent in English language.

Furthermore through this scope of study it is intended to assess the impact of English language proficiency on employability, increase students’ awareness of developing their professional identity and finally to integrate English language proficiency and employability within teaching and learning.

IV. OBJECTIVES

General objective

- i. Assess the impact of English language proficiency of management graduates of Rajarata University on employability

Specific objectives

- ii. Develop students’ English Language Proficiency and making English Language development a central element of their learning and teaching.
- iii. Make the undergraduates aware about the current situation and to organize some programmes which will help them to make themselves to the changes. The programmes will be conducted with the collaboration of career guidance unit.
- iv. Increase students’ awareness of the requirements of the employers since the study will be carried out with selected 25 organizations, the research will bring about different type of requirements of employers. With the findings of the research to raise the awareness of the undergraduates about the employability and what do the employers expect from Management graduates.
- v. To make the undergraduates a group who are competent in fulfilling the hourly needs of the job market.
- vi. Energise students to focus on the importance of English Language proficiency.
- vii. Enable students to develop competencies to acquire internationally intelligible English.
- viii. Refresh students to acquire proficiency, fluency and accuracy in English.

V. LITERATURE REVIEW

i. Employability

Yorke and Knight (2003) defines employability as “a set of achievements -skills, understandings and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations which benefits themselves, the workforce, the community and the economy.

Increasing globalization of professional jobs/careers has placed demands upon students and graduates to excel academically and also to enhance their generic skills. According to Fallows and Stevens (2000), there is a need for university wide initiative to build employability skills in particular generic skills into the higher education curriculum, in line with the Consensus Theory. They offer two key reasons: first, knowledge of academic subject is inadequate in current economic situation. Second, graduates need to gain generic skills that will enhance their employability. This demand has led universities to review and adapt their curriculum to infuse generic skills through varying means, some through direct intervention at curriculum level, while others through integrative mechanism. The focus on this review and infusion of generic skills has been at the undergraduate level.

Since the organizations of today world are moving fast with the business trends, advanced technology and globalization, the employer tend to seek prospective employees who are well conversant in English language. Thus English language competency or proficiency has become a pivotal criteria in deciding if a graduate is employable or not. In a competitive business world, where flourishing organizations seek expand the branches internationally or organizations which have a wide array of sectors in international territories,” English has been elevated to a position of a common corporate language in order to bring about an economic integration and a closer networking in the global business environment.” (Wijewardene,2014,p.140).

ii. English for Employability

English has gain the status of being recognized as the global medium for business and communication. Thus a wake-up call has been given for the management graduates to be well versed in English language in order to increase the employment opportunities. Without being competent in English the graduates will not be able to communicate with counterparts and customers.

Many employers are of the view that business graduates need to improve their spoken English skills if they were to portray a positive image of the organization they represent to the business world. (Wijewardene,2016,p.55)

Focusing on English language competency specifically, studies have shown that there is a global concern about the increasing gap between the level of competency of the graduates and the level needed for employment. (Sarudin et al.2013) Many studies have been conducted in Japan, Singapore, Hong Kong,Taiwan and Korea to analyze the gap and they have taken active measures to improve the standards since English is considered as the language of business and technology. Ministry of Higher Education of Malaysia in their studies in 2012 concludes that most common problems among graduates seeking jobs were poor command of the English language which is 55.8% of the total. On the other hand Ismail Yussof and Lai, 2011 have conducted a survey in order to assess employers’ perception on Malaysian graduates. The respondents were senior Human resource Managers in the service industry and they were on the opinion that the graduates need to improve soft skills,

which included communication skills as well as English Language.

iii. English Language Teaching at Sri Lankan Universities

Wijewardene (2014,p.139) articulates the fact that employees with generic capabilities such as teamwork, oral and written English skills are very much sought after by employers. The state universities being understood the prime importance of English language proficiency, all the subject’s started to be taught in English medium. With the reforms put forward by the National Education Commission in 2009 the state universities could elevate the position of English thereby it became the medium of instruction. Gunasekara (2013) noted that “today the needs have morphed in to a mix of English for academic purposes, English for professional purposes and English for social purposes including upward mobility. (as cited in Jayasinghe and Wijethunga, 2015,p.81)

VI. METHODOLOGY

i. Conceptual Framework

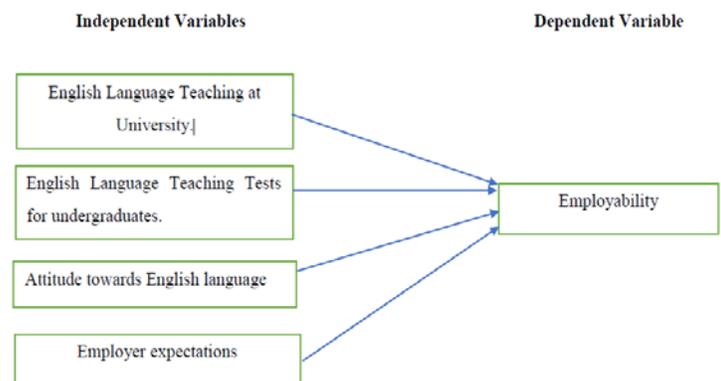


FIGURE 6.1 : CONCEPTUAL FRAMEWORK

ii. HYPOTHESIS

Null hypothesis - H_0

Alternative Hypothesis - H_a

H1	H ₀ 1- There is no relationship between English language Teaching at university and Employability
	H _a 1- There is a relationship between English language teaching at university and Employability
H2	H ₀ 2- There is no relationship between English language teaching tests for undergraduates and employability
	H _a 2- There is a relationship between English language teaching tests for undergraduates and employability
H3	H ₀ 3- There is no relationship between Attitude towards English Language and employability
	H _a 3- There is a relationship between Attitude towards English Language and employability
H4	H ₀ 4- There is no relationship between employer expectations and employability
	H _a 4- There is a relationship between employer expectations and employability

iii. Research process

The research onion is used in explaining the research methodology for the study with the research onion framework adopted from Saunders & Lewis (2012). This is presented in below figure .The approach taken in using the research onion framework is to go from the outer layer to the inner layer of the research onion.

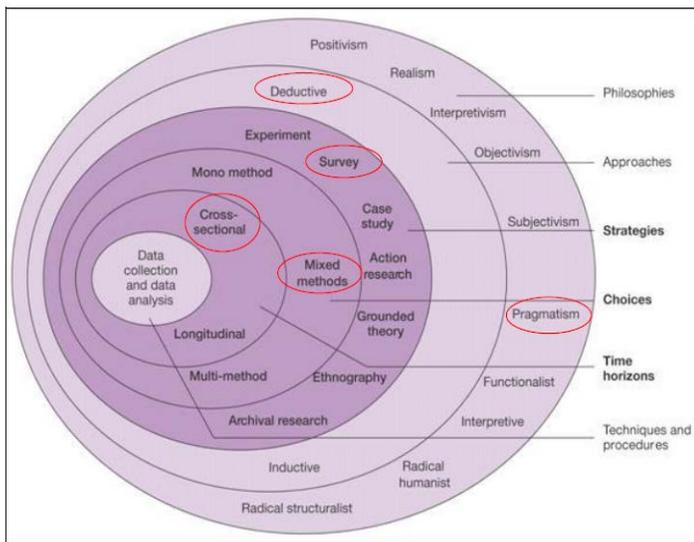


Figure 6.2 Research Onion
Source: Saunders et al (2007)

iv. Population, sample and sampling

The research will be carried out to assess the impact of English language proficiency of Management graduates, Rajarata University on employability. Thus the target audience consist of Management graduates of 2017 and selected government and

private organizations.

Simple random technique will be used to select the graduates since there are about 450 graduates from Faculty of Management studies, 80 graduates will be selected. Purposive technique will be used to select 25 employers or organizations. As Saunders et al (2009) describes, the purposive sample method or the judgmental sampling method facilitates the researcher to intentionally select the sample focusing on specific characteristics which will best enable to answer the research questions and to meet the research objectives.

v. Primary data collection

Primary data will be collected with questionnaires and interviews. Questionnaires will be distributed among 80 graduates and 25 employers to obtain quantitative results. In depth interviews will be conducted with the 25 employers to gather their ideas on English language proficiency among business graduates and how does ELP impact on employability. 20 interviews will be conducted with the graduates to find their opinions on English language proficiency. The interviews will be conducted on the basis of anonymity.

vi. Secondary data collection

Secondary data collection will be drawn from organizational records and prospectus 2015-2019, Faculty of Management studies and the Survey conducted by Ministry of Higher Education.

Data from “Graduand Employment :Rajarata University of Sri Lanka (2012) by 2012 Dr. Asoka Ramanayake, Imali Jayamanne,Nadeeka Weerasinghe, D. B. U. S.Perera, W. M. L. K. N. Wijesekara” will be used to compare between generated results with the existing records.

vii. Quantitative analysis

Likert scale type questions, pre tested questionnaires will be given in the questionnaires to generate statistics. Correlation method will be used to analyze data. The hypothesis will be tested using T-test or ANOVA.SPSS software will be used to analyze the gathered data.

viii. Qualitative analysis

In order to generate statistics, interviews and open ended questions will be used. Open ended questions will be asked through the questionnaires. Narrative analysis will be used as the method and the presentation of data will be done using tables, charts, graphs and statistical measures.

VII. ANALYSIS

Quantitative Analysis

i. English language teaching at University and Employability

The following table illustrates the correlation of English language teaching at university and employability

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean_English Language Teaching at University	4.2754	.90128	80
Mean_Employability	8.7125	.89575	80

Correlations			
		Mean_English Language Teaching at University	Mean_Employability
Mean_English Language Teaching at University	Pearson Correlation	1	.206
	Sig. (2-tailed)		.067
	N	80	80
Mean_Employability	Pearson Correlation	.206	1
	Sig. (2-tailed)	.067	
	N	80	80

Table 6.1 Correlation of English language teaching at University and Employability

According to the table, the correlation coefficient value in the coefficients table (0.206) gives a positive value which indicates a low degree of correlation. This would mean that the increase in one variable may increase the other variable. This could be further elaborated that higher the quality of English language teaching at university higher the employability rate. Once the graduates are given a firm foundation of quality English language teaching, they will have higher opportunity of employability.

ii. English Language Test and Employability

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean_English Language Test	3.8630	.56356	80
Mean_Employability	8.7125	.89575	80

Correlations			
		Mean_English Language Test	Mean_Employability
Mean_English Language Test	Pearson Correlation	1	.255
	Sig. (2-tailed)		.022
	N	80	80
Mean_Employability	Pearson Correlation	.255	1
	Sig. (2-tailed)	.022	
	N	80	80

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.2 English language Test and Employability

According to the table, the correlation coefficient value in the coefficients table (0.255) indicates a positive value which indicates a low degree of correlation. This would mean that the increase in one variable may increase the other variable. This could be further elaborated that higher the quality of English language test for undergraduates higher the employability rate.

iii. Attitude towards English language and Employability

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean_Attitude Towards English	3.5659	.45609	80
Mean_Employability	8.7125	.89575	80

Correlations			
		Mean_Attitude Towards English	Mean_Employability
Mean_Attitude Towards English	Pearson Correlation	1	.261
	Sig. (2-tailed)		.019
	N	80	80
Mean_Employability	Pearson Correlation	.261	1
	Sig. (2-tailed)	.019	
	N	80	80

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.3 Correlation of Attitude towards English language and Employability

According to the table, the correlation coefficient value in the coefficients table (0.261) Indicates a positive value which indicates a low degree of correlation. This would mean that the increase in one variable may increase the other variable. This could be further elaborated that higher the attitude towards English language higher the employability rate.

iv. Employer expectations and Employability

Descriptive Statistics			
	Mean	Std. Deviation	N
Mean_Employer	3.6293	.48135	25
Mean_Employability	8.7125	.89575	80

Correlations			
		Mean_Employer	Mean_Employability
Mean_Employer	Pearson Correlation	1	.205
	Sig. (2-tailed)		.326
	N	25	25
Mean_Employability	Pearson Correlation	.205	1
	Sig. (2-tailed)	.326	
	N	25	80

Table 6.4 Correlation of Employer expectations and Employability

According to the table, the correlation coefficient value in the coefficients table (0.205) a positive value which indicates a low degree of correlation. This would mean that the increase in one variable may increase the other variable. This could be further elaborated that when the management graduates fulfil the expectations of employers more and more the employability rate increases.

v. Relationship between English language teaching at university and Employability

H01- There is no relationship between English language teaching at university and Employability

Ha1- There is a relationship between English language teaching at university and Employability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.837	.481		16.293	.000	6.880	8.795
	Mean_English Language Teaching at University	.205	.110	.206	1.859	.067	-.014	.424

a. Dependent Variable: Mean_Employability

Table 6.5 Coefficients Table: English language teaching at university and Employability

According to the table 6.5, it is identified that the perceived access to English language teaching at university and employability relationship is significant at 0.067 which is less than in the significant level of 5% (0.05). Hence the null hypothesis was rejected and the alternative hypothesis was accepted. Hence it could be concluded that there is a significant positive relationship between English language teaching at university and employability.

vi. Relationship between English language test at university and Employability

H02- There is no relationship between English language teaching tests for undergraduates and employability

Ha2-There is a relationship between English languages teaching tests for undergraduates and employability.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.145	.679		10.520	.000	5.793	8.498
	Mean_English Language Test	.406	.174	.255	2.331	.022	.059	.752

a. Dependent Variable: Mean_Employability

Table 6.6: Coefficients Table: English language test at university and Employability

According to the table 6.6, it is identified that the perceived access to English language tests for undergraduates and employability relationship is significant at 0.022 which is less than in the significant level of 5% (0.05). Hence the null hypothesis was rejected and the alternative hypothesis was accepted. Hence it could be concluded that there is a significant positive relationship between English language tests for undergraduates and employability.

vii. Relationship between Attitude towards English language and Employability

H03- There is no relationship between Attitude towards English Language and employability

Ha3-There is a relationship between Attitude towards English Language and employability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	6.885	.772		8.922	.000	5.349	8.421
	Mean_AttitudeTowardsEnglish	.512	.215	.261	2.387	.019	.085	.940

a. Dependent Variable: Mean_Employability

Table 6.7 : Coefficients Table: Attitude towards English language and Employability

According to the table 6.7, it is identified that the perceived access to attitude towards English language and employability relationship is significant at 0.019 which is less than in the significant level of 5% (0.05). Hence the null hypothesis was rejected and the alternative hypothesis was accepted. Hence it could be concluded that there is a significant positive relationship between employer expectations and employability.

viii. Relationship between Employer expectations and Employability

H04- There is no relationship between employer expectations and employability

Ha4- There is a relationship between employer expectations and employability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.104	1.524		4.662	.000	3.952	10.256
	Mean_Employer	.418	.416	.205	1.003	.326	-.444	1.279

a. Dependent Variable: Mean_Employability

Table 6.8 : Coefficients Table: Employer expectations and Employability

According to the table 6.8, it is identified that the perceived access to employer expectations and employability relationship is significant at 0.326 which is less than in the significant level of 5% (0.05). Hence the null hypothesis was rejected and the alternative hypothesis was accepted. Hence it could be concluded that there is a significant positive relationship between employer expectations and employability.

Qualitative analysis

10 Companies and 10 students were selected in order to conduct the interviews and they were recorded and they were transcribed as follows in order to reach the conclusion.

i. English language teaching at university

Majority of the respondents have declared that English language at Faculty of Management studies is really good and they are satisfied with the teaching. They said that the lecturers are well trained and they are most of the times very flexible with the students, giving them opportunity to ask questions and to clear the doubts. The respondents were on the view that the teaching style is very good and may be that they are keep on training themselves with the latest methods. And they highlighted the fact that there are so many students who are lagging behind when it comes to English language and their performance on other subjects too are fairly low since English is the language they have to use when writing for the examination. So they suggested to have small groups of students where the lecturer can pay individual attention and can do lot of activities with the students.

ii. English language test for undergraduates

The students came up with the view that it is really good to have three papers with different aspects. (Writing, listening and speaking). And also they appreciated that they had General English for first year and Business English for second and third years. All the lessons and activities were based on business flavor and they said that their knowledge helped them to co up with the work once they are hired by the organizations.

Moreover they were on the opinion that the content of the test helped them a lot once they get in to the field of study. The respondents held the notion that these tests are good benchmarks to evaluate the level of the English knowledge but then again they said that some students get nervous and panic when it comes to speaking tests. This can happen because the students do not get a chance often to speak in the class since they have large number of groups in departments. Even though they were given one hour per week to do speaking tasks due to the large number of students one may not get enough time to speak out and do the tasks. So they said that once they were given tasks to be done at the examination, they may not do it up to the expected standard. So there are pros and cons in these tests as well.

iii. Attitude towards English language

The respondents accepted that they were not that confident when they first came in to the university and they were not that familiar with English language at first because most of the students said that even though they had good results for Ordinary level English subject, most of the students got C and S passes for English in Advanced level examination and they abhorred the subject and the attitude was a very minus one in the initial part. But once they got touch with the interactive sessions in English lecture they have felt that there was an attitudinal change and the lecturers were very flexible with their attitudes. No of course the respondents have a positive attitude towards English language and they were happy about that because they could improve a lot because of their positive attitude and they said that they could grab opportunities that came their way and they could even get promotions since they were functioning smoothly with the flow of the workplace.

iv. Employer expectations

The respondents were Managers of 10 Companies and they held the notion that they evaluate the management graduates from the moment they enter to the organization, from the initial parts of the interviews they will start evaluating the graduates and they of course expect a moderate level of English language proficiency from the graduates because they are with the expectation that they will build up their level of English knowledge and competency in their career life. They did not highlight many weak points but they said that management graduates are fresh for the workplace and they get little bit of time to adapt to the environment and to take responsibilities. Apart from that there is nothing to be emphasized as the weak points.

They were on the opinion that English knowledge is a must in the workplace and it is very important in the workplace. Most of the graduates are thorough with the theories but when it comes to the workplace it is not that they are applying the theories, they may apply but it will be one out of thousand theories. So they have to use their practical hands on work with the aid of English language competency. IF they can do it they can flourish in the organization and if not, one may have a bad effect on his or her career life.

v. Employability

The respondents were the graduates and they declared that they had many obstacles once they were hired by the organizations because it was their first job and the workplace is obviously an unfamiliar one and they were not that confident in communicating with peers in English language. Most of the students who are in multi- national Companies declared that they encountered problems since they have to deal with different kind of people around the world and the middle language is English.

The respondents accepted that if they are competent in English language they will definitely have opportunities to climb up the

career ladder and they were on the view that English is a must when you work especially in private sector. Furthermore they said that writing, reading, speaking and listening skills are important to do daily chorus in the workplace.

VII. CONCLUSIONS AND RECOMMENDATIONS

i. Conclusions

Several statistical analysis methods were used under quantitative data analysis. Overall mean of each independent variable was measured, the correlation analysis, scatter plot diagrams, for hypothesis testing, regression analysis and multiple regression analysis were used and the data collected through closed ended questions were analyzed.

Overall measure of mean of each independent variable had positive mean interpreting that all the respondents agree with the statements. Furthermore all the independent variables had positive relationships with dependent variable and thus alternative hypothesis of the study were accepted while the null hypothesis were rejected.

Correlation analysis and scatter plot diagrams proved that all the independent variable have positive relationships with dependent variable which is employability. This mean that change in an independent variable may result in dependent variable as well. Thus the researcher could accept all the alternative hypothesis which were built in the initial phase of the proposal and all the null hypothesis could be rejected.

Independent variables and the dependent variable were tested afterwards through a set of closed ended questions which were raised in the questionnaire section A and B. Majority of the respondents agreed with the statements but the respondents from the Company did not agree with the statements and they were on the view that the Companies are not providing in-house and outside the Company English language programmes. Apart from that statement all the other statements proved that there is a positive relationship between independent variables and dependent variable.

Qualitative data analysis consists of open ended questions which were raised in the questionnaire and the interviews. Section A of the questionnaire was given to 80 sample of graduates and section B to 25 Companies and interviews were held with randomly selected 10 graduates and randomly selected 10 Companies. Through the data gathered, it was proved that all the independent variables have positive relationships with dependent variable which again proved the alternative hypothesis. All the graduate respondents accepted that there is an impact of English language proficiency on employability and all the respondents from the Companies too highlighted the fact that there is an impact of English language proficiency on employability.

Secondary data which were taken from Grandaunt Employment :Rajarata University of Sri Lanka (2012) by 2012 Dr. Asoka Ramanayake, Imali Jayamanne, Nadeeka Weerasinghe, D. B. U. S.Perera, W. M. L. K. N. Wijesekara

proved that there is an impact of English language proficiency on employability.

The study was carried out in order to find out whether there is a relationship between the independent variables and the dependent variable. Through several analysis conducted throughout the research concluded that there is a positive relationship between the independent variables which include English language teaching at University, English language tests for undergraduates, attitudes towards English language, Employer expectations and the dependent variable employability

Furthermore the research highlight that there is a trivial negative impact as well. Some graduates came up with the view that the quality of teaching style should be improved since most of the students enter the university with "C" or "S" pass for English subject in Advanced level Examination. They highlighted that since there are large group of numbers in one department, the students should be categorized in to groups for a successful acquisition of second language.

Graduates as well as respondents of the Companies highlighted some suggestions that could be implemented for a successful second language acquisition as well as for a smooth functioning in the workplace.

ii. Recommendations

Majority of the graduates are on the view that teaching methods used at the university to teach English are effective, learning process is suitable for current job environments, practical knowledge about the business world is acquired through coursework but 6% of the total has said that the teaching should be improved. As for the recommendations, it is said that there are so many students from every department who are lagging behind when it comes to English language, since happens mainly due to their knowledge about English and they have entered the university with C or S passes for English in Advanced level examination. Nevertheless the medium of instruction is English and they have to master the language if they are to have good performance even in the other subjects. Thus it is recommended that student centered activities should be implemented and students should be categorized according to their level of English language and the number of students per group should be minimal as it will give an opportunity for the lecturer to pay individual attention to the student.

When analysing the grades received for First year General English and third year Business English majority of the students have improved their English language competency but 13.75% out of total are not satisfied with their competency and they have come up with recommendations that more speaking activities should be done because at the workplace speaking in English is a must specially in private sector. Even though at the university they are given one hour per week to do speaking activities due to the large number of students per department, they get a rare chance to speak up. So it is suggested that they have to be given presentations to do and an interactive session throughout the lecture hour is expected from the lecture where students get an opportunity to speak up and get rid of their inhibition they have

to a second language.

Moreover the respondents agreed with the statements that competency in English is equally or more important than academic knowledge and skills associated with the bachelor degree, English is a must when participating for business meetings, it is difficult to communicate with counterparts and customers without English language competency and English is a must to present the presentations. Most of the students are satisfied with their level of English language but 26.25% of the total declared that they are not satisfied with their level of English language competency and as recommendations, they offered that soft skills programmes should be implemented at university in order to brush up their soft skills, participate for an interview with confidence and other skills which are mandatory in workplace should be improved through some programmes. The undergraduates who are in the threshold of graduation should be provided with these kinds of programmes and the University can MOU s with Companies which flourish in the job market and they can implement programme where both parties will get benefit at the end of the day.

When analysing the responses of the Companies, majority agreed that competency in English is important in the Company, English language competency is equally or more important than academic knowledge and skills associated with the bachelor degree. Moreover they were on the opinion that four skills of English language are really important in the workplace. Companies are not ready to employ the graduates without the minimum English language competency required by the Organization. Majority of the Companies accepted that newly recruited employees are not that prepared to perform work in English and they always feel inhibition when it comes to speaking. Companies will be evaluating the English language competency from the first step of the fresh graduates and they are using several methods such as interview, written essay, prompts/tasks, impromptu speech, oral presentations, and response to questions. But they declared that most of the Companies do not provide in-house English language training for the employees and it is 64% out of the total and English language programmes outside the organizations were not implemented and it is 76% out of the total. Thus as far as recommendations concerned, Companies should conduct a performance appraisal of soft skills and communication of the employees and they should be sent to trainings in order to brush up their skills and competency.

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Influence of Cognitive Styles and Gender on Upper Basic III Mathematics Students' Achievement in Keffi, Nasarawa State, Nigeria

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DOI: 10.29322/IJSRP.9.08.2019.p9282

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9282>

Abstract

This study investigated the influence of cognitive styles and gender on upper basic III Mathematics students' achievement in Keffi, Nasarawa State, Nigeria. The study was a descriptive survey research design. The population consisted of 1,890 upper basic III Mathematics students in 25 coeducational schools in the zone. The sample of the study comprised 245 upper basic III Mathematics students drawn from six intact classes of six coeducational schools in Keffi Education zone. The schools were randomly selected using disproportionate stratified random sampling techniques from the schools that satisfied the condition that their students were taught by qualified teachers over the years. Two instruments were employed for data collection namely; Cognitive Style Checklist (CSC) with a reliability coefficient of 0.79 and Mathematics Achievement Test (MAT) with a reliability coefficient of 0.81. Descriptive statistics of means and standard deviations were used to answer the research questions while Z-test was used to test the hypotheses at 0.05 level of significance. The findings of this study revealed that Basic Mathematics students in the Field Independence (FI) group achieved significantly better than the those in the Field Dependence (FD). The findings also revealed that male students in both the Field Independence (FI) and Field Dependence (FD) groups achieved better than the female students significantly. Based on the findings of this study, it was recommendation that seminars and workshops should be organized to adequately equip teachers with the needed skills to create an environment where students with different cognitive styles can experience meaningful learning of Mathematics.

Keywords: Achievement, Cognitive Styles, Gender and Mathematics.

INTRODUCTION

The selection of Mathematics as one of the core subjects offered in Basic and Secondary schools in Nigeria, as well as its status as part of mandatory requirement for admission into post-secondary Institution in the country are clear indication of the relevance of the subject in Nigeria education (FRN, 2014). At national and global levels, there is a general consensus that economic development, viability and stability are solely, in the 21 century, scientific and technological based. This means that, economic prosperity of a nation depends largely on the scientific and technological development, which cannot be possibly attained without sound, effective and strong Mathematics Education (Sanni, 2012). Alechenu (2012), described Mathematics as the "queen" of the sciences without which it would be difficult for people to study other sciences like physics, chemistry, biology

and computer science/information technology. Underscoring the importance of Science, Technology and Mathematics Education to national development, he said. “We hope our government will properly address the issue of scientific transformation of our growth dynamics and processes as a nation”. As important as the subject is, there is tremendous and persistent failures of the Nigerian Students in it.

Despite the relevance of Mathematics to national development, security, economy, manpower and government’s efforts to improve Mathematics instruction in schools, students’ achievement is below average. This has become a great concern for Mathematics educators especially at the foundational level. Researchers such as (Amoo, 2013; Sanni 2012; Alechenu, 2012) opined that underachievement in Mathematics among basic school students could be attributed to several factors such as poor teaching, psychological factors, unpreparedness on the part of the students, poor learning environment, school locations, gender stereotyping, dearth of qualified teachers among others. As a result of the decline in Mathematics students’ achievement, stakeholders in STM agree that the huge investment in Science, Technology and Mathematics education is not yielding the desired dividend.

Gender remains an important factor to be considered in the determination of students’ academic achievement. Gender has been identified as a major factor that affects students’ achievement in science examinations and Science, Technology and Mathematics endeavor (Omiko, 2017). Oni (2014) posited that in Nigeria, women are marginalized while men are given greater opportunities to advance based on their science background. In the Nigerian setting, this factor has been found to offer males an unfair advantage over their female counterparts. Alabi (2014) reported that women are hindered from progressing through discrimination on the basis of gender, early marriage and child bearing and as a result, they are deprived sound education, job opportunities and incapacitated and rendered passive generally in the society. Researchers (Oludipe, 2012; Kola & Taiwo, 2013) in their various studies observed that there is no significant difference between male and female achievement; on the other hand, (Onuekusi & Ogomaka, 2013; Igoegwu & Okonkwo, 2012; Amoo, 2013) found out that a significant difference did exist between the achievement of male and female students in favour of the male students. Nevertheless, there is no specific study on the influence of cognitive style and gender on upper basic III Mathematics students’ achievement and Nasarawa State; hence the need for this study.

Cognitive style is a psychological construct which is concerned with how an individual learns, thinks, solve problems, remembers and relates to others. It represents the individual differences in the various subcomponents of an information-processing model of three main cognitive processes: perception, memory and thought. Cognitive style is considered to be personality dimension that influences attitudes, values and social interaction. It is an individual characteristic mode of perceiving and processing information in the environment (Hall, 2000). An individual is either Field-independent (FI) or Field-dependent (FD). A Field-independent (FI) cognitive style learner is described as analytic, competitive, individualistic, task-oriented, internally referent, intrinsically motivated (self-study), self-structuring, detail oriented and visually perceptive, prefers individual project work and has poor social skills; while Field-dependent (FD) cognitive learner is described as global (wholistic), group-oriented, sensitive to social interactions and criticisms, externally motivated, externally referential, not visually perceptive, a non-verbal and passive learner who prefers external information and group projects (Hall, 2000; Calcaterra, Antonetti & Underwood, 2005; Guisande, Paramo, Tinajero & Almedida,

2007). A summary of the differences between the two dimensions of cognitive styles (Field Dependence and Field Independence) is shown in Table 1.

Table 1

Differences Between Field Dependence and Field Independence Cognitive Styles

FIELD DEPENDENCE (FD) (non-analytic)	FIELD INDEPENDENCE (FI) (analytic)
Have comprehensive perception	Excellent at analytical thinking
Perceive objects as a whole and approach a task more wholistically	Focus on individual parts of the object and tend to be more serialistic in their approach to learning
Rely on external references	Rely more on internal references
More influenced by format-structure	Less affected by format structure
More reliant on salient cues in learning	Tend to sample more cues inherent in the field and are able to extract the relevant cues necessary for the completion of a task
Likely to use active cognitive strategies	Likely to use passive cognitive strategies
Adopt a hypothesis-testing role in learning	Adopt a spectator role in learning
Likely to benefit from a self-directed emphasis	Tend to prefer more structured learning environments
Self-view is derived from others	Has sense of separate identity
Not well-skilled in social/interpersonal relationships	Highly skilled in interpersonal/social relationships

Source: Wyss (2002), Chen and McCredie, (2004)

Cognitive process styles affect how one stores knowledge and retrieves it when the need arises (Tinajero & Paramo, 2000). The students’ cognitive styles may hinder or facilitate the acquisition of knowledge in Science, Technology and Mathematics (Hooda & Devi, 2017; Okwo & Otuba, 2007). Studies (Hooda & Devi, 2017; Idika, 2017; Okoye, 2016; Agboghoroma, 2015; Owoduni, Sanni, Nwokolo & Igwe, 2016; Ezeugwu, Nji, Anyaugbunam, Enyi & Eneja, 2016; Basseyy, Umoren & Udida, 2013) reveal that there is a difference between the mean achievement of Science and Mathematics of students with analytical (FI) cognitive styles and those with relational and inferential (FD) cognitive styles while Ndirika (2013) opined that ability levels have no significant effect on the achievement of students. Also, Okereke (2011), Amoo (2013) Anidoh and Eze (2014) reported that cognitive styles and gender have influence on students’ achievement. Nevertheless, there is no specific study on the influence of cognitive styles and gender on upper basic III Mathematics students in Nasarawa State, hence, there is a need to investigate how upper basic III students’ cognitive styles and gender influence their achievement in Mathematics.

Statement of the Problem

Mathematics is the chief corner stone of all sciences without which there will be no technology and without technology, there will be no modern society. This implies that a strong background in mathematics is critical for the nation’s scientific and technological development. Despite its importance, underachievement in this

subject has become a thing of concern to stakeholders in Education. This persistent underachievement in Mathematics especially at the basic level is linked to factors of teaching and learning. Based on these, effort is geared towards improving teaching and learning strategies and yet students' achievement is still below expectation. On this note, there is need to turn to find out what could be the influence of other variables such as cognitive styles on students' achievement in Mathematics. The problem of this study therefore is, what is the influence of cognitive styles and gender on upper basic III Mathematics students in Keffi, Nasarawa State, Nigeria?

Purpose of the Study

The purpose of this study is to investigate the influence of cognitive styles and gender on upper basic III Mathematics students in Nasarawa State. Specifically, this study sought to find out the influence of;

1. Field-Independent (FI) and Field-Dependent (FD) cognitive styles on students' achievement in Mathematics.
2. Field-Independent (FI) cognitive style on male and female students' achievement in Mathematics.
3. Field-Dependent (FD) cognitive style on male and female students' achievement in Mathematics.

Research Questions

The following research questions guided the study;

1. What are the mean achievement scores of students with Field-Independent (FI) and Field-Dependent (FD) cognitive styles in Mathematics?
2. What are the mean achievement scores of male and female students with Field-Independent (FI) cognitive styles in Mathematics?
3. What are the mean achievement scores of male and female students with Field-Dependent (FD) cognitive styles in Mathematics?

Hypotheses

The following hypotheses were tested at 0.05 α level.

H₀₁: Field-Independent (FI) and Field-Dependent (FD) cognitive styles have no significant influence on mean achievement scores of students in Mathematics.

H₀₂: Field-Independent (FI) cognitive style have no significant influence on mean achievement scores of male and female students in Mathematics.

H₀₃: Field-Dependent (FD) cognitive style have no significant influence on mean achievement scores of male and female students in Mathematics.

Methodology

The study was a descriptive survey research design. The study was carried out in Keffi Education Zone of Nasarawa State. The population consisted of 1,890 (987 males and 903 females) upper basic III Mathematics students in 25 coeducational schools in the zone. The sample of the study comprised 245 upper basic III Mathematics students (139 males and 106 females) drawn from six intact classes of six coeducational schools in the zone. The schools were randomly selected using disproportionate stratified random sampling techniques from the schools that satisfied the condition that their students were taught by qualified teachers over the years. Two instruments were employed for data collection; they are: CSC and MAT. The Cognitive Style Checklist (CSC) was adapted Robert Wyss (2002) CSC, it consists of 10 simple statements from which subjects in the research were to indicate the ones applicable to them. The checklist was used to categorize students based on their cognitive styles. It was divided into two sub-statements. Sub-statement A represents the characteristics of the Field Independent (FI) while sub-statement B represents those of Field Dependent (FD). The instrument was subjected to construct and face validity by expert in Measurement and Evaluation from Nasarawa State University, Keffi. It reliability was determined through test-retest and the reliability coefficient of 0.79 was obtained. The Mathematics Achievement Test (MAT) is a 20 multiple choice achievement test designed to measure students' achievement in Mathematics. Each item has 5-options A-E. the test was based on the units of study (Ratio, Indices and Logic) in upper basic III Mathematics curriculum used for the study. The instrument was subjected to content and face validity by expert in Science Education from Nasarawa State University, Keffi. It reliability was determined using Kuder-Richardson formula 20 (KR_{20}) and the reliability coefficient of 0.81 was obtained. The two instruments were administered on two separate days. On the first day, the CSC was administered and on the second day, MAT was administered with the help of research assistants who were seasoned teachers in the sampled schools. Descriptive statistics of means and standard deviations were used to answer the research questions while Z-test was used to test the hypotheses at 0.05 level of significance.

Results

Research Question One

What are the mean achievement scores of students with Field-Independent (FI) and Field-Dependent (FD) cognitive styles in Mathematics?

The data used to answer this research question is presented in Table 2.

Table 2

Means, Standard Deviations and Z-test of Students' FI and FD Cognitive Styles and Achievement in Mathematics.

Cognitive Styles	N	Mean	SD	Df	Z-cal	Z-crit.	Decision
FI	136	41.81	12.40	243	28.40	1.96	Reject H_0
FD	109	37.12	12.98				
Total	245						

Table 2 shows that the mean achievement scores of Mathematics students in the FI group stood at 41.81 with SD of 12.40. It also shows that the mean achievement scores of Mathematics students in the FD group stood at 37.12 with SD of 12.98.

Hypothesis One

Field-Independent (FI) and Field-Dependent (FD) cognitive styles have no significant influence on mean achievement scores of students in Mathematics.

From Table 2, Z -calculated = 28.40 and with $df = 243$ at $\alpha = 0.05$, Z -critical = 1.96. Since Z -calculated > Z -critical, the null hypothesis is rejected. This indicates that there is significant difference in the mean achievement scores of Mathematics students with FI and FD Cognitive styles. Hence, Mathematics students in FI group achieved higher than those in the FD group.

Research Question Two

What are the mean achievement scores of male and female students with Field-Independent (FI) cognitive styles in Mathematics?

The data used to answer this research question is presented in Table 3.

Table 3

Means, Standard Deviations and Z-test of male and Female Science Students' FI Cognitive Style and Achievement in Mathematics.

Cognitive Styles	Gender	N	Mean	SD	Df	Z-cal	Z-crit.	Decision
FI	Male	82	45.34	12.02	243	22.73	1.96	Reject H_0
	Female	54	31.14	12.41				
Total		136						

Table 3 shows that the mean achievement scores of male Mathematics students in the FI group stood at 45.34 with SD of 12.02. The mean achievement scores of their female counterparts is 31.14 with SD 12.41.

Hypothesis Two

Field-Independent (FI) cognitive style have no significant influence on mean achievement scores of male and female students in Mathematics.

From Table 3, Z -calculated = 22.73 and with $df = 243$ at $\alpha = 0.05$, Z -critical = 1.96. Since Z -calculated > Z -critical, the null hypothesis is rejected. This indicates that there is significant difference in the mean

achievement scores of male and female Mathematics students with FI Cognitive style. Hence, male students in both FI achieved higher in Mathematics than their female counterparts.

Research Question Three

What are the mean achievement scores of male and female students with Field-Dependent (FD) cognitive styles in Mathematics?

The data used to answer this research question is presented in Table 4.

Table 4

Means, Standard Deviations and Z-test of male and Female Science Students' FD Cognitive Styles and Achievement in Mathematics.

Cognitive Styles	Gender	N	Mean	SD	Df	Z-cal	Z-crit.	Decision
FD	Male	64	41.72	12.55	243	24.41	1.96	Reject H ₀
	Female	45	33.11	12.27				
Total		109						

Table 4 shows that the mean achievement scores of male Mathematics students in the FD group stood at 41.72 with SD of 12.55. The mean achievement scores of their female counterparts is 33.11 with SD 12.27.

Hypothesis Three

Field-Dependent (FD) cognitive style have no significant influence on mean achievement scores of male and female students in Mathematics.

From Table 4, Z-calculated = 24.41 and with df = 243 at $\alpha = 0.05$, Z-critical = 1.96. Since Z-calculated > Z-critical, the null hypothesis is rejected. This indicates that there is significant difference in the mean achievement scores of male and female Mathematics students with FD Cognitive style. Hence, male students in both FD group achieved higher in Mathematics than their female counterparts.

Discussion

The findings of this study revealed that Mathematics students in the Field Independence (FI) group achieved significantly better than the those in the Field Dependence (FD). This finding is in agreement with the findings of (Hooda & Devi, 2017; Idika, 2017; Okoye, 2016; Agboghoroma, 2015; Owoduni, Sanni, Nwokolo & Igwe, 2016; Ezeugwu, Nji, Anyaugbunam, Enyi & Eneja, 2016; Bassey, Umoren & Udida, 2013; Okereke, 2011) in their various researches reported that there is a difference between the mean achievement of students with analytical (FI) cognitive styles and those with relational and inferential (FD) cognitive styles in Mathematics and other related subjects. But in contrast with the findings of Maghsudi (2007), Guisande, Paramo, Tinajero and Almeida (2007) who in their different researches reported that cognitive styles are not affected by intelligence and that Field Dependence/Independence focuses on the process of learning rather than ability.

The findings of this study revealed that male Mathematics students in both Field Independence (FI) and Field Dependence (FD) groups achieved significantly better than their female counterparts. This finding agrees with the findings of Ndirika (2013), Amoo (2013) and Aniodoh and Eze (2014) who reported that cognitive styles and gender have influence of students' achievement in Mathematics, and other related subjects. Learning Mathematics involves critical and deep thinking as well as display of initiatives. The reason for the high

achievement of students with Field Independence level of cognitive style could be because, Field Independence individuals are excellent analytical thinkers who view things from serialistic and detailed manner. The more Field Independence a students are, the more likelihood for them to achieve meaningful learning.

Conclusion

The findings of this study revealed that Mathematics students in the Field Independence (FI) group achieved significantly better than the those in the Field Dependence (FD). The findings also revealed that male students in both the Field Independence (FI) and Field Dependence (FD) groups achieved better than the female students significantly in Mathematics.

Recommendations

Based on the findings of this study, the following recommendations were made;

1. Seminars and workshops should be organized to adequately equip Mathematics teachers with the needed skills to create an environment where students with different cognitive styles can experience meaningful learning of Basic Science.

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Correlation between Expression of Interleukin-22 in Immunohistochemistry Examination with Epidermal Thickness in Psoriasis Vulgaris

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DOI: 10.29322/IJSRP.9.08.2019.p9283

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9283>

Abstract

Introduction: Psoriasis is a chronic residue inflammatory skin disease that can occur in all age, characterized with erythematous plaque and thick scales. Interleukin-22 (IL-22) is a cytokine pro-inflammatory that has an important role in inflammatory diseases. IL-22 induces migration of keratinocytes, causing hyperplasia of the keratinocyte layer resulting in thick epidermis. There was correlation between expression IL-22 with psoriasis severity.

Objective: To determine correlation between expression of IL-22 in immunohistochemistry examination in psoriasis vulgaris patients with psoriasis severity.

Methods: This study is an observational analytic study with cross-sectional design involving 30 psoriasis vulgaris patients. The diagnosis is based on anamnesis and clinical examination, the severity of the disease is measured with PASI score. Skin biopsy was taken from psoriatic plaque for immunohistochemistry examination for expression of IL-22.

Results: In this study we found that there was a mild positive correlation ($r=0.466$) between expression of IL-22 in immunohistochemistry in psoriasis vulgaris patients with psoriasis severity with $p=0.009$. The mean expression of IL-22 in immunohistochemistry examination is 1.57 ± 2.4 . The median of PASI score is 10.2 (1.2 - 40.5). There was no significant correlation between expression of IL-22 with gender, age and duration of the disease.

Conclusion: There is a correlation between expression of IL-22 in immunohistochemistry examination in psoriasis vulgaris patients with psoriasis severity.

Keywords: psoriasis vulgaris, interleukin-22, immunohistochemistry, PASI

I. INTRODUCTION

Psoriasis is an inflammatory skin disease that is chronic recidive, can affect all ages, is characterized by reddish plaques covered by thick silvery white scales.^{1,2} Psoriasis lesions are distributed symmetrically with predilection especially in the elbow and knee area, scalp, lumbosacral, buttocks and genitalia. This typical lesion caused by excessive keratinocyte proliferation. The causes of psoriasis are not fully understood, but multifactorial causes such as the immune system, genetics and environment cause the complexity of psoriasis.^{2,3}

The prevalence of psoriasis in the world population varies between 0.09% until 11.4%. in some developing countries, the prevalence is between 1.5% and 5%.² Based on medical records from Haji Adam Malik Central General Hospital in Medan, Indonesia from January to December 2012, from 5.342 patients in Dermatovenereology Department there was 36 patients (0.67%) diagnosed as psoriasis vulgaris.⁴ The average age of onset varies from various studies, but nearly 75% psoriasis patients have onset before age 46, and 12% have onset at the age 50-60.^{2,5}

Psoriasis treatment is still unsatisfactory, and the result is decrease in quality of life and became a socioeconomic burden. The absence of animal model that can produce psoriasis lesions de novo, make it hard to understand the pathogenesis of psoriasis.^{6,7} The pathogenesis of psoriasis is differentiation and proliferation of keratinocytes accompanied by an inflammatory process in the epidermis and dermis. This process mediated by T cells. Abnormalities in inflammatory cytokines cells such as interleukin-1 (IL-1), IL-6, Tumor Necrosis Factor- α (TNF- α) and pro-inflammatory transcription factors such as, NF- κ B and AP-1 can caused psoriasis. The presence of TNF- α , TGF- β , IL-6 make T cells differentiate into Th17.^{3,5} Production of Th17 induced by IL-23, that has an important factor in pathogenesis of psoriasis. Th17 cells that produce IL-22 alone, but not produce IL-17 called

Th22 cells.^{11,12} Based on the structural and gene coding, IL-22 is a group of IL-10 cytokines families. IL-22 functions are defense against microbes, regeneration and protection against damage, and an important role in chronic inflammatory disease.^{8,9}

IL-22 receptors are expressed in various tissues and mediate the non-specific immune system. IL-22 is produced by active CD4+ T cells and serve to regulate keratinocytes proliferation.¹⁰ IL-22 cause hyperproliferation of keratinocytes and production of antimicrobial peptide, such as S100A7-psoriasin, S100A8, S100A9. IL-22 induces the migration of keratinocytes, causing hyperplasia of keratinocyte layer resulting in thick epidermis.^{8,10,11} Increased levels of IL-22 caused an abnormality and abnormal differentiation of keratinocytes.

There are several studies that show an increased of IL-22 serum and expression in psoriasis patients compared to healthy individuals. De Oliveira's study in Brazil, showed a significant increase of IL-17A, IL-22, and IL-6 serum in psoriasis patients. However, this study did not find a significant correlation between IL-22 level serum and disease severity. In Benham's study, there was no significant difference in IL-22 level serum in psoriasis patients, but an increase in IL-22 level serum in psoriasis arthritis patients compared with non-psoriasis.¹² Local production of IL-22 was measured from the supernatant skin biopsy, and there was a significant increase of IL-22 in psoriasis patients.^{10,11}

Detection of IL-22 on the skin of psoriasis patients can be assessed using immunohistochemistry examination. The principle of this examination is antibody-antigen reactions on the tissue. Immunohistochemistry examination is a good detection technique and can precisely showing certain proteins that will be examined directly in tissues. The severity of psoriasis is measured using Psoriasis Area and Severity Index (PASI) which is the gold standard to determine the severity and the progress of therapy.

From this data, there was still controversy regarding correlation between the expression of IL-22 and severity of psoriasis need for further understanding of the pathogenesis of psoriasis. The present study was aimed to determine correlation between expression of IL-22 in immunohistochemistry examination in psoriasis vulgaris patients with psoriasis severity.

II. METHODS

The present study was a cross-section based observational study which included 30 patients of psoriasis vulgaris from February 2018 to February 2019 in the Department of Dermatovenereology, H. Adam Malik General Hospital Medan and Dr.Pirngadi General Hospital Medan, were enrolled in the study. The diagnosed of psoriasis vulgaris based on history taking and clinical examination by dermatovenereologist. The skin 4-mm skin biopsy performed by dermatovenereologist. The histologic and immunohistochemistry was performed and read by two Pathologist that blinded by the severity of the patients. The immunohistochemistry score with the Immuno

Reactive Score (IRS) multiplication of score percentage of positive cells and intensity of staining. The reagent of IL-22 from GeneTex that diluted 1:100. This study has been approved by the Health Research Ethics Commission of the Faculty of Medicine, Universitas Sumatra Utara/H. Adam Malik General Hospital Medan.

III. RESULTS

Total 30 subjects, with the highest proportion was male (56.7%) and female (43.3%), the highest distribution in the age group of 36-45 years (23.3%), the mean of age 38.53 ± 14.4 years. The most common level of education of the patients is high school graduate (63.3%). The highest distribution in the duration of the disease is 1-5 years (50%) and followed by 6-10 years (30%) with the mean duration is 5.58 ± 4.34 years.

Table 1. Characteristics of the subyek

	Descriptions	n	%	Mean \pm SD
Sex	Man	17	56.7%	
	Woman	13	43.3%	
Age (years)	17-25	8	26.7	38.53\pm14.4 years
	26-35	5	16.7	
	36-45	7	23.3	
	46-55	5	16.7	
	56-65	5	16.6	
	>65	0	0	
Level of education	Middle School Graduate	3	10	
	High School Graduate	19	63.3	
	University Graduate	8	26.7	
Duration of the disease (years)	< 1	1	3.3	5.58\pm4.34 years
	1 -5	15	50	
	6-10	9	30	
	>10	5	16.7	

The median score of IL-22 expression is 1, with minimum score is 0 and maximum score is 9. The median score of PASI is 10.2 and minimum score is 1.2 and maximum score is 40.5. The correlation strength is moderate.

Table 2. Correlation between IL-22 expression and PASI

	Mean \pm SD	Median (min-max)	p	r
IL-22 Expression	1.57 \pm 2.4	1 (0-9)	0.009	0.466
PASI	12,880 \pm 9,1959	10.2 (1.2 -40.5)		

There was no significant correlation between IL-22 expression and age, sex, duration of the disease.

Table 3. Correlation between IL-22 expression and sex, age, duration of the disease

	p	r
IL-22 Expression and sex	0.931	0.016
IL-22 Expression and age	0.732	0.065
IL-22 Expression and duration of the disease	0.201	0.240

IV. DISCUSSION

Out of 30 subjects of psoriasis vulgaris in this study, the highest proportion 17 were male (56.7%) and 13 were female (43.3%), the highest distribution in the age group of 36-45 years (23.3%), the mean of age 38.53 ± 14.4 years. A similar study by Putri et al in Medan, Indonesia also the proportion of male (54.5%) is higher than female (45.5%).¹³ Sinniah et al in Malaysia in Tengku Ampuan Rahimah Klang Hospital within 2 years there were 11.6% (316/2613) male and 7.2% (215/2994) female.¹⁴ Study by Affandi et al, based on Malaysian Psoriasis Registry (MPR) from 15,794 psoriasis patients from 2007 to 2016, showed the male percentage 56.6% is higher than female 43.3%. The ratio between male and female 1.3 : 1.¹⁵ Similar study Bohm et al in German reported from 381 psoriasis patients, proportion of male were 60.6% and female 39.4%. Generally, the proportion of male is higher than female, but there were no phenotype difference between male and female.¹⁶

The highest proportion group age 17-25 years and followed by group age 36-45 years. The mean and the standard deviation 38.53 ± 14.4 . Parisi et al rarely occur before 9 year, with prevalence 0% to 0.55%. Parisi et al also stated that there was a tendency an increase of psoriasis incidence with the increasing age.¹⁷ Similar to Darjani et al, the highest proportion age group is < 35 years (49.1%).¹⁸ Olsen et al in Norway from 8045 patients the highest incidences in male age group 24-27 years and female age group is 16-19 years.¹⁹ It is consistent with psoriasis onset, that have two bimodal onset, first 16-22 years and 57-60 years. This result can caused by the sampling method and small sample. Furthermore, this disease has multifactorial causes, so the distribution of age can also vary.

The most common level of education of the patients is high school graduate (63.3%) so we can assumed that the education is pretty good. Knowing the education level is important for assess the knowledge of the patients about the diseases, quality of life and compliance for treatment. Milcic et al stated that higher education associate with a good quality of life and manage the disease.²⁰

The highest distribution in the duration of the disease is 1-5 years (50%) and followed by 6-10 years (30%) with the mean duration is 5.58 ± 4.34 years. Similar to Milcic et al in Serbia from 201 psoriasis patient, the mean duration on the disease is 4 years.²⁰ As well as de Oliveira in Brazil, there was 65% patient who has the disease for more than 5 years.²¹ Little bit different from Sjahrir et al in Medan, where the most common duration is 11-15 years (34.8%).²² Egeberg et al stated that the average duration from 87,161 psoriasis patients was 7.8 years with standard deviation 5.2 years.²³ This shows the chronic and persistence of psoriasis. The difference from this study due to most of the sample is younger than other study.

Our study showed a correlation between expression of IL-22 in immunohistochemistry examination in psoriasis vulgaris patients with psoriasis severity. This correlation is moderate. Study from Nograles et al reported that IL-22 expression in skin biopsy was increased in dermatitis atopic (DA) and psoriasis compared to healthy skin, which is 16.62 ± 8.10 for DA, 3.02 ± 0.91 for psoriasis, 0.00 ± 0.00 for healthy skin.²⁴ Similar to Boniface et al that observed in supernatant psoriasis patients compared to blood serum and compared to healthy subjects, there was an increase in IL-22 level.¹¹ Study from de Oliveira et al also showed that IL-22 serum level is higher in psoriasis $7.8(7.8-103.9)$ pg/mL compared to healthy skin 4.6 pg/mL.²¹

Wolk et al observed from 47 blood plasma psoriasis patients, there was a positive correlation between IL-22 level and disease severity, with coefficient correlation was 0.73. Same with Liu et al found that IL-22 mRNA was expressed in psoriatic skin (0.929 ± 0.054) and not found in healthy skin.²⁵ Study conducted by Hofny et al, showed a positive correlation between IL-22 serum and PASI, with coefficient correlation 0.688.²⁶ Cengiz et al in Turkey in 2015, compared IL-22R1 in psoriasis, vitiligo and healthy subjects. The IL-22R1 expressed in healthy skin and vitiligo patients. This study also observed the correlation between PASI and IL-22R1 expression, the result is the higher the intensity of IL-22 expression have the higher PASI score.²⁷ Wawryzcki et al reported the serum level of IL-22 in psoriasis patients compared to healthy individuals and the association with PASI. The result is there was a correlation between PASI and IL-22 level serum.²⁸ This showed that IL-22 is not only a bystander phenomenon, but also has a role in psoriasis pathogenesis.

IL-22 secreted by Th1, Th17 and Th22. IL-22 has a major three functions, antimicrobial peptide, protein related to differentiation and protein that regulate the mobility and migration of keratinocytes. IL-22 has to bind to its receptors to start the function. Furthermore, these proteins for differentiation of keratinocytes, especially for cornification, decrease the thickness of granular layer and epidermal acanthosis.

From our study, we also observed there was no correlation between age, sex and duration of the disease with IL-22 expression.

V. CONCLUSION

IL-22 has a role in psoriasis pathogenesis, mainly for differentiation of keratinocytes to produce typical psoriatic skin. There is a correlation between expression of IL-22 in immunohistochemistry examination in psoriasis vulgaris patients with psoriasis severity.

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Bending Stress Analysis of High Contact Ratio Spur Gear

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DOI: 10.29322/IJSRP.9.08.2019.p9284

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9284>

Abstract- Tooth gears are used to transmit the power with high velocity ratio. During this phase, they encounter high stress at the point of contact. Today gears are needed to increase load carrying capacity, reduce the transmission weight and fulfil noise requirements without increasing the manufacturing cost. The high performance gear which provide higher pressure or contact ratio. In this paper, gear pair for automotive gear box application was designed based on high performance gear approach. This paper presents a general approach for analyzing bending stresses using Lewis Equation from nine different positions of gear tooth flanks and it showcases how the contact ration governs the stress conditions. In this process comparison of bending stress was done of steel gear of high contact ratio (HCR) gear as a substitute in normal contact ratio (NCR) gear and the software programmed was performed in SOLIDWORKS and ANSYS Workbench to get the best result possible. This study will help to improve the performance of gear system.

Index Terms- bending stress, Lewis Equation, HCR, NCR, ANSYS

I. INTRODUCTION

These Gears are the most common types of transmitting power in the modern mechanical engineering world. They change the rate of rotation of machinery shaft and also the axis of rotation. For high speed machinery, such as an automobile transmission, gears are the optimal medium for low energy loss and high accuracy. A pair of teeth in action is generally subjected to two types of cyclic stresses:

1. Bending stresses inducing bending fatigue
2. Contact stresses causing contact fatigue [1].

Both these types of stresses may not attain their maximum value at the same point of contact. Bending stresses inducing bending fatigue Contact stress causing contact fatigue. Both these types of stresses may not attain their maximum values at the same point of contact. [1] However, combined action of both of them is the reason of failure of gear tooth leading to fracture at the root of a tooth under bending fatigue and surface failure, due to contact fatigue. S.C. Mohanty suggested an analytical method to calculate the individual tooth load during meshing cycle, also he referred to determination of the locations and sizes of contact zones along the path of contact for high contact ratio gearing ($3 < CR < 2$) [2]. A.H. Elkholy introduced a method to determine tooth load sharing especially for high contact ratio spur gear. [3].

High performance gears such as aerospace and automotive, for example – do not use standard basic rack for design. Instead, they rely on custom racks which provide higher

pressure angles or contact ratio. Direct gear design method introduces an alternative gear design approach to maximize gear drive performance in custom gear applications. The gear tooth under consideration for NCR gearing is addendum of one unit module and a full depth of 2.25 times the module and the gear tooth for HCR gear is a full depth of 2.75 times the module and addendum of 1.25 times the module. The objective of this study focuses on the reduction of stresses occurs on HCR Spur gear by means of different contact ratio. The Bending stress has to be analyzed by means of analytical and FEA method.

II. SPUR GEAR

Spur gears are the most common type of gears. They have straight teeth, and are mounted on parallel shafts. Sometimes, many spur gears are used at once to create very large gear reductions. Spur gears are used in many devices like the electric screwdriver, dancing monster, oscillating sprinkler, wind up alarm clock, washing machine and dryer drive etc.



. Figure 1 Spur Gear

A. Contact Ratio

Contact ratio can be defined as a number of teeth in contact at one time as these teeth pass through the contact zone. It is impractical to make contact ratio (CR) less than unity. If the contact ratio is one, then one pair of teeth leaves contact just as the next pair begins contact. This is undesirable, because slight error in the tooth spacing will cause oscillations in the velocity, vibration and noise. Gears should not generally be designed having contact ratios less than about 1.2, because inaccuracies in the mounting might reduce the contact ratio even more, increasing the possibility of impact between the teeth as well as an increase in the noise level. Thus, even though a contact ratio 1.2 is acceptable, a minimum contact ratio of 1.4 is preferred and

larger is better [4]. High contact ratio can be achieved by different ways namely: increasing the number of teeth, lowering the pressure angle and increasing the addendum factor. A contact ratio of 2.0 means that there are always two pairs in contact, i.e. at the instant when one pair goes out of contact, a new pair comes in contact. When double pairs of teeth are engaged, the transmitted load will be divided between two meshing teeth.

$$CR = \frac{ARC}{P_c} = \frac{PTH}{P_b \cos \phi} = \frac{PTH}{P_b} \quad (1)$$

- where, CR = contact ratio;
- ARC = arc of contact;
- PTH = path of contact;
- ϕ = pressure angle;
- P_c = base pitch
- P_b = circular pitch

B. Teeth Pair Load Sharing

The pinion tooth diagram shown in Fig.2 is marked into seven different alphabetical points on the right side to show how the teeth pairs come into contact when they pass the mesh zone.

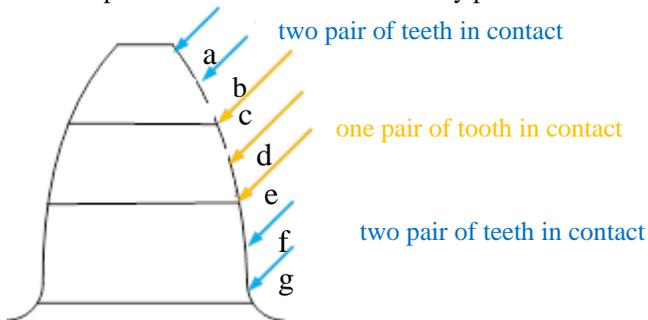


Figure 2. Pinion teeth

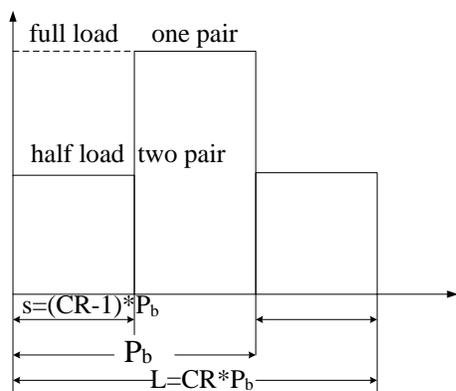


Figure 3. Loading along the path of contact

In Fig.2 and Fig 3, the points are located along the line of action within the interval of the length of action. Considering contact ratio 1.4 and above, the initial contact point for pinion tooth with the gear tooth is point 'g', and simultaneously for the second tooth of the same pinion, which is already in mesh will be at point 'c'. Therefore, the load will be shared between these two points similarly points 'f' and 'b', also 'e' and 'a' will have simultaneous action. Then point 'a' will go out of contact, therefore the full load will be applied starting from point 'e',

through point 'd' until the contact begins at point 'c', then new meshing tooth comes into contact [5]. When double pairs of teeth are engaging, the transmitted load will divide between two meshing teeth. Load sharing depends on contact ratio and stiffness of meshing tooth at point of application of load. For this reason the load sharing at the point 'd', which is critical position for this case.

C. Material Properties

In this paper, the material of AISI-5160 alloy steel is used. AISI-5160 steel is an alloy which contains magnesium, titanium, and chromium. This material is used in vehicular technology. This alloy steel can improve strength, toughness, and corrosion resistance of gear.

Table 1. Material properties

Name	Value	units
Material	AISI-5160	-
Yield stress	1790	MPa
Modulus of elasticity	206.9	GPa
Poisson's ratio	0.3	-
condition	OQT-400	
Brinell Hardness	684	

D. Gear Parameter

The solid model created two spur gears in mesh as shown in Fig 4 by using the SOLIDWORKS software, using the material properties are tabulated in table 1 and gear geometry is given in Table 2.

Table 2. Spur Gear Parameter

Parameter	Pinion	Gear
profile	involute	involute
No: of teeth	2	5
module	4 mm	4 mm
face width	15 mm	15 mm
Pressure angle	20 degree	20 degree
Fillet radius	1 mm	1 mm
Maximum torque	540	N m
speed	350 rpm	
Addendum factor	1.3 m	1.29 m



Figure 4. Spur Gear Mesh

III. FORCE ON GEAR TEETH

The power is transmitted from the input shaft to the output shaft. The teeth of pinion drive the teeth of gear and thus transmit the power to the gear. Gears are used to transmit mechanical power and this required applying mechanical torque that can be calculated. For SI unit;

$$\text{Power, } P = \frac{2\pi NT}{60} \quad (2)$$

where, P is power transmitted by gears, Watt
N is speed of rotation, rpm
T is torque transmitted by gear, Nm

A. Transmitted Force

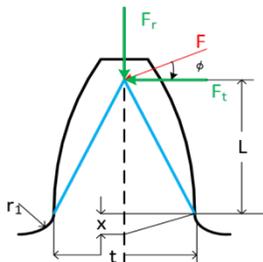


Figure 5. Load Transmitted on Spur Gear

The reaction force F between the mating teeth occur along the pressure line, and the power is transmitted by means of the force exerted by the tooth of the driving gear to the mesh of the driven gear. The reaction force F can be resolved into two components: a tangential force Ft and radial force Fr shown in Fig. 5.

B. Bending Theory

Wilfred Lewis in 1893 provides a formula for estimating the bending stress in a tooth. A gear tooth was taken the full load at its tip as simple cantilever beam [6]. If a gear tooth for the rectangular beam, it can find the critical point in the root fillet of the gear by inscribing a parabola. In the Lewis Analysis some assumptions are to be considered which are as follows:

1. The Gear tooth act as a cantilever beam.
2. The Tangential component causes the bending moment about the base of the tooth.
3. The effect of Radial components is neglected.
4. The tangential component is uniformly distributed over the face width of tooth.
5. The effect of stress concentration is neglected.
6. It is assumed that at any time only one tooth will be in contact and takes the total load.

The weakest section of the gear tooth is at the section BC, where the parabola is tangent to the tooth profile. At the section BC the moment will be,

$$\sigma = \frac{M}{I/c} = \frac{6F_t \times h}{bt^2}$$

$$\sigma = \frac{F_t \times P_d}{bY} \quad (\text{U.S. Customary Unit})$$

$$\sigma = \frac{F_t}{b \times Y \times m} \quad (\text{SI Unit})$$

C. Numerical Analysis of Bending stress for NCR Gear

Firstly, the following calculation is started at 3° for NCR gear and other different position is expressed in Table 3.1

For Ft = 6721.266 N

m=4 mm

Y= 0.328

b= 15 mm

Table 3. Tangential load and bending stress of different position for normal contact ratio gear (NCR)

case	Tangential load ,	Lewis's bending stress (MPa)
1	6 7 2 1 . 2 6 6	3 4 1 . 5 2 7
2	6 6 0 5 . 6 6 6	3 3 5 . 6 5 3
3	6 4 9 3 . 8 1 9	3 2 9 . 9 7 0
4	1 2 7 7 1 . 3 9 2	6 4 8 . 9 5 3
5	1 2 5 6 2 . 5 2 2	6 3 8 . 3 3 9
6	1 2 3 6 0 . 0 9 0	6 2 8 . 0 5 3
7	6 0 8 2 . 1 7 7	3 0 9 . 0 5 4
8	5 9 8 7 . 2 2 7	3 0 4 . 2 2 9
9	5 8 9 5 . 1 9 6	2 9 9 . 5 5 2

D. Numerical Analysis of Bending stress for HCR Gear

And then, to apply consider to formulation case of 4mm module, 21 teeth pinion and 51 teeth gear, pinion operating in 350 rpm, where the pressure angle is 20°. But, the addendum factor 1.3 and profile shift factor is 0.4 is used for high contact ratio gear. The length of contact and contact ratio are computed and they are 18.893 mm and 1.6 respectively. While from Equation 2.11 the corresponding angle of contact is 0.4759 radian or ≈ 27°, consider that the contact will start at angle 0° and end at angle 27°. The select angular interval value is 3.8°, so the progress of contact will be studied for each 3.8°, which means there are 9 cases of contact under consideration. From high contact ratio gear, 9 different positions were calculated maximum contact stresses, these values expected as shown in below.

For Ft = 5357.021 N

m=4 mm

Y= 0.328

b= 15mm

Table 4. Tangential load and bending stress of different position for normal contact ratio gear (NCR).

case	Tangential load , Ft	Lewis's bending stress (MPa)
1	5 3 7 5 . 0 2 1	2 7 2 . 2 0 6
2	6 1 0 5 . 3 9 9	3 1 0 . 2 3 3
3	6 8 3 5 . 7 7 8	3 4 7 . 3 4 6
4	7 5 6 6 . 1 5 6	3 8 4 . 4 5 6

5	8 2 9 6 . 5 3 5	4 2 1 . 5 7 2
6	7 5 2 6 . 6 5 8	3 8 2 . 4 5 2
7	6 7 9 6 . 2 7 9	3 4 5 . 3 3 9
8	6 0 6 5 . 9 0 1	3 0 8 . 2 2 7
9	5 3 3 5 . 5 2 3	2 7 1 . 1 1 4

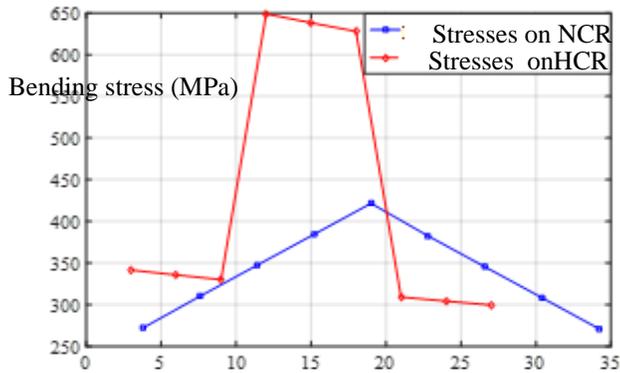


Figure 6. Lewis Bending Stress vs. Rotation Angle for NCR and HCR Gear

The normal contact ratio gearing Figure 6, the bending stress (Lewis) varies from 341.527 MPa at the root to 329.970 MPa at the start of single tooth contact, corresponding to less than 12.0°, then after sudden increase to 648.953 MPa at the degree rotation 12.0, the stress maintains to increase to 628.053 MPa till the rotation comes to 18.0°, then the stress goes to sudden decrease at the end of single pair tooth contact to 309.054 MPa at 21.0° rotation, gradually decrease to 299.552 MPa at the tip part of the tooth, in a manner to the load sharing pattern. When the high contact ratio gearing Figure 6, the maximum bending stress on the tooth is 421.572 MPa corresponding to 19.0° which is at the near pitch circle. At the root part and tip of tooth the stress goes decreasing to 272.206 MPa and 271.114 MPa respectively.

E. Simulation of Bending Stress Analysis

In the procedure for generating a FEA model for bending stress analyses, the equations used to generate the gear tooth profile curve were the same. When meshing the teeth is ANSYS, if “SMART SIZE” is used the number of elements near the roots of the teeth are automatically smaller than in other places. Figure 7 shows the mesh 3D model of NCR gear tooth and Figure 10 shows the mesh 3D model of HCR gear tooth.

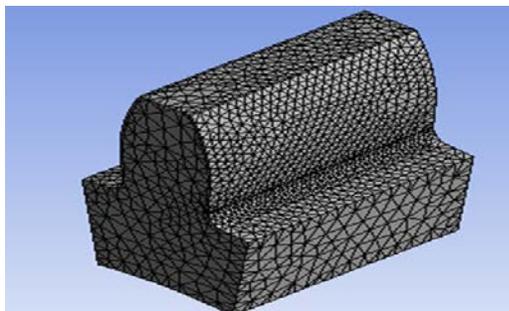


Figure 7. Mesh of NCR Gear Tooth

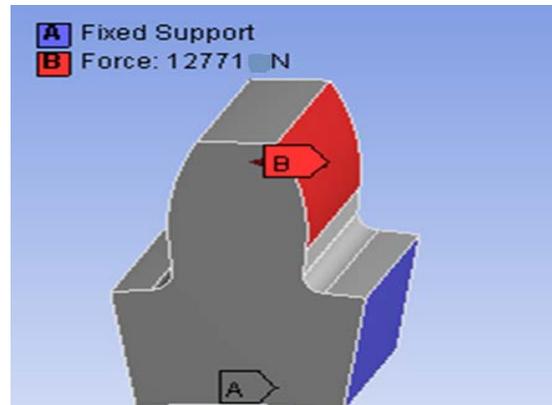


Figure 8. Boundary Condition and Force Applied

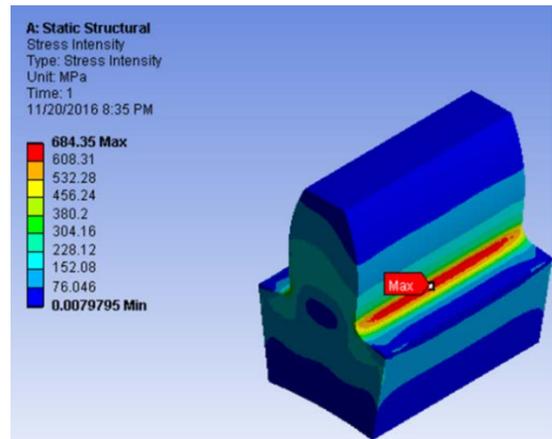


Figure 9. Maximum Stress at the Root of Tooth for NCR Gear

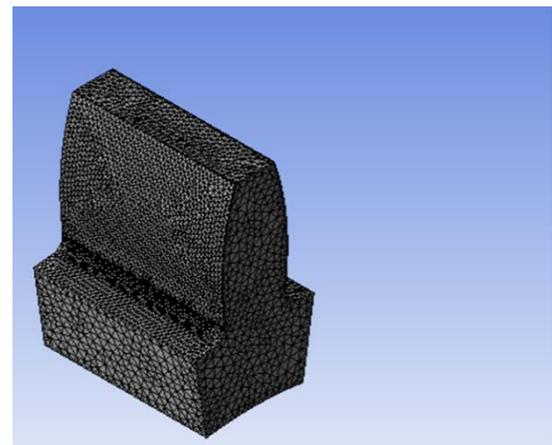


Figure 10. Mesh of HCR Gear Tooth

Figure 8 and Figure 11 are showed the boundary condition and applied force for NCR and HCR gears. Figure 9 and Figure 12 showed that the maximum tensile stress on the tensile side and maximum compressive stresses on other side of the tooth, respectively. It also indicated that only one tooth is enough for the bending stress analysis for the 3D model.

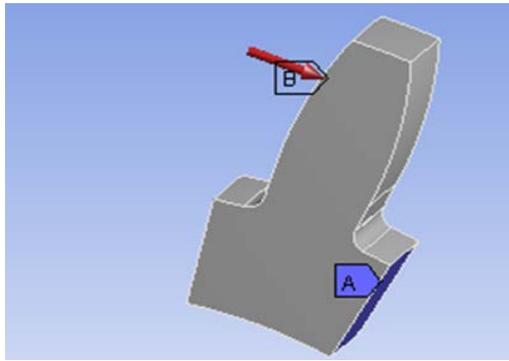


Figure 11. Boundary Condition and Force Applied

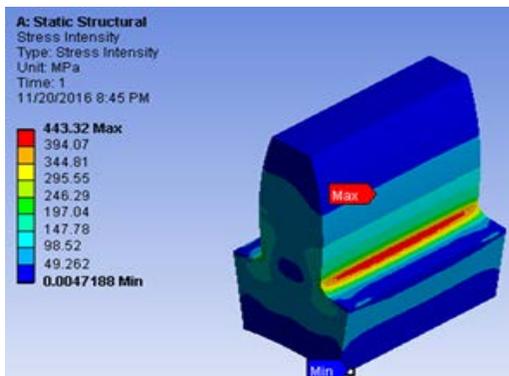


Figure 12. Maximum Stress at the Root of Tooth for NCR Gear

F. Comparison of Theoretical and Simulation

For determining the stresses at any stage during the design of gears face width, number of teeth and root fillet radius are important parameters. To determine the stress variations with the addendum factor relative to gear set weight models of spur gear are made by keeping constant other parameter i.e. pressure angle, tooth thickness etc. The combined effect of these parameters on bending stress also indicated in Figure 5.5 and Figure 5.8. Then NCR gear tooth is changed HCR gear tooth, the different bending stress value obtained. The following table is showed Lewis bending stress, AGMA bending stress and ANSYS software resulted for 21 teeth of (NCR and HCR) spur gear.

Table 5. Comparison of Lewis Bending Stress and ANSYS Software

c a s e	Lewis bending stress (MPa)	ANSYS software (MPa)	% different
N C R	648.953	684.350	5.1
H C R	421.572	443.320	4.9

This table showcases a general view of geometry of spur gear under static loading. It states the Lewis equation which is conventionally used for the stress calculation of a gear tooth further it gives Finite element analysis method for the same using ANSYS 15.0. The results shows the effect of high contact ratio on the bending stresses of the gear tooth and compare the normal contact ratio.

IV. CONCLUSION

In this paper load sharing of normal contact ratio and high contact ratio values using MATLAB code and Lewis bending equation have been used to find the bending stresses and compare finite element analysis (ANSYS). It allows reducing the maximum bending stress in the high contact ratio (HCR) gear tooth area 35%. However load carrying capacity can be increased by reducing the bending stress using the high contact ratio gear which in turn can be reduce the contact stress.

ACKNOWLEDGMENT

The author wishes to express the deepest thanks and gratitude to her supervisor Dr. Than ThanHtike, Professor, Mechanical Engineering Department of Yangon Technological University. The author special thanks go to Dr .KhinThu Zar, Demonstrator, Mechanical Engineering Department of Technological University (Thanlyin), for her invaluable advice and effective suggestion throughout the study. The author would like to express her thanks to her member Daw Chaw Wint Yee Zaw, Lecture, Mechanical Engineering Department of Technological University (Thanlyin), for her valuable comments and indispensable guidance during this study. Finally, her special thanks to all who helped her towards the successful completion of this study.

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Design Calculation of Timing Gears Trains for Tractor Engine (80HP)

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DOI: 10.29322/IJSRP.9.08.2019.p9285

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9285>

Abstract- The objective of this paper is to calculate the design of timing gears trains for MICO Tractor Engine (80hp), which is an inline, 4-stroke, 4-cylinder diesel engine. The engine is produced maximum rated output power of 59.68kW (80hp) at 1800 rpm. This timing gear trains for Tractor Engine is incorporated with helical gears. It consists of five helical gears are used. Synchronize mesh is used for this timing gear for tractor engine. This paper is consider the design calculation of timing gear. Tooth load is calculated with help of Lewis equation & dynamic tooth load is calculated with help of Buckingham equation. Static analysis of the gear is done to find the von-Mises stress on the tooth of the gear in while meshing with Autodesk software.

Index Terms- helical gears, tooth load, Buckingham equation, Lewis equation, von-Mises stress

I. INTRODUCTION

Today, automotive vehicles are widely used in many countries for transportation, farm agriculture and other purposes. So, it is necessary to know about automotive vehicle engine in detail. Automotive technology is also a required to develop the country rapidly.

In general, automotive vehicles are both compression ignition (diesel) engine and spark ignition (petrol) engine. Mostly Tractor Engine uses the internal combustion compression ignition engine. Because it is used heavy duties such as trucks, trains and ships. Fuel is injected from the fuel pump and fuel injectors directly into the combustion chamber at high pressure at the end of the compression stroke. The Tractor Engine is located at the front of the vehicle and connected with clutch housing, gears box and drives both large rear wheels. The engine type is four-cylinders, four-stroke inline engine. The firing order is 1-3-4-2. The brake horsepower of MICO Tractor Engine is 80 hp (59.68kW) at maximum engine revolution of 1800 rpm.

In this engine, the function of gears trains is important to get valves timing for entering the air into the cylinder, to release exhaust gas and is also important engine oil circulate into the engine block. The starting system of MICO Tractor Engine is also important to start the engine with rotation of crankshaft by using gear trains. The camshaft and its associated parts control the opening and closing of two valves. Its associated parts are pushrod, rocker arms, valves springs and valves. The crankshaft

through timing gears drives the camshaft and also drives engine oil pump shaft. Cams are made as integral parts of the camshaft are designed in such a way to open the valve at the correct timing and keep them open for the necessary duration. The camshaft in the block is driven either by timing gears or by using timing chain or timing belts. Camshaft timing is relationship between the camshaft and crankshaft. In most engine, the camshaft is driven by the timing chain or timing belts. But in this engine, the camshaft is driven by timing gears. Many newer engine designs place the crankshaft on the cylinder head. These engines are called overhead camshaft (OHC) engines. Engine oil pump shaft is also provided to flow the engine oil (lubricant) into many parts of engine block such as between pistons and cylinders, crankshaft, camshaft, gudgeon pin, connecting rod, rocker arms and valves spring, etc. Engine oil pump have two functions. Firstly, it is suction from the engine oil tank and delivered to the components of engine parts [1]. Engine oil pump are made as no luck of lubricant between rotating parts. Engine oil is circulated under pressure to the rotating bearings, the sliding pistons and the camshaft of the engine. This lubricates the bearings, allows the use of the higher-capacity fluid bearings and also assists in cooling the engine. Therefore, engine oil pump is essential for engine block [2].

In this paper, the author specializes Timing Gears Trains System of MICO Tractor Engine with detail approach.

II. DESIGN CONSIDERATION OF TIMING GEARS TRAINS AND ENGINE OIL PUMP GEAR

When a vehicle is starting from rest, the ignition switch is open, the starter motor is turn the flywheel and the crankshaft also turn counter clockwise. At the time, the timing helical pinions and gears related to each other.

Gears are defined as toothed wheels or multi lobes cams which transmit power and motion from one shaft to another by means of successive engagement of the teeth.

A. Classification of Gears

Gears are broadly classified into four groups;

- Spur gear,
- Helical gear,
- Bevel gear and
- Worm gears.

B. Helical Gear

Helical gear consists of infinite number of narrow spur gear, thus forming a cylindrical helix. There is a basic difference between spur and helical gears. While the teeth of spur gears are cut parallel to the axis of the shaft, the teeth of helical gears are cut in the form of helix on the pitch cylinder [3].

In spur gears, the contact between meshing teeth occurs along the entire face width of the tooth, resulting in a sudden application of the load which, in turn, results in impact conditions and generates noise in high speed applications.

In helical gears, the contact between meshing teeth begins with a point on the leading edge of the tooth and gradually extends along the diagonal line across the tooth. There is a gradual pick-up of load by the tooth, resulting in smooth engagement and quiet operation even at high speeds.

There are two basic type types of helical gears parallel and crossed. Parallel helical gears on two parallel shafts. A right hand helical will always mesh with a left hand helical. Crossed helical gears are mounted on shafts with crossed axes. Their teeth may have the same or opposite hand of the helix. The discussion in this chapter is limited to design of parallel helical gears.

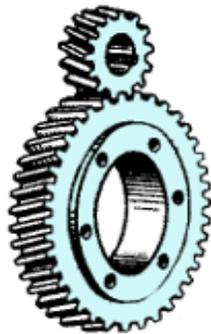


Figure 1: Parallel Helical Gear



Figure 2: Crossed Helical Gear

C. Gear Design

Gear tooth design involves primarily the determination of the proper pitch and face width for adequate strength, durability and economy of manufacture.

In a gear design it is necessary to calculate strength check and dynamic check. Strength point of view find the smallest possible module and corresponding face width [4].

Dynamic point of view find the endurance force F_0 , wear force F_w and dynamic force F_d . Required condition F_0 , $F_w \geq F_d$.

Economy of manufacture divided into three portions, 1st class commercial cut, carefully cut and precision cut.

D. Velocity Ratio (Transmission Ratio), V.R

Angular velocity ratio is the ratio of angular velocity of the pinion to the angular velocity of its mating gear. It is inversely proportional to the number of teeth on the two gears, and for spur gears it is also inversely proportional to the pitch diameters.

$$V.R = \frac{D_g}{D_p} = \frac{N_g}{N_p} = \frac{rpm_p}{rpm_g} \quad (1)$$

- Where,
- D_p = pitch diameter of pinion, mm or m
 - D_g = pitch diameter of gear, mm or m
 - N_p = number of teeth on pinion
 - N_g = number of teeth on gear
 - rpm_p = rotational speed of pinion, rev/min
 - rpm_g = rotational speed of gear, rev/min

E. Base Design

The amount of force that can be transmitted to a gear tooth is a function of the $S_0 y$ product (load carrying capacity) as shown by the Lewis equation. For two mating gears, the weaker will have the smaller $S_0 y$ value [5].

When two mating gears are to be made of the same material, the smaller gear (pinion) will be the weaker and control the design.

F. Force On Gear Teeth

Power is received from engine by the clutch shaft rotating at engine speed. Thus there is a torque in the shaft that can be computer from the following equation [6]. The pitch line velocity is derived from the basic relationship for

$$v = \frac{\pi \times D \times rpm}{60} \quad (2)$$

- D = pinion diameter, (mm or m)
- rpm = rotational speed for weaker gear (pinion), (rpm)

The torsional moment acting on the shaft can be determined from this equation.

$$M_t = \frac{9550 \times kW}{rpm} \quad (3)$$

- Where,
- M_t = Torsional moment, (Nm)
 - kW = Power being transmitted, (kW),
 - rpm = rotational speed for weaker gear (pinion), (rpm)

G. Transmitted Force

The transmitted force acts tangential to the pitch surface of the gear, actually transmits torque and power from the drive to the driver gear and acts in a direction perpendicular to the axis of the shaft carrying the gear. The transmitted force can be found by

dividing the power transmitted by the pitch line speed. If the torque (M_t) is Newton-meter and D is in meter [7].

$$F_t = \frac{M_t}{D/2} \quad (4)$$

Where, F_t = transmitted force

The normal force, F_n , and radius force, F_r , can be computer from the known F_t by using the right triangle relations evident

$$F_t = F_t \times \tan(\phi) \quad (5)$$

$$F_n = \frac{F_t}{\cos(\psi) \times \cos(\phi_n)} \quad (6)$$

Where, ϕ = pressure angle of the tool form

H. Formative or Virtual Number of Teeth

The shape of the tooth would be that one generated on the surface of the pitch cylinder of the radius and the number of teeth on this surface is defined as the virtual number of teeth.

$$N_f = \frac{N}{\cos^2(\psi)} \quad (7)$$

Where, N_f = virtual number of teeth, (teeth)

Ψ = helix angle, (degree)

D = $m \times N$ (8)

Where, N = number of teeth

D = diameter of pinion

m = number module

I. Strength in Gear Teeth

The stress analysis of gear teeth is facilitated by considering the orthogonal force components, F_t and F_r . The tangential force, F_t , produces a bending moment on the gear tooth. The resulting bending stress is maximum at the base of the tooth in the tooth in the fillet that joins the involute profile to the tooth space. Wilferd Lewis developed the equation for the stress at the base of the involute profile, which is called the Lewis equation. In the design of the gear for strength, the pitch diameter is either known or unknown. If the pitch diameter is known, the following form of the Lewis equation may be used [8].

$$\left(\frac{1}{m^2 y_{all}}\right) = \frac{s \times k \times \pi^2}{F_t} \times \cos(\psi) \quad (9)$$

Where, s = allowable stress (N/mm²)

m = module, (mm, m)

y = form factor based on virtual or formative number of teeth

k = 6 (max:), at helical gear

F_t = transmitted force, (N)

ψ = helix angle, (degree)

Where y is called Lewis form factor, values of which are tabulated in Table A.1.

This form factor y is a function of the tooth shape, which depends primarily on the tooth system and the number of the teeth on the gear [9]. If the pitch diameter is unknown, the following form of the Lewis equation may be used.

$$S_{ind} = \frac{2 \times M_t}{m^3 \times k \times \pi^2 \times y \times N_w \times \cos(\psi)} \quad (10)$$

Where, S_{ind} = Index stress

M_t = Torsional moment, (Nm)

m = module, (mm or m)

y = form factor based on virtual or formative number of teeth

k = 6 (max:), at helical gear

N_w = number of weaker gear (pinion), (teeth)

ψ = helix angle, (degree)

The allowable stress s may be taken as approximately equal to the endurance limit of the material in released loading, crossed for stress concentration effects and multiplied by a velocity factor.

$$S_{all} = S_{all} \times V.F \quad (11)$$

$$S_{all} = S_{all} \times \frac{5.6}{5.6 + \sqrt{v}} \quad (12)$$

Where, S_{all} = endurance stress (one third of the ultimate strength of material)

V.F = velocity factor

v = pitch line velocity, m/s

In the design check for strength, the pitch diameter is either known or unknown.

Reduce k value,

$$k_{red} = k_{max} \times \frac{S_{ind}}{S_{all}} \quad (13)$$

Where, k_{max} ; = 6 (for helical gear)

Then face width, b

$$b_{max}; = k_{max}; \times \pi \times m \quad (14)$$

$$b_{min}; = k_{red}; \times \pi \times m \quad (15)$$

Where, m = number of module

$$F_0 = s_0 \times b \times y \times \pi \times m \times \cos(\psi) \quad (16)$$

Where, F_0 = the endurance force

s_0 = endurance stress (one third of the ultimate strength of material)

b = face width of gear (pinion), (mm or m)

y = form factor based on virtual or formative number of teeth

m = module, (mm or m)

ψ = helix angle, (degree)

The allowable stress may be taken as approximately equal to the endurance limit of the material in released loading, corrected for stress concentration effects and multiplied by a velocity factor.

The limiting endurance strength load, F_0 , must be equal to or greater than the dynamic load, F_d .

The limiting wear load, F_w , for helical gears be determined by the Buckingham equation for wear,

$$F_w = \frac{D_p \times b \times K \times Q}{\cos^2(\psi)} \quad (17)$$

Where, D_p = pitch diameter of pinion, (mm or m)
 Q = ratio factor
 b = face width of gear (pinion), (mm or m)
 K = stress fatigue factor, (N/m²)

$$Q = \frac{2 \times D_g}{D_p + D_g} \quad (18)$$

Where, D_g = pitch diameter of gear, (mm or m)
 $K = \frac{S_{es}^2 \times \sin(\phi_n) \times [\frac{1}{E_p} + \frac{1}{E_g}]}{1.4}$ (19)

Where, S_{es} = surface endurance limit of a gear pair,
 E_p = Modulus of elasticity of the pinion material,
 E_g = Modulus of elasticity of the gear material,
 ϕ_n = pressure angle measured in a plane normal to a tooth

The surface endurance limit may be estimated from
 $S_{es} = [2.75(BHN_{avg}) - 70]$ (20)

Where, BHN_{avg} = average brinell hardness number of the pinion and gear material

The wear load, F_w is an allowance load and must be greater than the dynamic load, F_d . The dynamic load, F_d , for helical gears is the sum of the transmitted load and an incremental load due to dynamic effects:

$$F_d = F_t + \frac{21 \times v (bC \cos^2(\psi) + F_t) \times \cos(\psi)}{21 \times v + \sqrt{bC \cos^2(\psi) + F_t}} \quad (21)$$

Where, F_d = Dynamic load, (N)
 v = Pitch line velocity, (m/sec)
 b = face width of gear (pinion), (mm or m)
 F_t = Transmitted force, (N)
 C = Dynamic factor, (N/m)
 $\tan(\phi_n) = \tan(\phi) \cos(\psi)$ (22)

Where, ϕ_n = pressure angle measured in a plane normal to a tooth
 ϕ = pressure angle of the tool form
 ψ = helix angle, (degree)

$$BHN_{avg} = \frac{BHN_p + BHN_g}{2} \quad (23)$$

Where, BHN_{avg} = average brinell hardness number of the pinion and gear material BHN_p = brinell hardness number of the pinion material

BHN_g = brinell hardness number of the gear material

III. DESIGN CALCULATION AND RESULTS

A. Design Calculation of Gear Trains

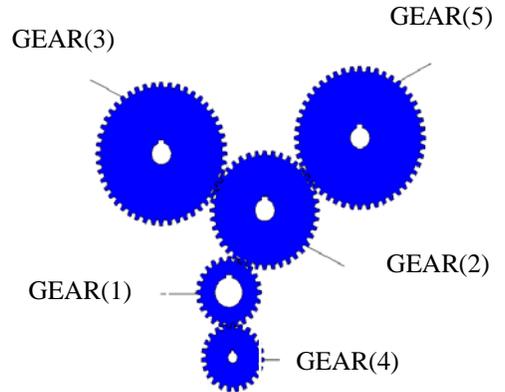


Figure 3: Crankshaft Pinion and Timing Gear,
 Where, Gear (1) is Crankshaft gear (pinion)
 Gear (2) is Timing gear (pinion)
 Gear (3) is Camshaft gear
 Gear (4) is Engine oil pump gear (pinion)
 Gear (5) is Pump shaft gear

B. Design calculation of crankshaft pinion and timing gear

Type of gear	= Helical gear
Pressure angle, ϕ	= 20° full depth
Helix angle, ψ	= 23°
Number of crank pinion, N_1	= 24 teeth
Number of timing gear, N_2	= 40 teeth
Crank pinion speed, rpm ₁	= 1800 rpm
Ultimate tensile strength, S_u	= 1120MPa
Endurance stress, S_0	= $\frac{S_u}{3}$ = 373.3333MPa
Yield strength, S_y	= 807MPa
Power of Tractor engine	= 80hp (59.68kW)
Modulus of elasticity, E	= 207GPa
Brinell hardness number, BHN	= 514
Timing gear speed, rpm ₂	= $1800 \text{rpm} \times \frac{N_1}{N_2}$ = $1800 \times \frac{24}{40} = 1080 \text{rpm}$

Same material, the smaller gear (pinion) will be the weaker and control the design.

Unknown Diameter case,
 Strength Check,

$$M_t = \frac{9550 \times kW}{rpm_1}$$

$$= \frac{9550 \times 59.68}{1800} = 316.6356 \text{ Nm}$$

$$N_{f_1} = \frac{N_1}{\cos^3(\psi)}$$

$$= \frac{24}{\cos^3(23)} = 30.7704 \approx 31 \text{ teeth}$$

$N_{f_1} = 31 \text{ teeth}$, $\phi = 20^\circ$ full depth

$N_{f_1} = 31 \text{ teeth}$, $\square y = 0.115$

$$S_{ind} = \frac{2 \times M_t}{m^3 \times k \times \pi^2 \times y \times N_w \times \cos(\psi)}$$

$$= \frac{2 \times 316.6356}{m^3 \times 6 \times \pi^2 \times 0.115 \times 24 \times \cos(23)}$$

$$= \frac{4.2092}{m^3} \tag{A}$$

Assume V.F = $\frac{1}{2} = 0.5$

$$S_{all} = S_0 \times V.F$$

$$= 373.3333 \times 10^6 \times 0.5$$

$$= 186.6667 \text{ MPa} \tag{B}$$

(A) = (B)

$$m = 2.8258 \times 10^{-3} \text{ m} = 2.8252 \text{ mm}$$

Standard module series 1, 1.25, 1.375, 1.5, 1.75, 2, 2.25, 2.5, 2.75, 3, 3.5,...

Try Standard module, $m = 3.5$,

$$D_1 = m N_1 = 3.5 \times 24 = 84 \text{ mm}$$

$$D_2 = m N_2 = 3.5 \times 40 = 140 \text{ mm}$$

$$v = \frac{\pi \times D_1 \times rpm_1}{60}$$

$$= \frac{\pi \times 0.084 \times 1800}{60} = 7.9168 \text{ m/s}$$

$$S_{all} = S_0 \times \frac{5.6}{5.6 + \sqrt{v}}$$

$$= 373.3333 \times 10^6 \times \frac{5.6}{5.6 + \sqrt{7.9168}} = 248.4842 \text{ MPa}$$

Sub in equation (A)

$$S_{ind} = \frac{4.2092}{m^3}$$

$$= \frac{4.2092}{(3.5 \times 10^{-3})^3} = 98.1738 \text{ MPa}$$

$$k_{red} = k_{max} \times \frac{S_{ind}}{S_{all}}$$

$$= 6 \times \frac{98.1738}{248.4842} = 2.3705$$

$$b_{max} = k_{max} \times \text{Standard module, } m \times \pi$$

$$= 6 \times 3.5 \times \pi = 65.9734 \text{ mm}$$

$$b_{min} = k_{min} \times \text{Standard module, } m \times \pi$$

$$= 2.3705 \times 3.5 \times \pi = 26.065 \text{ mm}$$

Used $b = 32 \text{ mm}$

$$F_0 = S_0 \times b \times y \times \pi \times m \times \cos(\psi)$$

$$= 373.3333 \times 10^6 \times 32 \times 10^{-3} \times 0.115 \times \pi \times 3.5 \times 10^{-3} \times \cos(23)$$

$$= 13.9056 \text{ kN}$$

$$F_w = \frac{D_1 \times b \times K \times Q}{\cos^2(\psi)}$$

$$Q = \frac{2 \times N_2}{N_1 + N_2} = \frac{2 \times 40}{24 + 40} = 1.25$$

$$\tan(\phi_n) = \tan(\phi) \times \cos(\psi)$$

$$\phi_n = \tan^{-1}(\tan(20) \times \cos(23))$$

$$\phi_n = 18.523^\circ$$

$$S_{es} = 2.75 \times (\text{BHN})_{avg} - 70$$

$$= 2.75 \times (514) - 70$$

$$= 1343.5 \text{ MN/m}^2$$

$$K = \frac{S_{es}^2 \times \sin(\phi_n) \times [\frac{1}{E_p + E_g}]}{1.4}$$

$$= \frac{(1343.5 \times 10^6)^2 \times \sin(18.523) \times [\frac{2}{207 \times 10^9}]}{1.4}$$

$$F_w = \frac{84 \times 10^{-3} \times 32 \times 10^{-3} \times 3957346.63 \times 1.25}{\cos^2(23)} = 15.6925 \text{ kN}$$

$v = 7.9168 \text{ m/s}$ $\square e = 0.01$ (Assume Precision Gears)

error = 0.01, $\phi = 20^\circ$ full depth

Using the Steel $\square C = 114 \text{ kN/m}$

$$F_t = \frac{M_t}{D_1 / 2} = \frac{316.6356}{84 \times 10^{-3} / 2} = 7.5389 \text{ kN}$$

$$F_d = F_t + \frac{21 \times v \times (b \times C \times \cos^2(\psi) + F_t) \times \cos(\psi)}{21 \times v + \sqrt{b \times C \times \cos^2(\psi) + F_t}}$$

$$= 7538.9 + \frac{21 \times 7.9168 \times (32 \times 10^{-3} \times 114 \times 10^3 \times \cos^2(23) + 7538.9) \times \cos(23)}{21 \times 7.9168 + \sqrt{32 \times 10^{-3} \times 114 \times 10^3 \times \cos^2(23) + 7538.9}}$$

$$= 13.5784 \text{ kN}$$

$F_0, F_w > F_d$ (\therefore Design is satisfied)

\therefore module, $m = 3.5$, $D_1 = 84 \text{ mm}$, $D_2 = 140 \text{ mm}$, facewidth, $b = 32 \text{ mm}$

IV. ANALYSIS OF GEAR USING AUTODESK

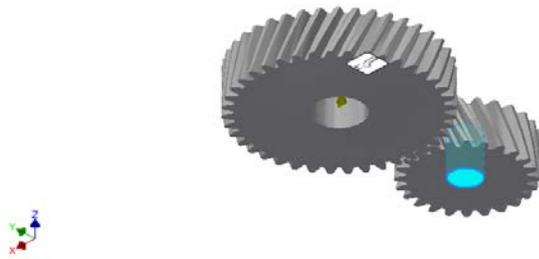


Figure 4: Model Exported in Autodesk

A. Material Properties

Name :AISI 1050 Steel
 Model type :Linear Elastic Isotropic
 Default failure criterion :Max von Mises Stress
 Yield strength :807 MPa
 Tensile strength :1120 MPa

B. Mesh Information

Avg. Element Size (fraction of model diameter) :0.1
 Min. Element Size (fraction of avg. size) :0.05
 Grading Factor :1.5
 Max. Turn Angle 60 deg
 Create Curved Mesh Elements :No
 Use part based measure for Assembly mesh :Yes

C. Results

Name	Minimum	Maximum
Volume	909480 mm ³	
Mass	7.13942 kg	
Von Mises Stress	0.00188894 MPa	87.3993 MPa
1st Principal Stress	-8.03851 MPa	51.3274 MPa
3rd Principal Stress	-96.0945 MPa	9.2745 MPa
Displacement	0 mm	0.0272425mm
Safety Factor	2.36844 ul	15 ul

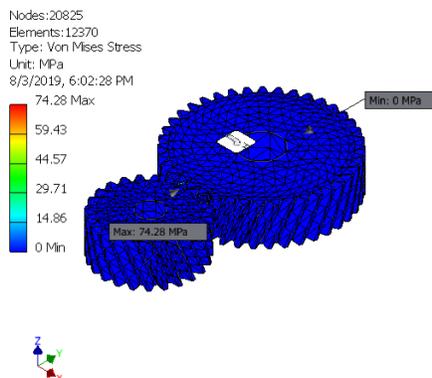


Figure 5: von Mises Stress

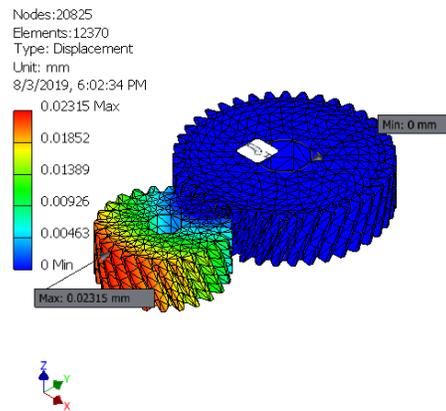


Figure 6: Displacement

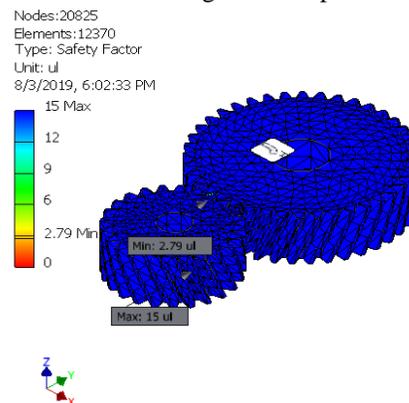


Figure 7: Factor of Safety

IV. CONCLUSION

Present day competitive business in global market has brought increasing awareness to optimize gear design. Current trends in engineering globalization require results to comply with various normalized standards to determine their common fundamental and those approaches needed to identify “best practices” in industries. From the study of effect of various parameters (wear load, dynamic tooth load, beam strength) on the design of helical gears for MICO Tractor Engine (80hp). The induced dynamic tooth load are much lower than those of the results obtained theoretically, thus the design is safe from the structural point of view.

APPENDIX

Table A.1. Form Factors ‘y’ for. Use in Lewis Strength Equation

Number of teeth	14 ¹ / ₂ ° Full-Depth Involute or Composite	20° Full Depth Involute	20° Stub Involute
12	0.067	0.078	0.099
13	0.071	0.083	0.103
14	0.075	0.088	0.108
15	0.078	0.092	0.111
16	0.081	0.094	0.115
17	0.084	0.096	0.117
18	0.086	0.098	0.120
19	0.088	0.100	0.123

21	0.092	0.104	0.127
23	0.094	0.106	0.130
25	0.097	0.108	0.133
27	0.099	0.111	0.136
30	0.101	0.114	0.139
34	0.104	0.118	0.142
38	0.106	0.122	0.145
43	0.108	0.126	0.147
50	0.110	0.130	0.151
60	0.113	0.134	0.154
75	0.115	0.138	0.158
100	0.117	0.142	0.161
150	0.119	0.146	0.165
300	0.122	0.150	0.170
Rack	0.124	0.154	0.175

ACKNOWLEDGMENT

The author would like to express thank to Daw Khin Khin Thant, Lecturer, Department of Mechanical Engineering, Technological University (Thanlyin), for her suggestion.

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Multi-Tensor Random-Walk Probabilistic Fibre Tracking Algorithms: Solving Complex Fibre Configurations in the Brain

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DOI: 10.29322/IJSRP.9.08.2019.p9286

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9286>

Abstract - Object In this study simple and computationally efficient random-walk probabilistic algorithms are presented for white matter fibre tracking using diffusion MR images. We examine how fibre tracts can be modelled globally by means of random-walk algorithms which capture the uncertainties in local fibre orientations due to noise and partial volume effects.

Materials and Methods Using Monte Carlo methods, the algorithms generate multiple pathways from a single seed location by randomly perturbing the direction of propagation according to the algorithm model at each step. We analyze the random-walk models quantitatively using a synthetic data set and estimate the optimal parameter values of the models. These algorithms are then applied to a multi-tensor model to compute the probabilities of connections between regions with complex fibre configurations. Voxels are classified based on tensor morphologies and a two-tensor model is estimated for planar voxels and a single-tensor model for the remaining voxels. The proposed algorithms are validated and compared to alternative methods on synthetic data, a physical phantom and real-world brain MRI datasets.

Results and Conclusion The results confirm the effectiveness of the proposed approach, which gives comparable results to other probabilistic methods. Our approach is however significantly faster and requires less memory. The results of multi-tensor random-walk algorithms demonstrate that our algorithms can accurately identify fibre bundles in complex fibre regions.

Index Terms - Diffusion Tensor Imaging, Probabilistic Fibre Tracking, Random-Walk, Multitensor, Fibre Crossing

1. INTRODUCTION

The random-walk of water molecules undergoing diffusion is anisotropic in organized tissues such as white matter. Diffusion weighted magnetic resonance imaging (DW-MRI), a non-invasive MRI technique, measures water self-diffusion rates and thus gives an indication of the underlying tissue microstructure. Fibre tractography using DW-MRI allows the study of anatomical connectivity of the brain *in vivo*, and thus there has been much interest in its application to clinical neurosciences. For generating fibre-tract trajectories a variety of algorithms have been proposed [1-12], broadly categorized into deterministic or probabilistic techniques.

Deterministic tractography algorithms [1-3] produce only one reconstructed trajectory per seed point, and therefore branching of fasciculi are not represented. Diffusion MRI is inherently a noisy technique, leading to uncertainty associated with each estimate of local fibre orientation. A criticism of deterministic tractography is the lack of measure of confidence or uncertainty of the reconstructed trajectories. A natural way to deal with this problem is to measure uncertainty of the local fibre orientation probabilistically at each voxel. As a result, probabilistic tractography algorithms [4-11] have been developed to determine the connectivity between brain regions and these methods allow branching of white matter tracts as well. Generally, probabilistic algorithms suffer from complex output in the form of a connectivity map and outliers. Recently, we have shown that these limitations can be addressed by computing representative curves to every anatomically distinct region from the seed point using branch-clustering and average curves [12].

Nonparametric probabilistic tracking methods [4-6] are based on bootstrap statistical methods and use as a sampling pool a set of repeated diffusion weighted measurements. Conventional bootstrapping [4] techniques require repeated acquisitions, and therefore scanning times under many clinical circumstances are unacceptable. Model-based bootstrap [5-6] offers an alternative, since it requires only a single data acquisition. However, the methods use large number of tensor volumes and fitting the diffusion tensor for all the volumes is a computationally expensive process. The parametric (model-based) probabilistic algorithms use a distribution of possible propagation directions at each step along the trajectory, with distributions generally defined on the basis of the diffusion tensor model and derived parameters. The uncertainties of the fibre orientations have been modelled in a Bayesian framework by Behrens et al. [7] and Friman et al. [8]. However, the intrinsic drawback of these methods is their computational complexity, since it is necessary to resort to Monte Carlo methods or to evaluate probability density functions (PDF). The methods take more than several hours on a high-end PC [7-8], and this is unacceptable in clinical practice.

Random-walk methods have been used successfully to date in various scientific contexts to estimate the uncertainty statistically. Random-walk probabilistic techniques have previously been applied to the problem of fibre tracking using perturbation methods

by Lazar and Alexander [9] and Prigarin et al. [10]. However, these previous attempts did not utilize the full power of the technique to assess the uncertainty in tractography. Hagmann et al. [11] developed a random-walk model where the fibre distributions are obtained by deflecting a set of directions uniformly distributed onto a sphere using the tensor operator. In this paper three random-walk probabilistic algorithms are developed and implemented to investigate white matter connectivity. The basic concept of these algorithms was originally proposed in a short report by Prigarin et al. [10]. However, the authors did not apply the method to any DW-MR images and they did not exploit the strength of the proposed random-walk models. Here, we combine these random-walk algorithms with tractography and demonstrate for the first time that the methods are qualitatively comparable to other probabilistic methods and computationally faster than them. A thorough quantitative analysis is performed on synthetic data to determine the optimal model parameters.

Conventional DTI tracking approaches have difficulties in brain regions where fibre bundles cross, which may result in a disk-shaped form of the tensor [13]. In such cases, a single diffusion tensor model is no longer valid. The development of new models based on high angular resolution diffusion imaging (HARDI) seeks to provide solutions to this problem [14-17]. The multi-tensor model [14] is a simple generalization of DTI, which replaces the Gaussian model with a mixture of Gaussian densities. Other HARDI approaches have considerable limitations compared to the multi-tensor model [14], such as very long acquisition requirements (e.g. Q-ball imaging [15] and DSI [16]), reliance on the Fourier transform (e.g. DSI [16]) and susceptibility to noise (e.g. spherical deconvolution [17]). The estimation of these models and the tracking processes using them are demanding in terms of memory requirement and processing time (e.g. PASMRI [18]), and are sometimes impractical. Probabilistic tracking methods can be extended to describe higher order diffusion imaging data, for example, Behrens et al. [19] used a mixture of Gaussian models to extend Bayesian DT-based tracking [7], and a model-based bootstrap technique has been used to estimate the uncertainty associated with the Q-ball model by Berman et al. [20].

Building on our preliminary studies [21], two-tensor random-walk probabilistic algorithms are employed that resolve the uncertainty and fibre crossing problems of the common single-tensor fibre tractography methods. The multi-tensor model [14] is only implemented on planar voxels to increase the validity of the algorithms and to decrease the total tensor estimation time. The results from the two-tensor random-walk tractography method are compared to those of commonly used single-tensor and two-tensor deterministic tracking methods on synthetic data with different levels of noise to evaluate the consistency of the tracking methods in a noisy environment and with complex fibre configurations. The performance of the proposed algorithms are measured and compared with existing deterministic and probabilistic algorithms using a physical phantom and healthy human brain data.

Table 1 Three Random-Walk Algorithms.

Algorithm-E	Algorithm-T	Algorithm-TL
$v_0 = e(D(x_0))$	$v_0 = e(D(x_0))$	$v_0 = e(D(x_0))$
$x_n = x_{n-1} + v_{n-1}\Delta t + \sqrt{\Delta t}\sigma\epsilon_n$	$x_n = x_{n-1} + v_{n-1}\Delta t + \sqrt{\Delta t}\sigma\epsilon_n$	$x_n = x_{n-1} + v_{n-1}\Delta t + \sqrt{\Delta t}\sigma\epsilon_n$
$v_n = e(D(x_n)), (v_{n-1} \cdot v_n) > 0$	$v_n = D(x_n)V_n - 1$	$v_n = c_0e(D(x_n)) + (1 - c_0)((1 - c_1)v_{n-1} + c_1D(x_n)v_{n-1})$

2. THEORY

Random-Walk Algorithms: A fibre path can be described as a sequence of three dimensional vectors $x_n \in V$, where n is the discrete step ($0 \leq n \leq N$) and V is a bounded set in the 3D Euclidean space, $V \subset R^3$. Fibre tracking algorithms determine how to obtain the sequence of points x_n for a starting point x_0 . Let $D(x)$, $x \in V$, be a given tensor field in V and the principal eigenvector of tensor $D(x)$ be denoted by $e(D(x))$.

Deterministic approaches with streamline Euler integration (STE) [1], obtain x_n values following the principal eigenvector. Thus, if the direction of the starting point is $v_0 = e(D(x_0))$ then

$$x_n = x_{n-1} + v_{n-1}\Delta t, \quad (1)$$

where $v_n = e(D(x_n))$ and Δt is the step size.

An alternative approach, tensor deflection (TEND) [2], for determining tract direction is to use the entire diffusion tensor to deflect the incoming vector (v_{n-1}) direction.

$$v_n = D(x_n)v_{n-1} \quad (2)$$

The tensor line algorithm (TL), described by Weinstein et al. [3], dynamically modulates the STE and TEND contributions to steer the tract.

$$v_n = c_0e(D(x_n)) + (1 - c_0)((1 - c_1)v_{n-1} + c_1D(x_n)v_{n-1}) \quad (3)$$

where c_0 and c_1 are user-defined weighting factors that vary between 0 and 1. Note that for $c_0 = 1$, the tensor- line algorithm is equivalent to STE.

Developing on the random-walk models of Prigarin et al. [10] three probabilistic algorithms are presented in this paper, by adding random perturbation to three deterministic differential equations (Table 1). Fibre distributions are obtained by perturbing the major eigenvector of the tensor (Algorithm-E), by deflecting a set of perturbed propagation directions similar to the TEND algorithm (Algorithm-T) or by a combination of STE and TEND (Algorithm-TL). In these algorithms, s_n represents independent standard normal random vectors and Δt , σ are parameters of the algorithm. A perturbed direction of $e(D(x))$ is obtained by randomly generating normally distributed offsets with mean zero and standard deviation 1. $(v_{n-1} \cdot v_n) > 0$ is an additional constraint to avoid backward jumps.

The step parameter Δt is assumed to be less than 1 and σ defines the intensity of artificial noise added to generate probabilistic tracks. The factor σ controls the degree of variability in tracking. If $\sigma = 0$, then the algorithms become deterministic and the tracks are defined in a unique non-random way.

The weighting factors c_0 and c_1 are user defined ($c_0+c_1=1$) parameters in Algorithm-TL. The algorithm has three directional terms: (i) an STE term weighted by c_0 (ii) a TEND term weighted by $(1-c_0)c_1$ (iii) an undeviated term weighted by $(1-c_0)(1-c_1)$. Estimated trajectories with different properties can be achieved by changing c_0 and c_1 .

Since the random-walk algorithms build on the basic deterministic methods (STE, TEND and Tensorline) the results of random-walk algorithms can be influenced by these basic algorithms. For example, in Algorithm-T the incoming vector (v_{n-1}) is multiplied by the diffusion tensor, therefore the tensor deflects the perturbed propagation direction towards the major eigenvector direction while limiting the curvature of the deflection, resulting in smoother tract reconstruction [2].

Fibre Tractography: The probabilistic algorithms described above simulate a macroscopic random walk of a particle through the set of voxels. This random walk is defined by one-to-one jumps where the steps of the jump and its direction are determined by the parameters of the algorithm. In order to map the connectivity of the brain with a single-tensor DTI model, random curves are initiated from seed points and the tracking algorithm then repeats many times from the seed points with the propagation direction randomly varied according to the algorithm.

Probabilistic techniques typically maintain the curvature criterion for the individual streamlines, but relax the anisotropy threshold for stopping trajectories, in order to potentially capture tract information in regions of fibre crossing. The curve elongation therefore stops when the border of the mask is reached or an angle between two consecutive fibre directions greater than a user defined curvature threshold is detected. The connection probability from a seed point to a random voxel within the dataset is defined as the frequency with which streamlines pass through the voxel, normalized for the total number of repetitions. Finally a global connectivity map is estimated, using the connection probabilities between all voxels in the image and the seed point.

3. MATERIALS AND METHODS

3.1 Data Acquisition

Synthetic Data Sets: We used the PISTE data sets [22] (<http://cubic.psych.cf.ac.uk/commondti>) that were created for the evaluation of tracking algorithms in regions with critical fibre constellations. The tracts were generated by simulating a DTI measurement with 30 diffusion weighted and 4 un-weighted images. The TE in the simulated measurements was 90 ms. A diffusion weighting b factor of 1000 s/mm² was chosen. The datasets are 150 × 150 × 16 voxels in size with isotropic voxel side length of 1 mm.

Physical Phantom: We used a common realistic physical phantom dataset [23] with known ground truth (<http://www.lnao.fr/spip.php?article157>). The images were used as the basis of the 2009 MICCAI Fiber Cup competition. DW-MRI data were acquired on a

3T MRI system with 3 × 3 × 3 mm³ voxel resolution, b value=1500 s/mm² and 65 directions (1 un-weighted and 64 diffusion directions). A single-shot diffusion-weighted twice refocused spin echo EPI pulse sequence was used for data acquisition, while compensating for eddy currents to the first order. The acquisition parameters were field of view FOV=19.2 cm, image size 64 × 64 × 3, repetition time TR=5 s and echo time TE=94 ms providing isotropic resolution.

In Vivo Data: DW-MR images were acquired from three healthy human subjects on a whole-body 1.5 Tesla scanner using a spin-echo EPI pulse sequence with a b-value of 700 s/mm² (TE=81 ms, TR=14 s) using 41 diffusion encoding gradients evenly distributed in space and 5 images without any diffusion weightings. Sixty slices were acquired with 2 mm thickness (no gap), which covered the whole brain with 1.875 × 1.875 × 2 mm spatial resolution. DW Images were corrected for eddy current distortion and motion using FSL [24]. The brain was extracted using BET [24]. The DW scan for each subject was registered to the non-DW image of each average, and the non-DW images from each average were registered to the first non-DW image obtained from each subject [25].

3.2 Model Parameter Optimization

Generally, fibre tracking results depend on the use of good-quality diffusion weighted images, together with a suitable algorithm to generate the tracks. However, acquisition of a set of images with sufficiently high quality is time-consuming, and in practice quality is usually compromised to allow shorter scan times. Fibre tractography algorithms may be affected by noise, partial volume effects etc., to varying degrees. The choice of parameters for random-walk algorithms influences the resulting fibre trajectories. The key parameters in random-walk algorithms are the noise ratio σ and step size Δt . It is therefore essential to optimize the parameter values, and determine under which conditions the algorithms can be used.

Synthetic data was analyzed with a single-tensor to estimate the optimal parameters of the random-walk models. Two tensor field geometries were considered: linear (all tensors oriented in parallel) and branching (comprised of an initial linear tract branching into two tracts). Zero-mean Gaussian noise was added (so that the SNR was equal to the average non-DW image intensity divided by the standard deviation of noise [26]) giving a range of SNRs (5-100) for each geometry.

Tracking was performed from six different seed points on two different synthetic models to optimize σ for different levels of SNR. Other parameters such as step size remained constant. For each experiment (geometry, SNR, 3 random-walk algorithms, 6 different seed points), tract estimates were generated for 1000 instances of the noisy diffusion tensor field. The error in tract estimation was analyzed using average minimum distance [12] from the mean curve [12] of generated curves and the ground truth (noise-free data). Average error was reported for each SNR and the three random-walk algorithms.

A similar experiment was used to optimize the number of step sizes (0.05 - 0.5 mm). The performance was evaluated on data with SNR=30 and SNR=15, using the optimized value of σ for each geometry for the three random-walk algorithms from 6 different seed points. The average error was calculated for the three random-walk algorithms.

3.3 Two-Tensor Random-Walk Tractography

Two-Tensor Estimation: The performance of the random-walk algorithms was further considered when two tensors are allowed to cross within a single voxel. The signal attenuation equation for a generalized two-tensor model can be described by a weighted sum of two Gaussian functions [14]:

$$S_i = S_0 f e^{-b g_i^T D_1 g_i} + S_0 (1 - f) e^{-b g_i^T D_2 g_i} \quad i = 1, 2, \dots, N \quad (4)$$

where S_i and S_0 are the signal intensities with and without diffusion weighting, f is a non-negative weight, g is the normalized gradient direction, b is the weighting factor, and D_1, D_2 are two tensors. Eq. (4) has 13 unknowns, compared to six in the single tensor case. The large number of parameters results in a high level of instability in estimating the tensors. The Levenberg-Marquardt nonlinear optimization algorithm was used to fit a mixture of Gaussian densities to the data. The initial step of our two-tensor estimation starts from using the least-squares single-tensor fit to the data by linear regression. The voxels were classified based on Westin measures [27] which determine the degree to which a tensor has linear (cl), planar (cp) or spherical (cs) shape. Two-tensor estimation was applied to planar voxels and single-tensor estimation to the other voxels, because only planar voxels are amenable to two tensor fitting.

Fibre Tractography: The two-tensor random-walk tracking method starts from a given seed point voxel. Every voxel in the data contains either 1 (single tensor) or 2 principal eigenvectors (two tensors) as appropriate for the tensor morphology of the particular voxel. If the seed voxel has two tensors then two separate trajectories are generated using two fibre orientations. A random-walk algorithm is then used to propagate the trajectories to the next position. If the next position contains two tensors, the corresponding two principle eigenvectors are compared to determine which of the trajectories (if any) should be followed. The diffusion tensor which has the most similar principal eigenvector to the principal eigenvector calculated from the previous position is chosen. The tracts are allowed to proceed along both positive and negative directions to obtain the full fibres. This process continues until the stopping criterion is met. The tractography algorithm describing these steps is given by Algorithm 1. This algorithm repeats for many random-walks (typically between 100 and 10000) and a region of interest, which contains a number of seed voxels.

Algorithm1: The two-tensor random-walk tractography algorithm.

1. Start from a given position x_0 .
 2. Compute the diffusion tensors $D(x_0)$ or $D_1(x_0)$ and $D_2(x_0)$ and corresponding major eigenvectors $e(D(x_0))$ or $e(D_1(x_0))$ and $e(D_2(x_0))$ according to the tensor morphology of the position x_0 .
 3. The initial tracking step proceeds along both the positive and negative of these major eigenvectors directions from x_0 to obtain whole fibres (if x_0 is not a fibre endpoint).
 4. If x_0 has two fibre directions then
 - Generate two separate trajectories using.
 - Trajectory 1: $v_0 = e(D_1(x_0))$
 - Trajectory 2: $v_0 = e(D_2(x_0))$
 Else
 - Generate one trajectory using $v_0 = e(D(x_0))$
- Repeat**
5. Obtain an updated position x_n ($1 \leq n \leq N$) using a random walk algorithm described in Table1.
 6. If the position x_n contains two fibre directions
 - Choose principal fibre direction at x_n as $e(D_c(x_n)) = e(D_1(x_n))$ or $e(D_2(x_n))$, so that the angular difference between the previous and current principal eigenvector ($v_{n-1}.e(D_i(x_n))$) is minimal.
 Else
 - Choose principal fibre direction at x_n as $e(D(x_n))$
 7. Compute v_n using a random walk algorithm de- scribed in Table1.
- Until** a stopping criterion is met

Synthetic Data Set: The two-tensor random-walk algorithms were validated in the presence of noise using two different simulated fibre geometries: two orthogonally crossing fibres with different values of FA for each fibre and a branching trajectory. The branching tract comprised an initial linear tract which diverged into two smoothly arching tracts. The single-tensor, two- tensor STE deterministic method and the two-tensor random-walk algorithm (Algorithm-E) were compared for

a range of SNRs. The appropriate parameter values were used from the optimization process for different SNRs.

Physical Phantom: The single-tensor random-walk (STRW) and two-tensor random-walk (TTRW) algorithms were applied to the physical phantom data, which simulates several complex pathway interactions, from 16 pre-defined seed positions with 1000 iterations. The results of our method were compared with that of the

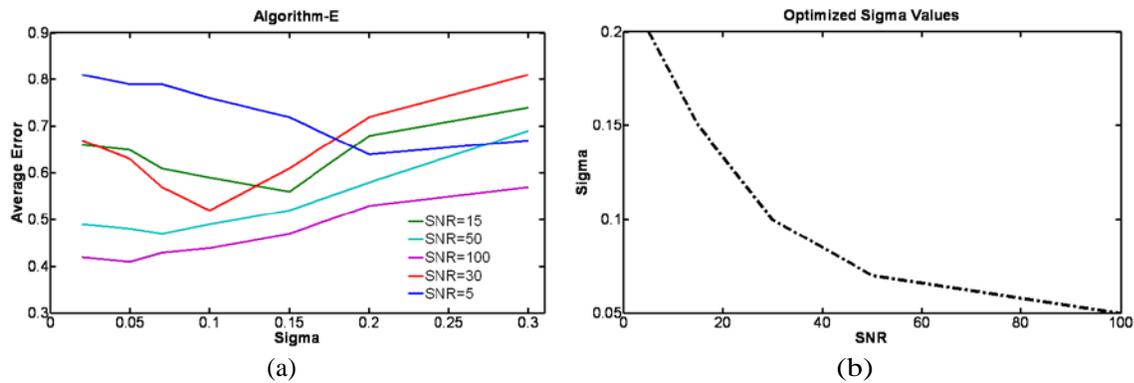


Fig. 1 (a) Plots of the average error (y-axis) as a function of σ (x-axis) for different SNR levels of the two synthetic datasets using Algorithm-E. (b) Optimized values of σ for different SNR levels.

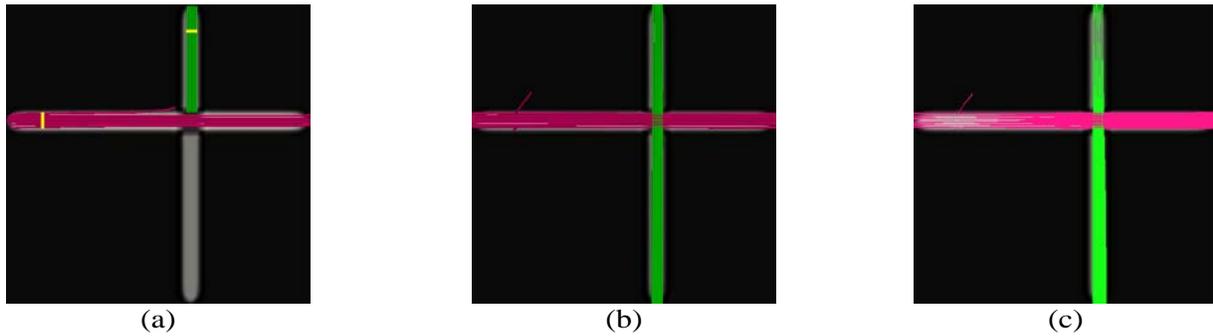


Fig. 2 Tracking results for two noise free orthogonal crossing fibre bundles using (a) STE, (b) two-tensor deterministic, and (c) two-tensor random-walk (Algorithm-E) algorithms. The reconstructed tracts are overlaid on the FA map.

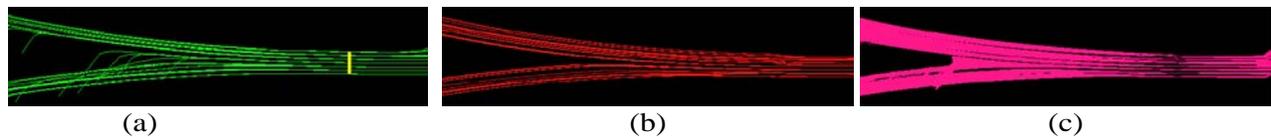


Fig. 3 Tracking results for two noise free branching fibre bundles using (a) STE, (b) two-tensor deterministic, and (c) two-tensor random-walk (Algorithm-E) algorithms.

STE [1] deterministic method applied to the same starting points as well as the ground truth.

In Vivo Data: The performances of the STRW and TTRW algorithms in three different human data sets were examined within the centrum semiovale, where callosal tracts and corona radiata cross with longitudinal tracts. The tracking algorithms were seeded from two different seed points, one within the anterior body of the corpus callosum and the other lying in the left genu of the internal capsule. For comparison purposes, a parametric Bayesian method [8] and a non-parametric wild-bootstrapping method [5] were performed using the same seed points and the same stopping criteria.

The parameters used for phantom data and *in vivo* data were as follows: Algorithm-E ($\sigma = 0.1, \Delta t = 0.1$), Algorithm-T ($\sigma = 0.1, \Delta t = 0.1$) and Algorithm-TL ($\sigma = 0.1, \Delta t = 0.1, c_0 = 1/3, c_1 = 2/3$). The choice of σ and Δt values were based on the optimization process and visual inspection confirms that the values of c_0 and c_1 values are appropriate choices, especially in the complex regions. A constant curvature threshold (50°) was used as stopping criterion for all cases.

4. RESULTS

4.1 Synthetic Data Sets

Model Parameter Optimization: Fig. 1(a) presents average error values for the 6 different seed points of the two synthetic data sets, as a function of σ (0.02 - 0.3) for different SNR levels (SNR = 5, 15, 30, 50 and 100). Generally the error first decreases

with σ and then

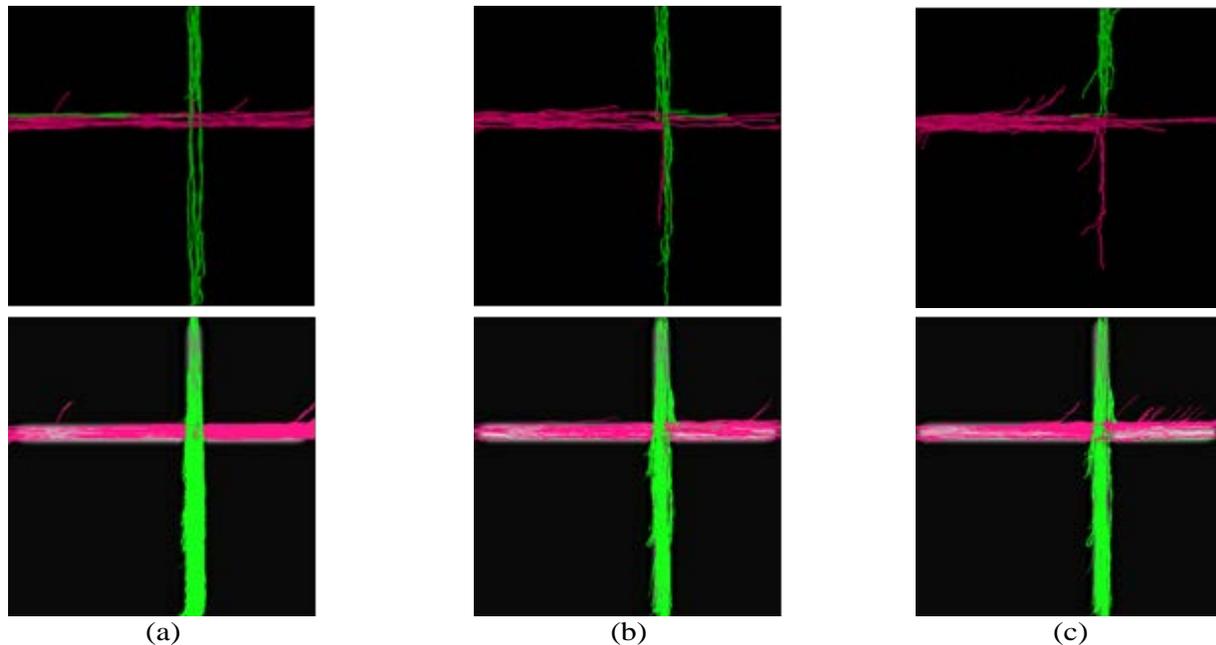


Fig. 4 The tracking results of the two-tensor deterministic (top row) and two-tensor random-walk (Algorithm-E) (bottom row) algorithms for two orthogonally crossing fibre bundles with SNRs of 30 (a), 15 (b) and 5 (c) respectively.

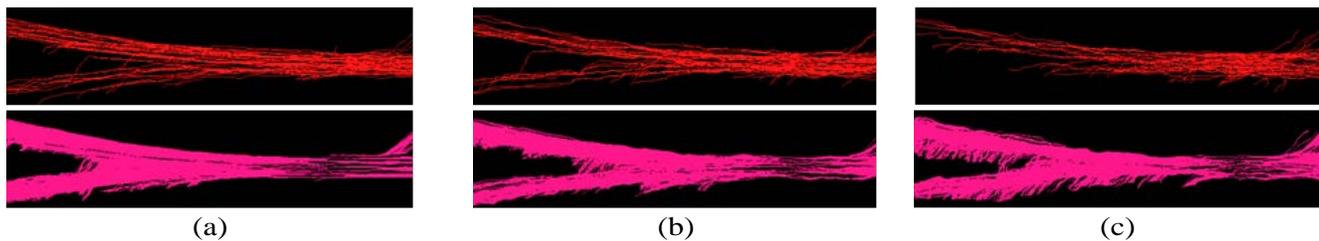


Fig. 5 The tracking results of the two-tensor deterministic (top row) and two-tensor random-walk (Algorithm-E) (bottom row) algorithms for branching fibre bundles with SNRs of 30 (a), 15 (b) and 5 (c) respectively.

later increases. The values of σ corresponding to the minimum average error values are considered as optimal for a particular SNR level (Fig. 1(b)). There was not a large difference between the three algorithms in the optimized σ values. Some interesting simple relationships were observed in the step size optimization experiment. As might be expected, increasing the step size Δt (0.05 - 0.5 mm) increases the average error. This relationship was found to be approximately linear and independent of SNR, different fibre geometry or random-walk algorithm. This means that, in principle, it is possible to improve the quality of the tracking simply by reducing the step size.

Orthogonal Crossing Data: The orthogonal crossing data set contains two fibre bundles crossing at 90 degrees. Each tract has a different FA value. Fig. 2 shows the tracking results for noise free orthogonal crossing data. The ROIs for the evaluation are chosen at the start of the fibre bundles (coloured yellow in Fig. 2(a)).

Reconstructions of the horizontal fibre bundle with higher FA value are plotted in magenta; reconstructions originating in the second ROI on the vertical fibre bundle with lower FA are plotted in green. The tracking along the vertical path with the STE algorithm stops in the region of fibre crossing, as shown in Fig. 2(a). The eigenvector of the tensors in this region is dominated by the horizontal tract with higher FA. This dominance allows the horizontal reconstruction to continue undisturbed. If more than a single orientation per voxel is considered this problem is resolved, and the two crossing tracts are reconstructed correctly (Fig. 2(b) and (c)).

The performance of the TTRW algorithm was then tested for noisy data, as shown in Fig. 4. Tracking along the vertical and horizontal paths with a two-tensor deterministic method stops in the region of fibre crossing, especially in low SNR regions. The TTRW algorithm reconstructs both tracts completely and consistently.

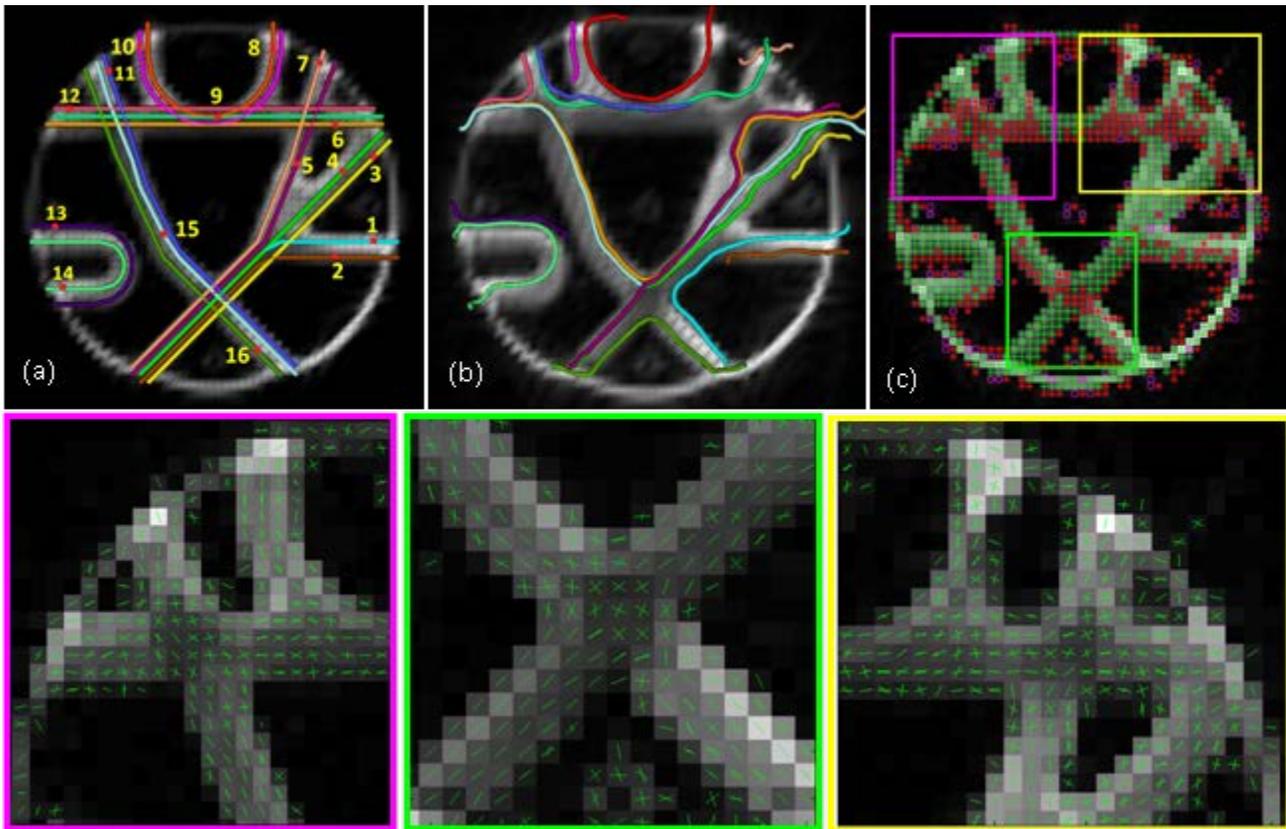


Fig. 6 Physical phantom (a) Ground truth and 16 seed points (b) STE deterministic tracking results (c) Westin measures (linear(+), planar(*) or spherical (o) shape) with three selected crossing regions and two-tensor estimation (bottom row).

Branching Data: The data set consists of two branching arms with each arm having a different FA value. The ROI was placed on the non-branching end of the fibre bundle (coloured yellow in Fig. 3(a)). Fig. 5 shows the reconstructed branching fibre bundle with two-tensor deterministic and two-tensor random-walk (Algorithm-E) algorithms. Many tracts of the deterministic results stop in the branching region and only reconstruct one arm completely, especially in low SNR data. However, the two-tensor random-walk algorithm reconstructs both arms completely in all cases. These two examples clearly illustrate the advantages of the TTRW tracking methods in the noisy, crossing and branching fibre environments.

4.2 Phantom Data

The random-walk algorithms were evaluated on a physical phantom, which was created with the aim of benchmarking different tractography techniques [23]. Fig. 6(c) shows the Westin tensor morphologies [27] where the diffusion is disc-shaped, indicating the expected crossing fibre trajectories. A two-tensor model was fitted to voxels identified as planar and a single tensor model to the remaining voxels. The random-walk algorithms were applied to 16 pre-defined seed points for the physical phantom (Fig. 6(a)) using the single-tensor and two-tensor models. Fig. 7 shows the trajectories and the connectivity map from seed points 4, 9 and 14 using the three algorithms with a single-tensor model. Only some seed points results are shown to provide a clearer view. Algorithm-T identified longer tracts than Algorithm-E, and generated more smooth and stable tracts in comparison to Algorithm-E. Generally, the most probable paths from the particular seed points of all three algorithms are the same. To compare our method, the STE deterministic method was also applied using the same seed points. The STE trajectories (Fig. 6(b)) show unusual tract behaviour, including sharp bends and loops.

The results of the STRW tracking are consistent with the ground truth except where some paths meet crossing regions. Fig. 8 shows the results of STRW tractography and TTRW tractography seeded through the area of identified fibre crossing using Algorithm-E. STRW fibre tractography results fail to pass through the crossing fibre area, where they stopped (Example: seed point 15) or leaked into unexpected regions and producing incorrect connections (Example: seed points 6, 5 and 1).

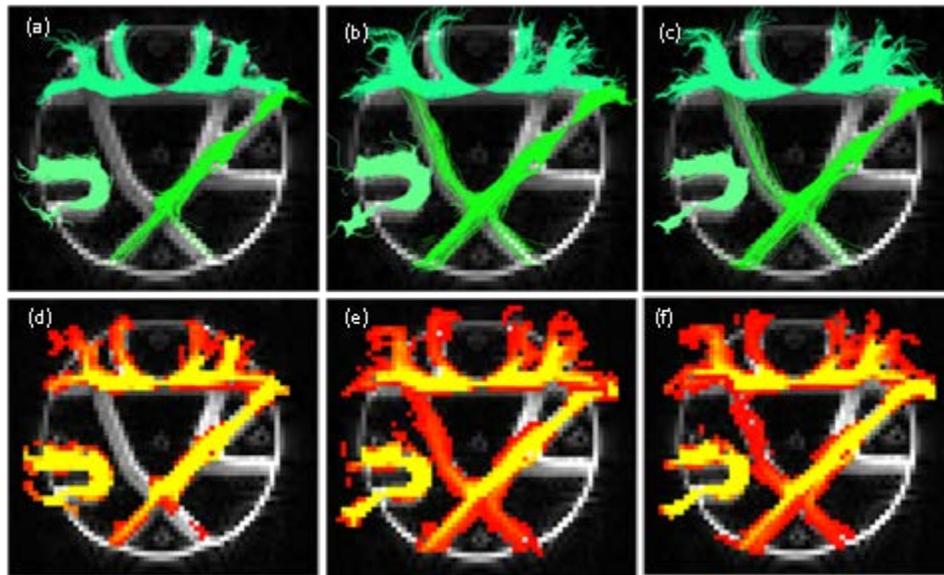


Fig. 7 Results of STRW tracking from seed points 4, 9 and 14 (a), (d) Algorithm-E (b),(e) Algorithm-T and (c),(f) Algorithm- TL

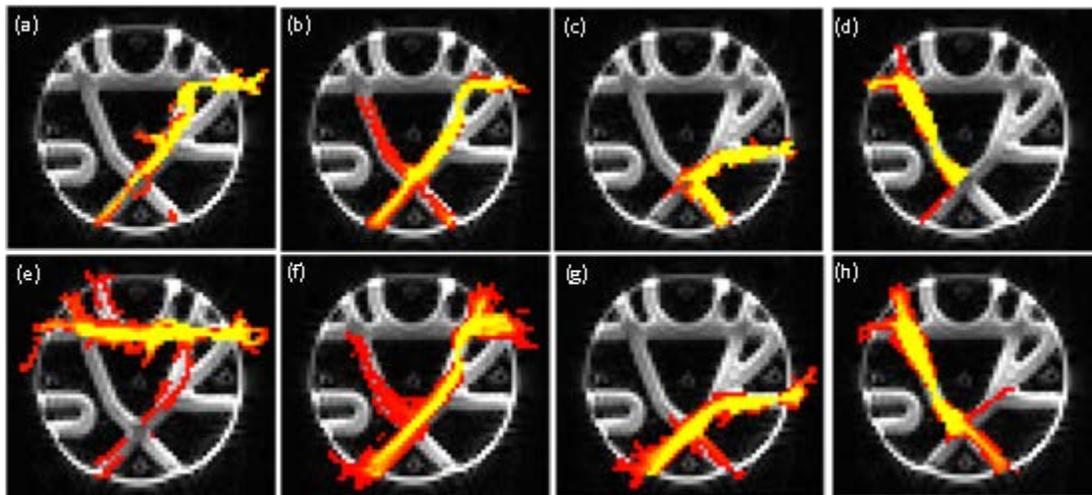


Fig. 8 Connectivity maps of STRW (top row) and TTRW (bottom row) algorithms using Algorithm-E from seed points (a),(b) 6 (c),(d) 5 (e),(f) 1 and (g),(h)15

The TTRW tracking results from these seed points are consistent with the ground truth.

These results show how our STRW tracking is able to give a clear output of fibre bundles from corresponding seed points in a way that is not possible with deterministic tracking. The proposed TTRW tracking approach performed better than the single-tensor approaches in the fibre crossing areas.

4.3 In Vivo Data

The majority of inter-hemispheric pathways are in the corpus callosum (CC), which has the highest anisotropy and moderate curvature. Fig. 9 shows typical results obtained from three healthy human subjects using the STRW tracking algorithms, TTRW tracking algorithms, Bayesian tracking method [8] and wild-bootstrapping method [5] for a seed point situated in the anterior body of the corpus callosum at the midline. The desired results observed from performing STRW tracking algorithms of the corpus callosum are its division into anatomic regions according to the fibre projections. The reconstructions obtained with the STRW tracking algorithms, Bayesian tracking method and wild bootstrapping are almost similar. However, tractography with these single-tensor methods estimates only medial tracts and were not able to resolve any crossing tracts. TTRW

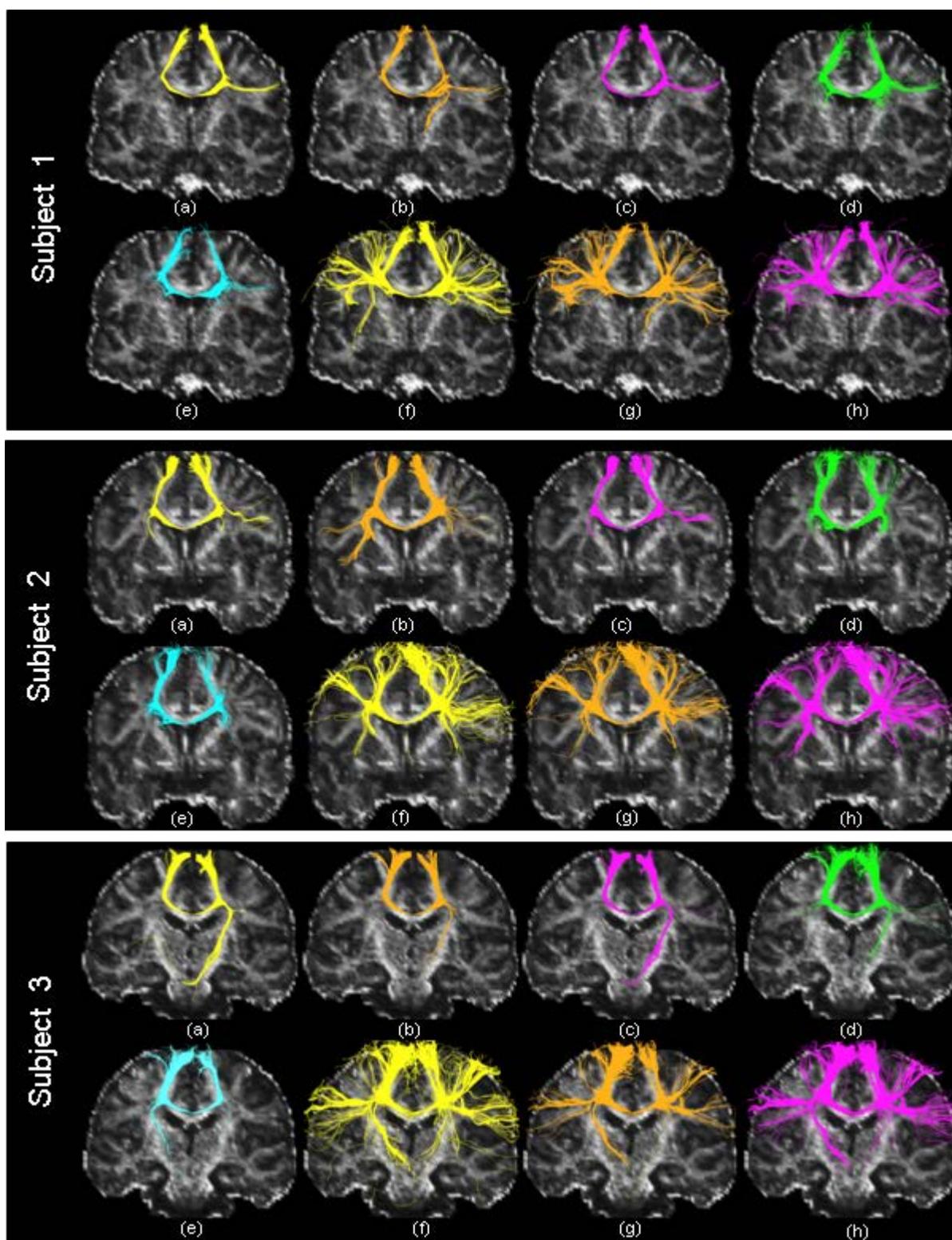


Fig. 9 Fibre tracking curves obtained using a seed point in the body of the corpus callosum for three different subjects and (a) STRW Algorithm-E (b) STRW Algorithm-T (c) STRW Algorithm-TL (d) Bayesian tracking (e) Wild-bootstrapping tracking (f) TTRW Algorithm-E (g) TTRW Algorithm-T (h) TTRW Algorithm-TL

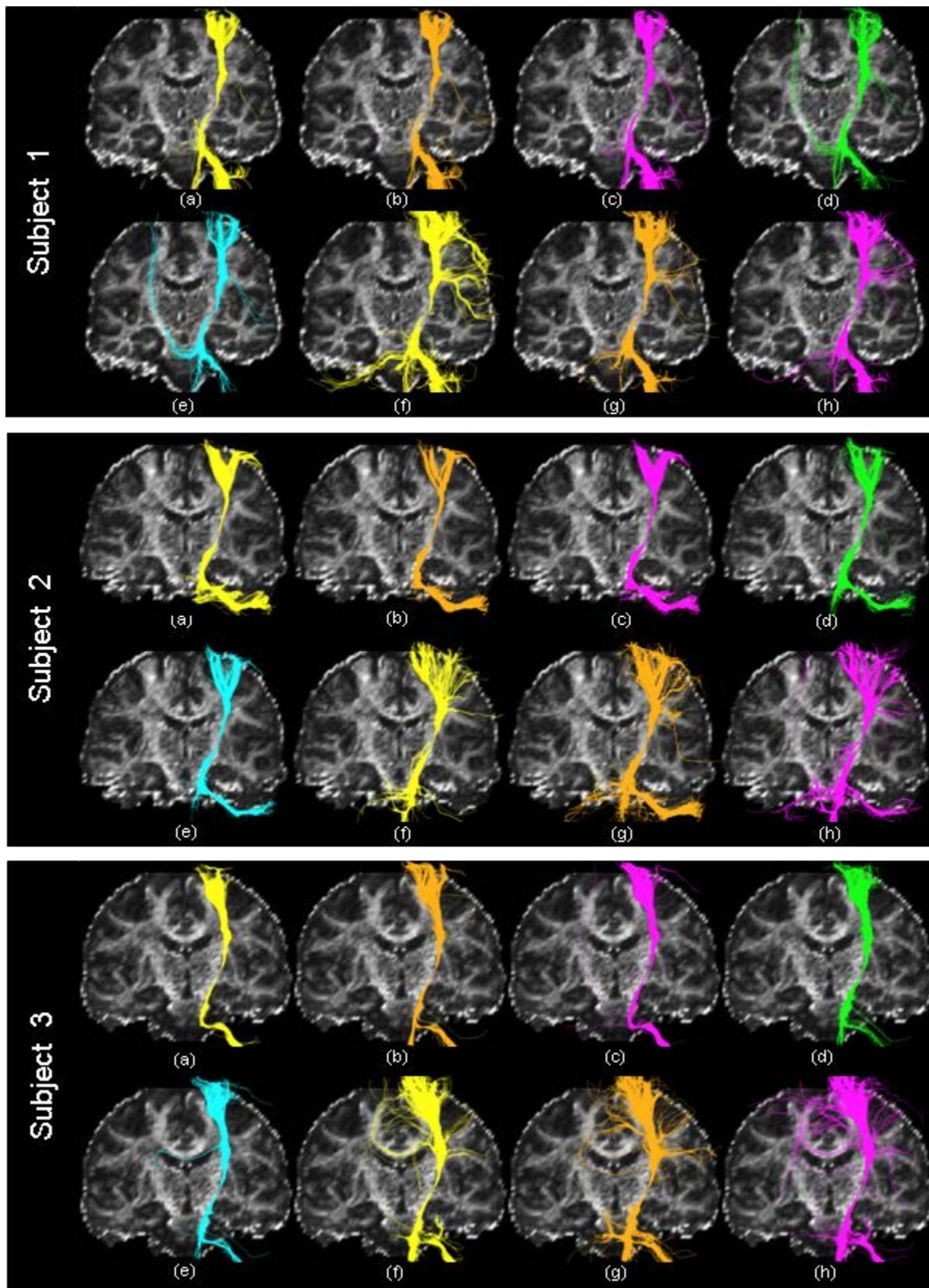


Fig. 10 Fibre tracking curves obtained using a seed point in the internal capsule for three different subjects and (a) STRW Algorithm-E (b) STRW Algorithm-T (c) STRW Algorithm-TL (d) Bayesian tracking (e) Wild-bootstrapping tracking (f) TTRW Algorithm-E (g) TTRW Algorithm-T (h) TTRW Algorithm-TL

tracking algorithms reconstructed a similar pattern of tracts across all subjects through the centrum semiovale and exhibited greater fanning of the callosal fibres to the cortex. Fibre paths for TTRW algorithms went through the crossing at the centrum

semiovale and the results capture lateral projections to the cortex. It should be pointed out that the results of TTRW algorithms (Fig. 9) were not perfectly symmetric in the two hemispheres for all three subjects.

The connections between the cerebral cortex and the spine, including the corticospinal tracts, are a part of the projection fibre system. Fig. 10 shows the results obtained from the seed point in the internal capsule using the STRW tracking algorithms, TTRW tracking algorithms, Bayesian tracking method [8] and wild- bootstrapping method [5]. The estimated corticospinal tracts of STRW tracking algorithms propagate inferiorly through the internal capsule and all the single- tensor tracking algorithms exhibit similar behaviour as the corpus callosum results. However, generally, these single-tensor tracking methods could not resolve the crossing between the corticospinal tract and the trans- verse pontine fibres. Tractography with TTRW how- ever exhibited greater fanning to the cortex compared to single-tensor approaches and was able to propagate to the different motor areas. TTRW performs better due to its ability to follow an appropriate, rather than any, fibre population in a crossing region.

The average computational time was estimated in each subject and compared with Bayesian tracking [8] and wild bootstrap tracking [5]. The computation time of the three tracking algorithms was defined in Fig. 9 as the time period required to yield a 3-D probabilistic path, beginning from the time that the *in vivo* diffusion weighted volumes were available. For the tracking experiments considered in Fig. 9, the average computation time (single processor) of our approach required less than 2 min, while the algorithms devised in [8] and [5] required >15 min and >10 min, respectively.

5. DISCUSSION

A number of probabilistic frameworks [4-8] have been proposed for fibre reconstruction as an alternative to deterministic streamline tractography, which has problems in handling uncertainty in fibre orientations. Generally, these probabilistic techniques generate stream- lines in a Monte-Carlo fashion and define an index of connectivity using visitation maps. An important draw- back of these parametric and non-parametric probabilistic techniques is the computational time. Moreover, the repetitive streamline generation increases execution time, while the connectivity values can depend on the total number of streamlines launched.

In this study, simple and computationally efficient random-walk probabilistic fibre tracking algorithms, building on the basic deterministic methods [1-3], have been presented for estimating uncertainty in fibre orientation and anatomical connectivity in white matter. How- ever, complex fibre configurations cannot be resolved by a conventional single-tensor model. These algorithms are therefore applied to a two-tensor model where the voxels are classified based on tensor morphologies before applying a single or two-tensor model. Synthetic data results showed that the two-tensor random-walk approach was successful in resolving the crossing and branching regions, particularly in cases of low SNR. Physical phantom and *in vivo* tractography results further supported these findings and showed the improved computational efficiency compared to conventional probabilistic approaches.

The principal eigenvector direction of DTI may not reflect actual fibre directions in noisy data and can be undefined in crossing regions. Random-walk algorithms are therefore developed here, which take into account more characteristics of the tensor field than only the directions of the principal eigenvectors. Despite using a simple model, it has been demonstrated how uncertainty can be taken into account during the tracking procedure. Using a random-walk approach, the tracking procedure has been extended from one-to-one mapping to a one-to-many mapping. This could give a better view of connectivity in the brain, taking branching of fibres into account.

STRW tracking results were compared against the results of two conventional parametric [8] and non para- metric [5] tractography algorithms using three human subjects. The results of STRW algorithms confirm the effectiveness of the proposed approach, which gives com- parable results to other probabilistic methods. The probabilistic random-walk algorithms are however fast, re- quire less memory and are relatively easy to implement. The computational cost of the algorithms can vary widely, depending on the resolution of the data set, step size and stopping criteria, seed point and the algorithm parameters supplied by the user. However, from our experiments on real data the random-walk algorithms are significantly quicker than the time to generate all possible tracts using other probabilistic methods from a seed point. The STRW tracking algorithms show promise in resolving the problems of deterministic tracking methods and the standard probabilistic methods.

The key parameters in these algorithms are the step size Δt and noise ratio σ . Generally, these parameters influence the results of the random-walk fibre tracking algorithms. Here we used optimal tuning of these parameters based on the use of simulated data with a range of SNRs. We used synthetic data to analyze the random-walk models quantitatively and thereby estimated the optimal parameter values of the models. We performed the STRW tracking method on straight and branching geometrical shapes for optimization since we optimized the parameters against noise only and the results of single-tensor tracking algorithms are most likely to be affected by crossing fibres. It may be sensible to use the STE algorithm for highly prolate tensor voxels and to use the TEND algorithm when the diffusion tensor has a more oblate or spherical tensor shape [2]. The user defined weighting factors c_0 and c_1 in the Algorithm-TL dynamically adjust these tensor morphologies circumstances. The performance of the tracking algorithms has been verified using these optimal parameter values and a physical phantom and an *in vivo* datasets with a wide variety of seed points. Our results show that, in general, tracking with high SNR and a low step size gives the most reliable results.

Hagmann et al. [8] proposed a random walk model of a particle diffusing in a diffusion tensor field to assess uncertainty in tractography. They provided many parameters (η , α and λ) in their random-walk algorithm, however, there was no

experiments presented for optimal tuning the parameters. One of the main disadvantages of this method is that there is no deterministic limit of the algorithm: when the stochastic part of the algorithm vanishes ($\lambda = 0$), a track turns into a straight line ($\Omega_i = \Omega_{i-1}$) compared with our algorithms which perform in a basic deterministic way when $\alpha = 0$.

An important drawback of the conventional diffusion tensor model is its limited ability to present detailed information about multidirectional fibre architecture within a voxel. We therefore further extended these algorithms to a two-tensor model for resolving crossing fibre configurations, a major concern in DW imaging, using data that can be routinely acquired in a clinical setting. Two-tensor estimation was performed only on planar voxels by classifying the morphology of the tensor. A model selection procedure was necessary to identify regions where DTI fails. Planarity was quantified using the planar index cp [27]. In planar regions, an oblate DTI tensor was decomposed into multiple compartments with orientations compatible with the neighbourhood. The recent super-resolved spherical deconvolution method [28] has shown satisfactory results in resolving fibre crossings using DTI data acquired in 4.5 minutes, however, only orientational estimates are given by this technique. PASMRI [18] has also shown good results using relatively low angular resolution DTI data, however it has very high computational requirements.

Using simulated datasets we demonstrated the performance of the two-tensor random-walk algorithms for different SNR levels. We successfully applied this method for the extraction of the callosal fibres and corticospinal tracts from *in vivo* data. The *in vivo* example showed the ability of the algorithms to resolve crossing regions, but also demonstrates the limitations of this DTI-based approach. We have illustrated the results using a single seed point in order to provide a clear view of multiple random-walk patterns and to simplify the evaluation. Finally, the robustness and the reproducibility of the method confirmed experimentally using 3 human brain datasets.

The random-walk probabilistic approach presented here is governed by the assumption that a maximum number of two crossing tracts can be resolved. In cases of three crossing populations the DTI diffusion profile will be mostly spherical and in such cases could be identified using Westins spherical index cs [27] within white matter and a three-tensor model fitted. Reducing the step size Δt could improve accuracy but since decreasing the step size increased computational time slightly, so 0.1 was considered a good compromise between accuracy and speed.

6. CONCLUSION

Simple and computationally efficient random-walk probabilistic algorithms have been presented, motivated by the fact that deterministic tracking algorithms have difficulties handling regions of low anisotropy and noise. For resolving fibre crossings using DW-MRI data, multi-tensor random-walk algorithms were developed and crossing orientations were estimated utilizing two-tensor models, applied to voxels with a planar diffusion profile. Tractography results were improved using the appropriate estimates of the model parameters from an optimization scheme. Based on our experimental evaluations, unlike previous standard probabilistic methods which are computationally very expensive, our algorithms can accurately reconstruct fibre paths with substantially improved computational efficiency as compared to conventional methods. The ability of multi-tensor random-walk algorithms to reconstruct complex intra-voxel structures robustly and rapidly is of relevance to both in research and clinical applications.

ACKNOWLEDGMENT

We are grateful to Dr. R.Nagulan for helping us for getting some data mentioned below from the foreign agencies through his personal contacts. We would like to express our sincere thanks to Maxime Descoteaux and Cyril Poupon for their help in providing us the *in vivo* dataset. NMR database is the property of CEA I2BM NeuroSpin and can be provided on demand to cyril.poupon@cea.fr. We also thank Pierre Fillard and the group members from INRIA Parietal, Neurospin, France, for providing the physical phantom data set.

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Design Optimization and Energy Management of Photovoltaic powered Electric Boat

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DOI: 10.29322/IJSRP.9.08.2019.p9287

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9287>

Abstract - Diesel only propulsion system for transportation system in navigation route caused the river pollution. The green house gas emission and pollution to environment will occur seriously. Beside, the fuel price is gradually increased from year by year; it is importance to replace the diesel only propulsion system for boat. Solar energy is one of the most importance energy resource which abundance in most parts of the world. Photovoltaic (PV) system with energy storage is one of the replacement propulsion systems for boat. The photovoltaic (PV) generation system, the diesel generator and the energy storage system in a hybrid power supply system for boat that minimizes the fuel cost and the CO₂ emissions. The aim of this paper is the optimal design of a Solar-Electric Boat for transportation along the Bago River. This paper shows the practical new technologies (mechanical and electrical design), rational design and engineering approach, safety and reliability methods used in solar boats. In this paper, the boat is powered by lithium-ion batteries that can be charged at any time by the photovoltaic generator placed on a flat top structure. It also uses the diesel generator as an emergency backup power supply system. The power generation from PV modules on a boat relies on the date, local time, time zone, longitude and latitude along a navigation route and is different from the conditions of power systems on land. It takes the seasonal and geographical variation of solar irradiations and temperatures along the route from Bago to Yangon in Myanmar into account. The proposed method considers three conditions along the navigation route to model the total ship load.

Keywords –Photovoltaic generation, Energy storage system, Solar Electric boat, Electric Propulsion, CO₂ emission

I. INTRODUCTION

The amount of greenhouse gas produced by the transportation systems is increased year by year. Among them, CO₂ emission by boat is involved with a certain number and the International Convention for the Prevention of Pollution from Boat has made the claim that the boats must find a new way to reduce their collective emissions of greenhouse gas. Serious environmental pollution and the low energy efficiency of traditional boat systems whose power is supplied only by diesel generators can be mitigated by properly integrating renewable energy.

Almost all boats that now are travelling along the river are monohull boats powered by outboard or inboard engines using fossil fuels where the exhaust gasses causing measurable negative effects on the earth's atmosphere so called as the carbon emission. Besides that increasing of oil price will increase the operational cost of the boats/farries especially when there is small number of passengers using the ferries hence will not making profit but loss. Electric

boat is not produced any pollution during its operation; no carbon emission, no waste engine cooling water and no noise.

Photovoltaic (PV) energy has been introduced into ship power systems to reduce their greenhouse gas emissions, improve energy efficiency and reinforce the boat power system stability. However, the use of too much solar energy may increase investment cost and make the power system unstable owing to the uncertainty associated with solar power. Additionally, a wide range of investigations have found that the use of an energy storage system (ESS) is one of the most effective solutions for ensuring the reliability and power quality of power systems and the increased penetration of distributed generation resources. The PV system applied for marine vessels has been discussed to reduce the fuel cost.

The integration of a significant amount of PV power into a boat power system to reduce CO₂ emission is challenging. The PV power generation in a boat depends on its position of the river. Using the PV system consider the date, local time, time zone, longitude and latitude to formulate the power generated by PV on a moving boat. The optimal sizing of hybrid PV/battery/diesel power system was proposed, taking into account various tilt angles of PV panels. Owing to the strong dependency of the performance and rating of a solar-based system on climatic conditions, parameters such as date, local time, longitude and latitude were considered and corrections for the output of PV modules were made for different locations. The optimal design of hybrid power supply system for boat which considered various environmental conditions.

The boat is powered by direct solar energy. This boat uses solar cells that transform the solar energy into electrical energy, which is stored temporarily in lithium-ion batteries, and used to drive the boat through electric motors (permanent magnet synchronous motors) and drive systems electric propulsion offers effective system, precise and smooth speed control, reduced fuel using, low noise and low pollution rates. This paper represents the optimal electric supply for boat.

II. SOLAR POWERED ELECTRIC BOAT

Solar power is started to be used in boats is around 1985, and the first commercial solar boats are introduced in 1995. Solar powered electric boats are reduced greenhouse gas emission, operating cost and improve energy efficiency and stability than diesel boat. The boat is powered by direct solar energy. It used solar cells that is converted the solar energy into electrical

energy, which are stored temporarily in lithium-ion batteries. The boat is powered by lithium-ion batteries that can be charged at any time by the photovoltaic generator placed on a flat top structure. Then it is also used electric motors for rotating the boat propeller. Electric propulsion offers effective maneuverability, precise and smooth speed control, reduced engine room, reliability, low noise and low pollution rates. Solar-electric boats are recommended solution for navigation in areas where combustion engines are prohibited (lake, protected areas) [12Giu].



Figure1. Solar Powered Electric Boat [10]

There are many electrical and mechanical components for solar powered electric boat are Photovoltaic array, Battery bank, Charge Controller and Inverter, Buck/Boost Converters, Loads (Induction motor, lumps, pump, TV, etc), Diesel Generator and GPS System, Rudder and Propeller.

The electrical components for solar powered electric boat are described in the followings:

- Photovoltaic array
- Battery bank
- Charge Controller
- Inverter
- Buck/Boost Converters

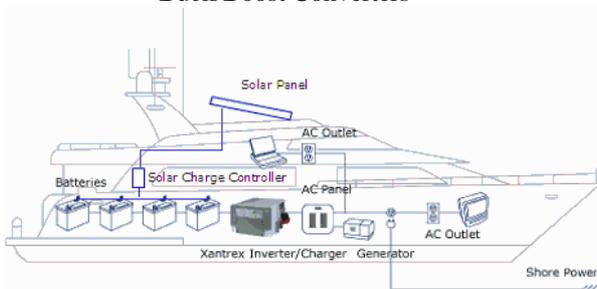


Figure2. Electric Supply System for Solar Powered Electric Boat

III. NAVIGATION ROUTE

In this research, the proposed river is Bago River. It is located in lower Myanmar. The river is flowing from north to south. So, it comes from Bago Division to Yangon Division. East Longitude and North Latitude for Bago Division are 96.48° and 17.34°. Yangon Division for East Longitude and North Latitude are 96.16° and 16.81° [2].

Bago River is start from Bagoyoma, which is connected Yangon River near the Thanlyin Bridge. The distance between the Yangon and Bago Bridge is about 40miles. BagoRiver flows from North to South. The river is gradually wider in Yangon Division. It passes through Tabu, Tawa, Ywathikon and Thonegyi village.

It is carry about 30 passengers on the boat. It is started from Botataung harbor (Yangon) at 7:00am. During this time it cannot get solar power from the sun. It is 30minutes docking at Tabu harbor. Tabu is located at Bago Region.

Itwill reache that harbor in lunch. Then, it is continued to Bago region. It will reach the Bago bridge harbor at 5:00pm. So, the time duration for navigation route is about 10 hours. The river for the Bago River is 0.3ms⁻¹. Itis sailing the upstream speed is 2.3ms⁻¹ and downstream speed is 1.7ms⁻¹.Figure 3 is shown the proposed river for solar powered electric catamaran by using the Google map searching [2].

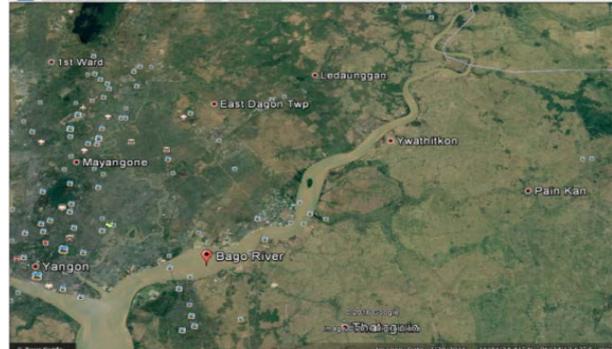


Figure3. The Proposed River Location and Map

The total radiation is the sum of the direct radiation, diffuse radiation and reflected radiation. Latitude for the proposed river is 16.8° and 17.3°[1]. In this research, December 21 is used as the typical day for solar radiation along the navigation route and tilt angle for the collector is assumed to zero. The region is received enough solar power for proposed system. The solar radiation for the navigation route is shown in figure 4.

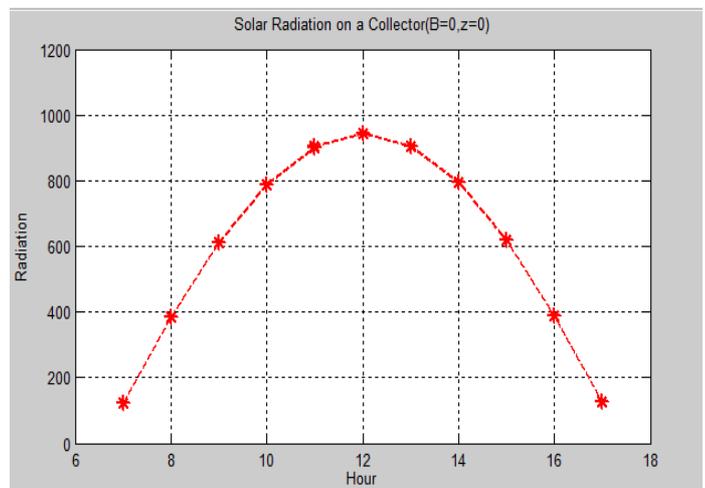


Figure4. Solar Radiation on a Collector Surface

IV. ENERGY CONSUMPTION

A. Characteristics of Solar Electric Boat

For this research, it is consider for a boat in the following characteristics:

- From Bago to Yangon
- Cruising speed: 2.3ms⁻¹(up), 1.7ms⁻¹ (down)
- Cruising range: 10hours
- Length over all: 10.8 m
- Width over all: 6.49 m
- High over all: 3 m
- The boat is equipped with one 4.7kW permanent magnet synchronous motors;
- Boat travels for about 28miles per day;

Not all boats are suitable targets for the integration with photovoltaic generating system. A solar-electric boat must have sufficient deck space. In boat a flat top structure is used for putting up a photovoltaic array.

B. Load Profiles

The time duration for boat sailing in Bago river is about 10hours (7:00am – 5:00pm). The followings are details calculation for propulsion components at upstream speed and downstream speed.

Table 1. Load profile

S / N	Appliances	Qty	Power Rating (Watt)	Hours of use per Day	Energy per Day (Wh)
1	19" Plasma TV	1	80	3	240
2	Lighting	5	20	1	100
3	Water Pump	1	350	1	350
4	GSM (System)	1	25	10	250
5	Cell Phone	4	2.5	10	100
6	Motor (up)	1	4.7 × 10 ³	10	47 × 10 ³
	Motor (down)	1	2.6 × 10 ³	10	26 × 10 ³

Thus, the load profile of the residence is 48040watt-hours per day and will be used to determine the PV and battery power system. The speed for the Bago River is 0.3ms-1 and the boat speed is 2ms-1. So, the above table is considered the upstream speed 2.3ms-1.

Thus, the load profile of the residence is 27040watt-hours per day and will be used to determine the PV and battery power system. The above table is considered the downstream speed at 1.7ms-1.

V. SIZING OF POWER SUPPLY SYSTEM

A PV Array Sizing

The photovoltaic array is the important component of any PV system. It is responsible for the conversion of sunlight into electricity. The fundamental power conversion units are the solar cells, which typically produce less than 2 Watts of power. In order to produce increased power output, the solar cells are normally connected in series and parallel to form modules. Modules are then also connected in series and parallel architecture to form an array so as to meet the desired power output.

The modules in a PV array are usually first connected in series to obtain the desired voltage; the individual strings are then connected in parallel to allow the system to produce more current as desired. The following information should be determined before the actual sizing of the PV array begins:

- ❖ The dc voltage of the system (V_{dc})
- ❖ The average sun hours of the installation site per day (T_{sh})
- ❖ The daily average energy demand in watt-hours (E_d)

Required Information:

Solar Module: SunPower 345 Solar Panel,

V_{rm} = V_{mp} = 57.3V, I_{rm} = I_{mp} = 6.02A, I_{sc} = 6.39A
 System Voltage (V_{dc}) = 48 V
 Average Sun-hours for Bauchi (T_{sh}) = 4.8 Daily
 Average Demand (E_d) = 48kWh Battery Efficiency
 (η_b) = 0.98 Converter Efficiency (η_c) = 0.985
 Charge Controller Efficiency (η_{cc}) = 0.98

Table 2. PV Array Sizing

Parameter	Equation	Value	Unit
Required Daily Energy Demand (E _{rd})	E _{rd} = E _d / η _b η _c η _{cc}	51.78	kW
Average Peak Power (P _{ave,peak})	P _{ave,peak} = E _{rd} / T _{sh}	10.79	kW
Total dc Current (I _{dc})	I _{dc} = P _{ave,peak} / V _{dc}	225	A
Number of Series Modules (N _{sm})	N _{sm} = V _{dc} / V _{rm}	1	No
Number of Parallel Modules (N _{pm})	N _{pm} = I _{dc} / I _{rm}	37	Nos
Total Number of Modules (N _{tm})	N _{tm} = N _{sm} × N _{pm}	37	Nos

In this boat the area available for laying a photovoltaic array is about 70.09m². The Total area of PV modules is 68.79 m². So the area is enough for placing of PV array.

B Battery Sizing

The storage batteries are used to supply the load during non-sunshine hours whilst being charged by the PV array during periods of high solar radiation. The recommended batteries that should be used in hybrid power system for solar boat are lithium-ion batteries because of their high performance.

Lithium iron phosphate batteries have higher energy densities. Lithium iron phosphate batteries are lighter and smaller per amp hour capacity so more energy can be stored in the same amount of space as lead acid.

To get a system that can ensure a reliable transport, it must assume that the energy, used during the cruise (5 h), must be entirely taken from the batteries; for designing in safety, it have to hypothesize that the photovoltaic system doesn't supply energy. Therefore, the daily energy consumption that the batteries have to provide is equal to the average energy (38.25kW) for half cruise time (5hours). With all these hypotheses, the total storage battery capacity has to be >90 kWh. It proposed the electrical load during a typical day without return in emergency.

The battery type recommended for use in solar PV power system is lithium-ion battery, specifically designed such that even when it is discharged to low energy level it can still be rapidly recharged over and over again for years. The battery should be large enough to store sufficient energy to operate all loads at cloudy, rainy and dusty days.

The daily average energy demand per day is 19.2kWh. The nominal system voltage is 48V. The day of autonomy is 2days, allowable depth of discharge is 0.8 (80%) and the

derate factor is 1. The rated battery voltage is 12V. The sizing of the battery bank proposed the following:

Required Information:

Lithium-Ion Battery

Number of Days of Autonomy (Daut) = 2 Days

Battery: LIT / D12-200

Cb=200Ah, Vb=12.8V, Ddisch=80%

Table 3. Battery Bank Sizing

Parameter	Equation	Value	Unit
Total Capacity of Battery Bank (Ctb)	$C_{tb} = E_{safe} / V_b$	1	kAh
Total Number of Batteries in Bank (Ntb)	$N_{tb} = C_{tb} / C_b$	20	Nos
Number of Batteries in Series (Nsb)	$N_{sb} = V_{dc} / V_b$	4	Nos
Number of Batteries in Parallel (Npb)	$N_{pb} = N_b / N_{sb}$	5	Nos

Total weight: $20 \times 25.69 \text{ kg} \approx 513.8 \text{ kg}$

Volume: $485 \times 170 \times 245 \times 20 \approx 404 \times 10^6 \text{ mm}^3 \approx 0.4 \text{ m}^3$

C. Sizing of Charge Controller

A charge controller must be able to withstand the array current as well as the total load current and must be designed to match the voltage of the PV array as well as that of the battery bank. Table 3 shows the parameters of the selected solar charge controller. The rating of charge controller should be 25% greater than short circuit current of PV array. Required charge controller current is 295.54A. The total number of charge controller is divided the required charge controller current by the selected charge controller current. The selected charge controller current is 60A. The total number of charge controller is five.

Table 4. Parameters of Charge Controller

Model Number	FSR 60/12
Rated Charge/Discharge Current	60A
Nominal System Voltage	12V
Dimension	91 x 103 x 228 mm
Weight	1.73kg

D. Sizing of Inverter

The selected inverter for the proposed system is three phase inverter. The data specification for the three phase inverter is described in Table 4.

Table 5. Parameters of Inverter

Model Number	Delta M15A
Nominal Voltage	635V _{dc}
Rated Power	15kW
AC output	230/400V _{ac}
Efficiency	98.3%
Maximum AC Current	24A
Start up Voltage	>250V

The frequency for the selected inverter is 50Hz. The weight for the inverter is 43kg and dimension is 612mm x 625mm x 278mm.

E. Selected Buck/Boost Converters

In this thesis, it selected boost converter between the PV modules, batteries and motor. It is connected buck converter between the PV modules and batteries. It is selected the 20kHz switching frequency, output voltage ripple is 5% and inductor current ripple 10%. The specification for the buck/boost converters is shown in Table 5.

Table 6. Parameters for Buck/Boost Converters

Types	Buck Mode	Boost Mode
Input Voltage	57.30V	57.3/12V
Output Voltage	12V	400V
Maximum Power	4.7kW	4.7kW
Duty Cycle	0.21	0.86
Selected Inductor	299μH	12μH
Selected Capacitor	100μF	100μF

VI. ENERGY MANAGEMENT SYSTEM

The PMS is used for the right managing of the energy aboard. It is to provide the master with the real autonomy of navigation and the real power from the battery. In our system, a storage device (battery bank) is used for balancing the mismatch between the available energy by the photovoltaic array and power required by motors and ship instruments. Both the powers that flow in and out of the storage device have to be designed accurately and controlled for a global energy management strategy.

In particular, since the lithium-ion batteries decrease the storage capacity with aging, is not possible to know the instant energy available for the navigation, by measuring the output voltage of the battery. For a safety and reliable navigation, it is necessary to know the real autonomy of navigation, which means to know the real energy storage within the battery banks.

The boat is start sailing from Botataung harbor, Yangon Division. Firstly, it cannot get sufficient power from the sun. The sufficient solar power for the electric boat is from 9:00am to 3:00pm. It will get efficient solar radiation at 12:00pm. The sunrise, sunset and night cannot get sufficient solar power for the electric boat. The total load consumption for solar powered electric boat for 6hours (9:00am – 3:00pm) is 28685 watt-hours per day.

The time duration for supplying the battery power to the load is 7:00am – 9:00am and 3:00pm – 5:00pm. It is the 4hours for supplying the load. Then, it is recharged the battery for reusing the evening. The total load consumption for 2 hours is 9.75kWh. So, the total load consumption using the battery per day is 19.49kWh.

Manage the energy from PV and battery bank for sailing time of the boat is shown in figure 5. The boat is consumed 4.7kW and 4.8kW during sailing time. At 11:00am to 11:30am is dock time at harbor and no consumed energy.

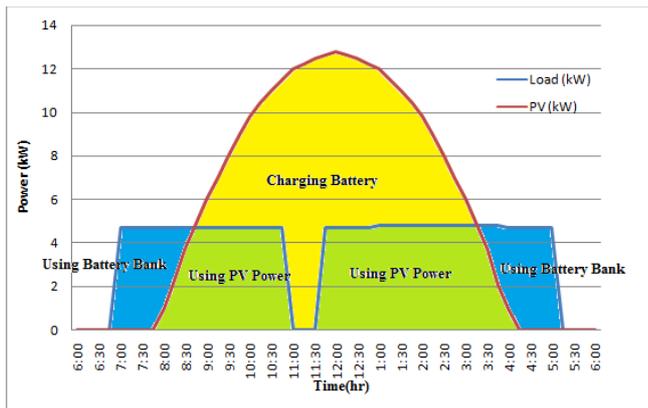


Figure 5. Energy supply from various sources

VII. DIESEL GENERATOR

It is used diesel generator as a backup emergency power supply system when the solar power and batteries power are insufficient. It is used 5kW diesel generator, which calculation is shown Table 4.20. The daily fuel consumption per day is about 18 gallons. The One nautical mile (nm) is 1knots and it equal to 1852m, the fuel consumption for liters per nm is 0.87.

Table 6. Data Sheet of Diesel Generator

Power	5kW, 41.7 amps, 240Volts AC
Dimensions	57" x 33" x 40"
Weight	950lbs
Liter/nm	0.87

IV. CONCLUSION

The optimal sizing of electric supply for solar Boat using in transportation along the coast, in the rivers, in the Lakes have been presented. It is possible to replace the standard fuel engine with an electric one, by accepting a loss in power, and without changing the weight and the dimension of the boat

In this paper is proposed to find the optimal size of hybrid PV/diesel/ESS generators in a boat's power system. Hourly loads are model with various conditions of power supply options, which are regular cruising, starting and docking. A navigation route from Bago to Yangon in Myanmar serves a route for decision makers considering three different seasons to allocate the sizes of PV and ESS herein.

The optimal sizes of the PV system, ESS and diesel generator for boat is reducing the fuel consumption and emission. It will get simulation results of optimal hybrid PV/diesel/ESS power supply for boat. The proposed method can be enhanced to study other mobile micro grid such as container ship and high-speed train.

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The Effect of Transformational Leadership and Involvement on Employees' Job Performance in Abu Dhabi National Oil Company

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DOI: 10.29322/IJSRP.9.08.2019.p9288

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9288>

Abstract- Employee performance is a measure of the effectiveness of one's job. It is also the way an individual does a job evaluated by its effectiveness. Hence, optimal job performance is often the primary outcome that organizations seek to attain. Therefore, this study examined the effect of leadership behaviour on the job performance of employees at Abu Dhabi National Oil Company, through the mediating role of involvement. In this quantitative research study, a structured questionnaire using a 5-point Likert scale was used to collect data from a total of 450 respondents from Abu Dhabi National Oil Company. The validity and reliability of the measurement and the structural models were ascertained. The Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to test the hypotheses. Findings revealed that there was a substantial mediation effect of involvement in the relationship between leadership behaviour and job performance. The findings add to the extant literature by integrating the factors that could improve job performance. Based on the findings of the study, it was recommended that oil and gas organizations in UAE improve their organizational involvement and appoint managers who possess good leadership qualities. By doing so, employee job performance can be enhanced, thus leading to a positive and significant effect on the overall organizational performance. The implications for practice and future research were also discussed.

Index Terms- Transformational Leadership; Involvement; Job Performance; Abu Dhabi National Oil Company

I. INTRODUCTION

Organizations all over the world have continued to witness and undergo tremendous changes. Some of these changes have influenced the practices of these organizations in developed countries like the United States and Australia (Zahari, 2012). Consequently, developing nations are now beginning to strategize and adopt best practices to bring about the desired changes and innovations in their respective organizations. The primary goal of any organization is to achieve set goals and consequently impact the overall organizational performance. Employees are also crucial to the achievement of optimal performance within organizations. Hence the concept of job performance is crucial to the effective functioning and success of organizations.

Organizations compete to survive the challenging and aggressive business environment. Therefore, employees' job performance is an essential tool that can be used for determining the success of any organization in the long-term (Dobre, 2013). Yahaya, Bon, Ismail, & Noor (2012) pointed out that employees' performance drives organizations to change and execute a developmental process that further benefits the organization (Ramzy, Bedawy, and Maher, 2018). In addition, one of the primary sources of competitive advantage for an organization is determined by the type of organizational culture which has been developed within the organization as this influences the commitment of workers, both individually and collectively, as well as learning and the capability for growth (Yahaya, et al, (2012). Therefore, organizational culture explains how employees think and make decisions that may eventually influence their job performances (Yahaya, et al, 2012). Hence, in any organization, the job performance of employees is crucial because highly motivated employees would have better performances and this will increase their productivity and lead to the attainment of organizational goals (Zabadi, 2016).

The Abu Dhabi National Oil Company (ADNOC) is a state-owned company whose impact and contributions to the national economy of the United Arab Emirates cannot be underemphasized (Alrayssi, 2018; Hoath, 2009; News, 2018). The company is composed of over 17 subsidiaries in the oil, gas, and the petrochemical industry as well as oil and gas transport and logistics services. Its diversification has ensured that the company has continued to amass wealth for the nation and the created millions of new jobs for its citizens (Wan, 2015). Similarly, the UAE, according to a recent international report, accounts for 4.38 percent of the total Middle East regional oil demand and up to 10 percent of the total volume of oil and gas in the world. The report by Business Monitor International (BMI) states that the UAE will provide up to 11.07 percent of the regional supply (Wan, 2015).

Siregar (2013) examined the effect of leadership behaviour on job performance and found that leadership has a high impact on organizational success. Only a few leaders understand the importance of how significant their leadership behaviour is to employee's job performance (Siregar, 2013). A significant amount of research report that leadership style matters for the different business environment. Likewise, leadership plays a critical role and is an important theme for studies (Yukl, 2008 and Bass et al., 2008). Similarly, Shiva, & Suar (2012) stated that in

service and product-oriented industries exhibit significant differences in leadership behaviour. In other words, the behaviours and attitudes of a leader vary from one organization to another (Shiva, 2012). The job performance of employees, whether positive or negative depends on the type of leadership style used within the organization (Muthueloo et al., 2014). Hence, employees need to be happy and driven in order for their job performance to be positively increased.

An analysis of studies conducted in Arabic countries revealed that there is an overwhelming lack of insights regarding leadership styles and a leader's communication competence (Obasan Kehinde & Hassan Banjo, 2014). Negussie, & Demissie, (2013) for instance, suggested that it was important to investigate the transformational leadership theory in a variety of countries as well as cultural contexts. He added that the results from western research studies might be useful when applied to the Middle Eastern countries. However, it has been revealed that the behaviour and views of people with certain values have an impact on their general environments based on their cultural background. Thus, there seems to be a gap in the literature regarding studies that have examined the mediating effects of organizational culture in the associations between leadership behaviour and employee job performance in the UAE (Negussie, & Demissie, 2013).

The underlying importance of leadership behaviour to developing optimal performances within organizations has mandated the need to understand the intricacies and factors that mediate such relationship, especially in oil and gas settings. The relationship between leadership and job performance in the literature is well researched. However, there exist a lack of studies in the extant literature that has examined the underlying role of some mediating factors in the relationship between employee performance and leadership (Kehoe and Wright, (2013). However, only one study was found that examined the potential associations between organizational justice, organizational commitment (employee loyalty), and job performance in the UAE (Suliman and Al Kathairi, 2012). Furthermore, Suliman and Al Kathairi, (2012), using a sample of 500 employees from three government organizations in the UAE investigated the link between organizational justice, organizational commitment (employee loyalty), and job performance. Findings from the study revealed that organizational justice (procedural and interactional) was positively and significantly correlated with affective and continuance commitment as well as job performance. Findings from the study also revealed that affective and continuance commitment moderated the high effects of job performance.

Given the crucially of transformational leadership to developing high job performance, it becomes critical that research study investigates the mediating effect of some organizational construct in the relationship between transformational leadership and job performance. In recent years, job involvement has been studied enormously, and more attention has been paid to the relationship between organizational culture and some underlying variables such as productivity, organizational structure, the leadership of style, efficiency, and effectiveness. However, to the knowledge of the researcher, no study had been conducted to investigate the indirect effect of job involvement on employee's job performance, particularly in the oil and gas sectors (Khademfar & Amiri, 2013). Given this identified gap in the literature, this study hence sought to examine the potential direct

and indirect associations between transformational leadership and employee job performance using job involvement as a mediating variable (Khademfar & Amiri, 2013).

II. LITERATURE REVIEW

1.1 Job performance

Performance is a unique construct; it describes the overall output of an individual, resource or system. It can also be referred to as the standard to which someone or something performs a given task. In other words, "it is the accomplishment of a given task measured against pre-set standards of accuracy, completeness, cost, and speed" (Business Dictionary Online, 2010). In the views of Mathis and Jackson (2011) performance is described as a function of; (1) the quantity of outputs (2) the quality of outputs (3) the timeliness of outputs (4) presence or attendance on the job (4) the efficiency of the work completed and (5) the effectiveness of the work completed. Hence, employee job performance is a measure of the timely, effective and efficient completion of assigned tasks from leaders that are achieved with little or no persuasion, rather with high motivation and willingness to meet and complete such assigned tasks. Hence, employee performance is a measure of the effectiveness of one's job. It is also the way an individual does a job evaluated by its effectiveness (Encarta, 2009). Performance is considered an extremely important standard that relates to an organization's outcome and success. It is measured by key concepts such as overall input and productivity on the job. According to Campbell et al. (1993) performance is an individual level construct, that is; it is something an individual does. Performance is also the extent to which an individual carries out an assignment or task. In other words, it refers to the degree of accomplishment of the task that makes up an employee's job requirements (Casio, 1992).

1.2 Transformational Leadership

According to Bass, transformational leaders display four leadership behaviours which allow followers to exceed self-hobby and carry out a task beyond expectations; these attributes are; idealized influence, intellectual stimulation, inspirational motivation and individualized consideration (Choi et al., 2016). Primarily, idealized influence is the ability of the leader to act as a role model and gain the trust and appreciation of his or her followers. It can also be described as the extent to which a leader gains acceptance among followers in the organization. Here, the leader prioritizes subordinates' needs more than their own needs and sells a vision that followers come to internalize (Amin, Shah and Tatlah, 2013). Idealized influence consists of two components: first, its effect on conduct, which is associated with the leader's behaviour, and secondly, its impact on attributes (Salter, Harris and McCormack, 2014).

Inspirational motivation illustrates the extent to which a leader presents an image which inspires followers to commit to organizational goals and objectives. It consists of articulating a compelling vision and having vivid expectations that followers will acquire more than they ordinarily consider feasible and in the long run, realize that vision (Shaari, Salleh, & Hussin, 2015). Hence, these leaders provoke spirit among their followers, deliver clear expectations and willpower to achieve objectives as well as share a collective vision (Bass et al. 2006; Salter et al. 2014; Amin

et al. 2013). Bass (1991) mentioned that inspirational motivation is understood by means of how well a leader communicates his or her visions, using visual tools or aids, and helping others find meaning (Atkinson et al., 2011). Intellectual stimulation portrays the quality of a leader who encourages followers to innovate and challenge themselves. The leader tends to encourage his supporters to reframe challenges and take risks, to venture assumptions, and to discover new approaches of working and be creative. Here, the complaint of subordinates' errors is not endorsed (Salter et al., 2014; Amin et al., 2013). Bass (1991) mentioned that the magnitude of a leader' intellectual stimulation is identified by the leaders' ability to make subordinates reflect on new methods of carrying out work, as well as new methods of looking at tasks (Atkinson et al., 2011).

Lastly, Individualized consideration symbolizes the extent to which a leader sympathizes with his followers' needs. For instance, it entails leaders spending time to educate and give non-public attention to each follower's wishes and improvement. In summary, (Bass, 1991) stated that this element is characterized by means of how nicely the leader encourages people to develop themselves, as well as the amount of meaningful feedback the leader provides to his/her subordinates and the manner by which the leader takes the time to place employees into a group (Atkinson et al., 2011). Furthermore, the point in which the goals of a business enterprise and the creative and discerning abilities of the leader are internalized, and subordinates acquire performances beyond expectations, can be described as transformational management (Gabel-Shemueli et al., 2019). Similarly, it can be described as a method of influencing foremost adjustments within the ideals, attitudes, and values of subordinates, for the purpose of enabling them to initiate a system characterized by self-boom and transformation. Transformational leaders, on the other hand, interact with subordinates while enriching environment at the same time thus allowing subordinates to realize hidden potentials for the mutual benefits of self- improvement and organizational performance (Hetland et al., 2018).

1.3 Involvement

Involvement seeks to recognize whether humans are aligned, engaged, and successful to growing personnel' potential to function under conditions of autonomy and setting value on working cooperatively towards commonplace dreams. It makes sure that human beings are aligned, engaged, and capable of performing any given assignment for the business enterprise intention. Involvement involves to the diploma to which

organizations emphasize their makes a specialty of developing, informing, and concerning people, with the purpose of growing employee dedication. furthermore, effective businesses empower and engage their humans, build their organization round teams, and increase human capability at all degrees (Denison, Hooijberg, Lane, & Lief, 2012). From the involvement measurement, organizational participants experience a strong sense of belonging and therefore, are dedicated to their paintings. whilst the individuals in any respect levels of the company since they have got a few responsibilities for making choices as a way to affect their paintings and experience that their work is at once connected to the desires of the employer, this permits them to be extraordinarily concerned to the bureaucratic management structures. these will be consequential and the part of the -group in the organizations will have to rely on their willingness to contribute.

Involvement within the Denison model is measured with 3 indexes: (i) Empowerment creates a sense of ownership and responsibility toward the organization where individuals have a sense of authority, initiative, and ability to manage their own work. (ii) Team orientation place value on teamwork toward the achievement of common goals. The organization relies on the collective effort of every individual in the organization to get work done and thus for which all employees feel mutually accountable. (iii) In order to remain competitive and meet the on-going business needs, Capability development excites the organization to continually invest in the development of the employees' skills. According to Wahyuningsih *et al.* (2019), organizations encourage organizational involvement by empowering people, building teams and developing employee's ability at all levels in the organization. Effective organizations empower and engage their employees, build their organization around teams, and increase human capability at all level (Denison et al., 2012).

1.4 Research Theoretical Framework

A theoretical framework refers to the theory that a researcher chooses to guide researchers in their study. Thus, a theoretical framework is the application of a theory, or a set of concepts drawn from one and the same theory, to offer an explanation of an event, or shed some light on a particular phenomenon or research problem. Figure 1 presents research theoretical framework, which explains role of job involvement in the relationship between transformational leadership and job performance.

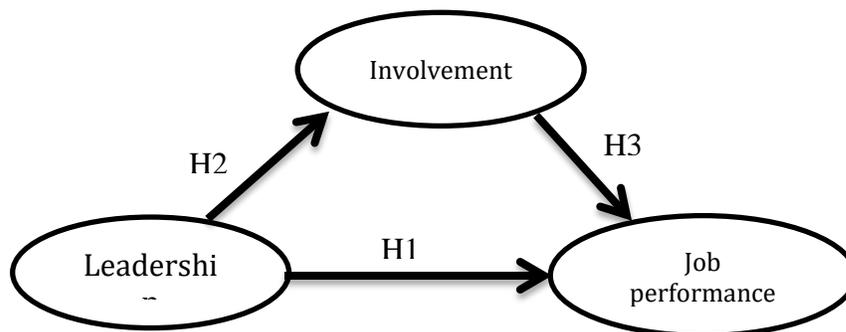


Figure 1: Research Framework

2.4.1 Hypothesis

Hence using the Abu Dhabi National Oil Company, it is hypothesized that;

H₁: There is a significant positive relationship between transformational leadership and Job performance.

H₂: There is a significant positive relationship between involvement and Job performance.

H₃: There is a significant positive relationship between transformational leadership and involvement.

III. METHODOLOGY

1.5 Data Collection

The research design for this study was explanatory with survey as main data collection technique. The selection of the research design was based on the nature of the research objectives that involved hypothesis testing and the need to observe the phenomenon in its natural setting. The study took place in Abu Dhabi National Oil Company among managerial level employees. Based on Krejcie and Morgan's (1970) sampling size table, a sample size of 538 was derived to get 95% confidence level. However, a total of 450 respondents were retrieved, accounting for 80.65% of response rate. After data cleaning, the researcher analyzed 450 completed questionnaires. According to Miller Miller (1983) a return rate ranged from 30% to 50% is common in social science studies surveys and can be accepted similarly, Hair,

Ringle, & Sarstedt (2011) stated that a return rate ranged from 50% to 80% is considered as good response rates. Hence, the validity and reliability of the measurement and the structural models were ascertained. Furthermore, the Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to test the hypotheses.

1.6 Instruments

Three established instruments which include leadership questionnaires, Involvement (organizational culture survey) and job performance questionnaire from Campbell (1990) were used in this study. Multifactor leadership questionnaire (MLQ) was used to measure transformational leadership style while Denison Organizational Culture Survey (DOCS) was adopted to measure the organizational culture which only used involvement in this study. Job performance is approached as a unidimensional construct using the Campbell (1990) job performance measures.

IV. RESULTS

The accompanying subsections discuss the specific tests utilized for examining and validating the structural model in this study. The validity of the related structural model is evaluated by utilizing the coefficient of determination (R²), effect size (f²) assessment, path coefficients, discriminant validity and assessment of collinearity. Moreover, the related study also examines the mediation relationship that was proposed in the study.

Table 1: Constructs Reliability and Validity

	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Involvement	0.809	0.862	0.513
Job performance	0.917	0.929	0.503
Leadership	0.854	0.890	0.542

Table 1 clearly shows that all the Cronbach's alpha values are above 0.7, and that means the result is good and acceptable. If the value of any construct is below 0.7, if the Cronbach's alpha is below the margin and it should be look into. These Cronbach's alpha outcomes illustrate that our entire constructs indicators have

very good reliability as shown in the Table above. In addition, all the constructs' indicators are averaging above 0.7. Item total correlation is the correlation of the item with the total of other items in the scale (Aimran et al., 2015).

Table 2: loading and Cross loading

	Involvement	Job Performance	Leadership
IV10	0.690	0.408	0.420
IV2	0.678	0.406	0.241
IV3	0.586	0.238	0.348
IV5	0.701	0.271	0.188
IV6	0.774	0.514	0.413
IV7	0.841	0.515	0.518
JP10	0.437	0.692	0.626

JP11	0.510	0.776	0.504
JP12	0.353	0.701	0.298
JP13	0.410	0.636	0.473
JP14	0.489	0.810	0.618
JP15	0.344	0.662	0.295
JP16	0.308	0.568	0.425
JP4	0.373	0.765	0.517
JP5	0.460	0.783	0.487
JP6	0.437	0.786	0.502
JP7	0.160	0.621	0.227
JP8	0.435	0.624	0.458
JP9	0.392	0.742	0.504
L11	0.441	0.558	0.827
L12	0.484	0.541	0.834
L13	0.219	0.467	0.701
L20	0.542	0.483	0.515
L5	0.350	0.460	0.769
L7	0.338	0.500	0.820
L8	0.150	0.387	0.629

Considering such loadings with added value in terms of theoretical sense and the value to be added to the discovery that is been sorted, loadings with values ranging from .40 to .70 can be retained in the model except if the elimination of such loading will result to the increase in convergent validity measures which is subject to the required benchmark. More often, researchers frequently witness weaker outer loadings; such is being realized

when new scales are being created. The loadings of all items exceeded the recommended value of 0.5 with the composite reliability. In order to retain an items in the measurement model, the outer loading must be significant and should be greater than 0.7 (Hair et al., 2013).

Table 3: Discriminant Validity

	Involvement	Job Performance	Leadership
Involvement	0.716		
Job Performance	0.574	0.709	
Leadership	0.525	0.674	0.736

The matrix shows that for all pairwise combinations of all the latent constructs, the correlations are less than the square roots of their respective average variance extracted (AVE). Thus, discriminant validity was achieved among all the study constructs. In addition, to confirm the achievement of discriminant validity in the study, the Heterotrait-Monotrait (HTMT) method was used to

support the proposal of Fornell and Larcker (1981). The HTMT method shows that discriminant validity is achieved when the inter-correlations between a construct of interest with all other constructs are less than 0.85 (Kline, 2015). Similarly, this position has been achieved in this study, as summarized in Table 4.

Table 4: Heterotrait-Monotrait Ratio (HTMT)

	Involvement	Job Performance	Leadership
Involvement			
Job Performance	0.619		
Leadership	0.607	0.713	

Table 4 shows that all the values in the matrix are less than 0.85 for inter-construct correlation, therefore further confirming the achievement of discriminant validity as previously presented in Table 3. Therefore, based on the above results, it can be confidently concluded that the reliability and validity tests

conducted on the measurement model are acceptable. The tests confirm that the measurement model for the study is valid and is thus fit to be used to estimate the parameters of the structural model.

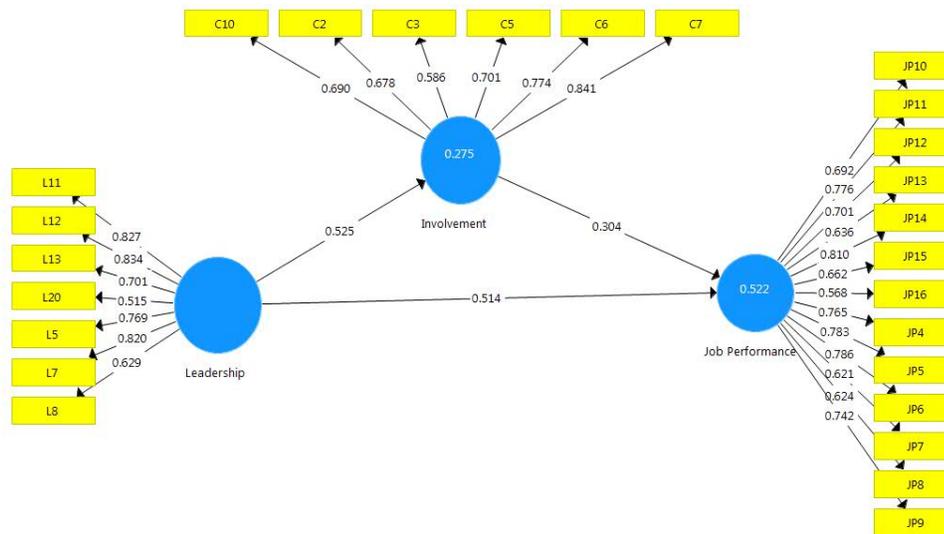


Figure 1: Measurement Model with Constructs and Indicators

Table 5: Path Coefficient

	Involvement	Job performance	Leadership
Involvement		0.293	
Job Performance			
Leadership	0.503		

According to Hair, Ringle, & Sarstedt (2014) the level or strength of a relationship is measured by the magnitude and significance of the estimates. Path coefficients that are close to +1 are considered to represent strong positive relationships while those that tend towards -1 are considered to represent strong negative relationships. Table 5 shows the results of the path

coefficients since it was evaluated based on magnitude, sign, and significance level, the path coefficients have standard values between -1 to +1. According to the result presented in Table 5; involvement has a positive but not strong relationship on Job performance. Likewise, leadership has a positive relationship on involvement.

Table 6: Coefficient of Determination R²

	R Square	R Square Adjusted
Involvement	0.253	0.251
Job performance	0.571	0.568

According to Chin, (2010) R² values of 0.67, 0.33 or 0.19 for dependent variables are considered as substantial, moderate, or weak respectively. Hair et al., (2011) prescribed R² values of 0.75, 0.50, or 0.25 for dependent constructs, which are interpreted as strong, moderate, and weak respectively. Nevertheless, R² depends on the correlation. In addition, Falk and Miller, (1992) suggested that R² values should be >= 0.10 for the variance explained in the specific unobserved construct to be considered acceptable (Ramayah et al., 2016). Thus, Table 6 presents the R² values of this study. The R² value for job performance is 0.568, which is considered substantial. Whereas the R² value for involvement is 0.253 which is described as moderate.

Table 7: Effect size assessment

	Involvement	Job performance	Leadership
Involvement		0.147	
Job performance			
Leadership	0.338		
Mission		0.053	

Having measured the R^2 values for the endogenous concept, Hair et al. (2016) proposed that it is also advisable to evaluate or measure the effect of change in it. This estimation is known as the effect size (f^2) assessment. The categories for its calculation was provided by Cohen, (1988) which are 0.02, 0.15 and 0.35 representing small, medium and large effects respectively (Hair et al. 2016). Thus, as shown in Table 7 the effect size of involvement on job performance is found to be ($f^2 = 0.147$) which is also considered high. Leadership, on the other hand, has a medium effect on involvement.

Table 8: Path Coefficient and Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Leadership -> Job Performance	0.198	0.199	0.051	3.871	0.000
Leadership -> Involvement	0.503	0.507	0.032	15.684	0.000
Involvement -> Job Performance	0.293	0.293	0.042	7.055	0.000

The significance of such indirect effect can be determined by the Variance Accounted for Statistic (VAF), which measures the impact of the related indirect effects on the dependent variable, or how much of the dependent variable is explained by the indirect effects through the mediator. With regard to its decision rules, VAF with values that is above 80% indicate full mediation, on the other hand VAF values between 20% and 80% is considered partial mediation. However, VAF values that are less than 20% are considered no mediation (Hair, et al, 2014). According to the value of VAF derived, the following conditions relating to mediation effect is specified by Hair et al., (2014):

$$VAF = (p_{12} * p_{23}) / (p_{13} + p_{12} * p_{23})$$

- i) If $0 < VAF < 0.20$, then No mediation
- ii) If $0.20 < VAF < 0.80$, then Partial mediation.
- iii) If $VAF > 0.80$, the Full mediation

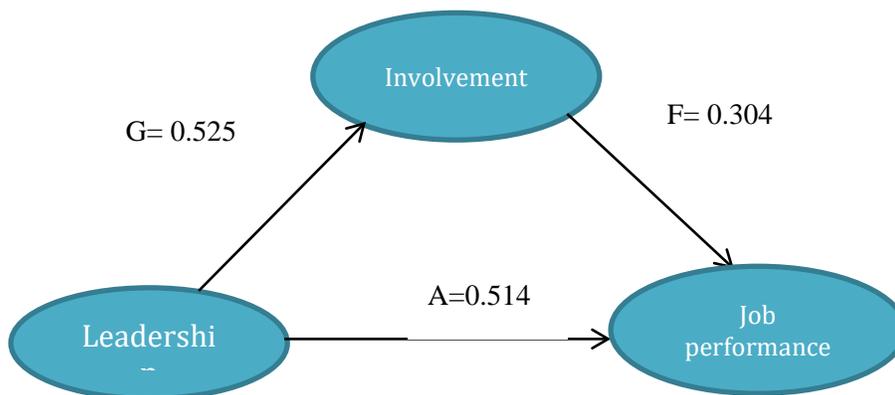


Figure 2: The Mediating effect of Involvement on Leadership and Job performance

$$A = 0.514$$

$$G = 0.525$$

$$F = 0.304$$

$$\text{Indirect effects} = G \times F$$

$$0.293 \times 0.503 = 0.147$$

$$\text{Total effects} = A + G \times F = 0.159$$

VAF (variance accounted for) indirect effects divided by the total effect = $0.159/0.673 = 0.236$. Therefore, with the VAF result of 0.236, this indicates that there is partial mediation between leadership and job performance mediated by involvement since the value derived ranges between 20% and 80%.

V. DISCUSSION AND CONCLUSIONS

This study is particularly important to undertake as it would contribute significantly to the literature on leadership practices, organizational involvement, and job performance, specifically in the oil and gas industries in the UAE. Furthermore, the study would provide useful and deductive insights to organizational leaders, decision-makers, and strategic planners regarding how oil and gas organizations can evaluate their present strategic workforce plans, practices and policies to increase productivity and performance, consequently enabling ADNOC to restructure its leadership model for increased job performance, thereby, contributing significantly to the economic development of the UAE. Findings of this study will also help to facilitate a better understanding of leadership in organizations regarding the appropriate leadership styles that should be adopted within such organizations.

4.1 Implications

The scope of the current study was only limited to a single organization, it is thus recommended that future research extend with study's scope with larger samples to include more organizations across the UAE and other parts of the world, which would help the enhancement and generalization of the outcomes. Likewise, it is recommended that future research should consider a mixed research design. In such design, quantitative as well as qualitative research approaches can be employed to complement each other in order to confirm, compare and contrast the collected data. Hence, Pradeep and Prabhu, (2011) recommended that future researchers who attempt to examine the effect of leadership behaviour on job performance should look into the mediating influences of other organizational behavior and emotional factors that may contribute to employees' job performance; but which were not taken into account by the current study. Therefore, leaders and the management of organizations should understand their employees' attitude and behavior. In addition, people with such leadership qualities should be selected to lead national organizations of the UAE. To enhance employees' job performance, the government of the UAE should amend their policies such that employees are more inclusive in the organizational processes and such employees with skills and talent should award be rewarded accordingly when they perform exceptionally in order to keep them motivated to produce more meaningful outcomes and performances.

4.2 Implications

Although the data was collected from 450 employees in one of the UAEs reputable national organization. The present study focused only on the managerial level. For this reason, the results of the study may not be generalized to other management levels such as top or low management positions, and to organizations outside of ADNOC. Although some useful deductions and insights emanating from the study, results for this study may only be applicable to ADNOC and to oil and gas companies which share similar characteristics with the Abu Dhabi National Oil Company (ADNOC). Furthermore, the study is also limited in terms of scope and research context. The study was carried out in a developing country i.e. the United Arab Emirates. Since, developing countries do not necessarily share the same characteristics as their developed counterparts especially in terms of social, cultural, political, administrative, economic and technological developments, (Palekar, 2012)., findings from this study may not be applicable to similar research context in developed nations. These distinctive features may have a substantial and significant influence on the outcomes of the study.

VI. CONCLUSION

The key aim of this research was to examine the effect of leadership behaviour on employees' job performance using involvement as a mediator variable in the petrochemical sector in the UAE. A questionnaire depicting the proposed framework constructs was designed to gather primary data for the research. The data was collected from 450 employees working at the Abu Dhabi National Oil Company (ADNOC). This study utilized a quantitative approach. and partial least squares structural equation modeling (PLS-SEM) was used to validate and confirm the research model which examined the hypothesized relationships between the constructs. Findings from the study provide empirical evidence that supports the mediating role of involvement in the relationship between leadership behaviour and job performance. Furthermore, the study findings confirm the influence of both the direct and indirect effects of the independent and mediating variable on job performance. Hence, for organizations to maximize their job performance and effectiveness, middle management leaders are encouraged to demonstrate transformational leadership styles. According to Robbins et al. (2012), transformational leadership builds on transactional leadership and produces a level of followers' effort and performance beyond what transactional leadership alone can provide. But the reverse is not true. Because transformational leaders' express higher levels of concern for people's well-being and appeal to people's values, employees are more likely to believe that the leader cares about them. Based on the findings of this study, it is the hope of the researcher that would not only shed light on or contribute to the literature but more significantly would

help organizations improve the performance of their employees in the petrochemical sector for the overall success of the organization and the UAE economy in general.

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Acquisition of Vocational and Technical Skills for Sustainable Development in Technical Colleges in Rivers State: Determinants of Gender Disparity

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DOI: 10.29322/IJSRP.9.08.2019.p9289

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9289>

Abstract- This study unveils the determinants of gender disparity in vocational and technical skills acquisition programs in Rivers State technical colleges. Two research questions and one null hypothesis were raised and formulated respectively to guide the study. Descriptive survey research method was used for the study. The population consisted of 645 students in Rivers State technical colleges and a sample size of 183 was selected through proportionate random sampling technique. A 20-item structured questionnaire was used for this study. Three experts validated instrument. Cronbach's alpha method was used to establish the reliability of the instrument in a pilot test; which yielded a reliability of 0.81. Mean and standard deviation were used in analysing data related to the research questions while t-test was used to test the hypothesis. The study revealed that societal and parental/guidance views were some of the determinants of gender disparity in acquisition of vocational and technical educational skills. The study among other things recommended that public relation units should be established in each technical college in order to sensitize members of the citizen on the importance of vocational and technical skills.

Index Terms- Gender disparity, Sustainable development, Technical colleges, Vocational skills, ,

I. INTRODUCTION

Sustainable development according to Holbrook (2015) is a form of development that addresses the needs of the present without compromising the needs of the future generation. Its implication is that, there is a need to adopt a rational approach to economic, social, environmental and cultural practices that will preserve available resources for future use. One of the goals of sustainable development which was adopted on the 25th of September, 2015 by countries around the world is gender equality. Gender according to Thundike (2015) is the fact of being male or female, especially when considered with reference to social and cultural difference. The issue of gender education has often been looked at from the perspective of equality in accessibility, that is to say, equal opportunity should be given to learners irrespective of sex. Obodo (2014) defined gender as a socially ascribed attribute which differentiate feminine from masculine. Gender disparity is the type of sex discrimination applied in the

educational system which affects both male and female during and after an educational experience (Enueme, 2015).

Akpotohwo and Ehimen (2014) describes gender disparity as lopsidedness in access to various developmental opportunities as it affects both males and females. The dichotomous nature existing between males and females role in occupations and careers in life has led to inequality that has manifested in numerous ways in our daily activities. These differences are very much evidenced in our private and public lives, choice of occupation, career ambitions and aspirations which have great effect on societal development.

The Association for the Promotion of Education, Health, Environment and Technology Research (NJEHTR, 2011) stated that, in every society, there seems to be a social difference between male and female in terms of roles and responsibilities, though these roles vary from one society to another and from one culture to another. They asserts that for ages we have been socialized into believing that the different roles and status accorded to men and women in the society is determined by biological attribute which is natural, constant and therefore not changeable.

While gender disparity is evidenced in various sectors of human endeavour, it has become more obvious in the acquisition of vocational and technical skills in Technical Colleges. The introduction of technical colleges or vocational education was not only to improve skill acquisition but also to encourage occupational development (Puyate, 2014 ; Sigh, 2016). Ugwu (2016) observed that the future of any nation lies on skills, knowledge and abilities of her citizens which are expected to be acquired through technical education without gender prejudice. Okoro (2015) explained that the major aim of technical education is to prepare its recipient for employment in any recognized occupation. Its recipients according to Okoro include both male and female trainees and learners.

Osam (2013) states that technical education is that aspect of education, which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. This implies that technical education is to prepare individuals without sex discrimination for gainful employment. In pursuance of the lofty objective of VTE, the Federal Government according to Akpotohwo and Ehimen (2014) directed the National Board for Technical Education (NBTE) to draw up circular for technical colleges and supervise the running of technical education. This

mandate led to the establishment of technical colleges all over the country where courses such as mechanical engineering, electrical engineering, fabrication engineering, automobile technology, building technology, furniture technology, drafting, painting and decoration and other practical skills related courses were taught. The major aim of technical colleges is to provide learners irrespective of sex and economic status with employable skills (Okala, 2014).

The widening gap of gender disparity in student's enrollment into technical colleges is unhealthy owing to the huge benefits inherent in VTE. National Board for Technical Education indicated that 43,176 students enrolled in technical colleges in 2014; out of which 36,508 were males (85%) and 6,668 were females (18%). In 2015 a total of 40,405 enrolled in technical colleges; out of which 32,606 (81%) were males while 7,799 (19%) were females (Sigh, 2016). The inequality in students' enrollment in technical colleges could be as a result of some determinants factors.

Obi (2015) stated that societal view about VTE is major determinants factor in students' choice of occupation and career in technical colleges. The feeling that technical skills are only meant for males discourages females from pursuing such careers. There is also a feeling by the society that vocational skills development processes are difficult for females. Others according to Akpotohwo and Ehimen (2014) believe that vocational skill acquisition were incompatible with mother's role at home and that girls who take to such careers have slim chances of getting married; as these negative thoughts may influence the interest, self-confidence among the female folk and reduce their ability and motivation to take up a career in technical skills acquisition programmes.

Parental interference in the choice of career in VTE may be another determinant factor. While some female children may desire to acquire a technical skill through technical colleges, most parents restrain them from doing so; after all, they are their sponsors (Steve, 2014 ; Olanka, 2015). It is repugnant to most parents and guardian to allow their children and wards to school in technical colleges. By implication,, the study will seek to find out if societal opinion on VTE and parental interference are determinants for gender disparity in acquisition skills in Rivers State technical colleges.

Location of prospective students and parents/guardian could influence their choice of career in vocational skill acquisition in technical colleges. Children from the rural areas prefer to attend technical colleges while those in urban areas do not (Idike, 2014). However, Okadara, (2014) was of the view that both parents and children from urban and rural areas did not like career in vocational skill acquisition in technical colleges. The study will seek to find out if location could influence choice of career in vocational skill acquisition in Rivers State technical colleges.

I.I. Statement of Problem

A critical look at the various skilled programmes in technical colleges in Rivers State designed to train youth, reveals a clear evidence of gender difference in careers, in areas of automobile technology, welding and fabrication technology, electrical and electronics technology, mechanical technology, craft practices, carpentry and joinery, building construction technology and plumbing and pipe-fitting. These skill areas is dominated by men

and as such it is regarded as a male domain and any female that go into these areas are seen to have step out of line (Akpotohwo & Ehimen, 2014). One of the most urgent challenges facing the world is the growing number of people that are excluded from meaningful participation in the economic, social, political and cultural life of their communities and their nations in general; and such societies are neither efficient nor safe. Educational discrimination in favour of males dominated occupations and favour of female dominated occupations can prevent the society from achieving the quest for rapid social and economic development (Akpotohwo & Ehimen, 2014). This study will examine the determinants of gender difference in technical and vocational skill acquisition in Rivers State technical colleges.

I.II. Purpose of the Study

The major purpose of this study was to determine the factors responsible for gender disparity in acquisition of skill for sustainable development in Rivers State technical colleges. The study will specifically sought to determine:

1. If the influence of the society causes gender difference in skill acquisition in technical colleges.
2. If parental/guardian interference influence their children/wards against careers choice in skill acquisition in technical colleges.

I.III. Research Questions

The following research questions were raised to guide the study:

1. does the unconscious influence of the society determine gender disparity in VTE skills in technical colleges?
2. does parental/guardian's interference influences their children/wards career choices in skill acquisition in technical colleges?

I.IV. Hypothesis

One null hypothesis formulated to guide the study.

1. Students in both rural and urban areas will not differ significantly in their mean rating on parental/guardians view influencing their children/wards career choices in skill acquisition in technical colleges.

II. METHOD

This study adopted description survey design. Descriptive survey was considered suitable for this study because it enabled the researchers to elicit information from its respondents. The population for the study comprised all 645 students of technical colleges in Rivers State. Through a proportionate stratified random sampling a total of 183 students (urban: 172, rural: 11) in 14 local government areas of Rivers State was the sample size. This sampling Technique ensures that the relative proportion of each item in the population is exactly its relative proportion in the sample (Nunmally, 2011).

Data was collected through the use of structured questionnaire that was developed by the researchers and validated by three experts in the department of Technical Education, Ignatius Ajuru University of Education, Port Harcourt. It was titled Determinants of Gender Disparity on Acquisition of Vocational and Technical Education skills in Rivers State

Technical Colleges: (DGDAVTERSTC). A questionnaire of 20 response items was formulated based on 4 point Likert-type scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with the corresponding ordinal value of 4, 3, 2 and 1 respectively.

Forty (40) copies of the questionnaire were trial-tested on 40 students not included in the sample for the study to determine the reliability of the instrument. Cronbach Alpha statistic was used to determine the internal consistency of the items. The instrument was found to have the reliability co-efficient of 0.81. The data was analyzed using mean and standard deviation for answering the research questions; while t-test statistics was used to test the hypothesis at 0.05 level of significance. T-test according to Nunmally (2011) is useful in both small and large samples. To guide the decision making, 2.5 was used as the benchmark for mean scores with respect to the research questions. Any value

from 2.5 and above was accepted as positive indication of determinants of gender disparity in VTE skills acquisition in technical colleges, while any mean below the benchmark was not adopted as a positive indication of determinants of gender disparity in VTE skills acquisition in technical colleges.

III. RESULTS

Results of the study with respect to research question 1 and 2 were presented in Tables 1 and 2 respectively while the result of the null hypothesis was presented in Table 3 below.

Research Question 1: Does the unconscious influence of the society determine gender disparity in VTE skills acquisition in technical colleges.

Table 1: Mean and Standard Deviation of students' responses on the unconscious influence of the society in determining gender disparity in VTE skills in Technical Colleges

S/N	ITEMS	X	SD	DECISION
1.	Careers in technical-vocational skills is only suitable for males	4.16	1.41	SA
2.	The perceived difficulty in technical-vocational skills causes gender disparity	3.58	1.48	SA
3.	The discrimination against female sex causes gender disparity	3.94	1.34	SA
4.	Our culture does not allow women to have technical skills	2.39	1.31	D
5.	The dirty nature of technical-vocational occupations causes gender disparity	3.91	1.31	SA
6.	The use of large and sophisticated machines in technical-vocational occupations causes gender disparity	3.44	1.40	A
7.	Few female sex in technical-vocational skills occupation causes gender disparity	3.04	1.50	A
8.	Lack of role model to emulate causes gender disparity	3.46	1.45	A
9.	Male sex domination in technical-vocational occupation causes gender disparity	3.27	1.49	A
10.	Lack of persons of sex to share future career prospect will make me to dislike technical-vocational skills	3.16	1.44	A

Table 1 revealed that only item 4 with mean of 2.39 was not agreed as one of the societal factors that determine gender disparity in technical-vocational skills acquisition items, while items 1, 2, 3, 5, 6, 7, 8, 9, 10 are all caused by societal influence.

Research Question 2: To what extent do parental/guardian's interference influence their children/wards career choices in skill acquisition in technical colleges.

Table 2: Mean and Standard Deviation of Students' Response on Prental/guardians Interference Influencing their Children/wards Career Choice in Skill Acquisition in Technical Colleges.

S/N	ITEMS	X	SD	DECISION
1.	My parents advice me that careers in technical-vocational skills have adverse effect on marriage opportunity	3.55	1.58	SA
2.	My father said technical-vocational skilled workers close late from work	3.27	1.30	A
3.	Technical-vocational skills occupations are incompatible with mother's care at home	3.31	1.39	A
4.	Those that take to technical-vocational skills occupations do not marry on time	3.48	1.46	A

5.	My uncle said that technical-vocational skills practitioner look masculine in nature	3.62	1.41	SA
6.	My mother said technical-vocational skills require much strength for its implementation	3.21	1.48	A
7.	Technical-vocational skills are foreign skills	3.39	1.48	A
8.	My aunty said that female that take to technical skills do not do well	3.32	1.56	A
9.	My parents advise that technical-vocational skills manipulations is not compatible with women during pregnancy	3.45	1.48	A
10.	My parents advise that technical skilled personnel look tough and aggressive, that I should not enrol into it	3.31	1.51	A

The result in Table 2 shows that parental/guardian's interference influences their children/wards choice of career in skill acquisition in technical colleges.

Hypothesis 1: Students in both rural and urban areas will not differ significantly in their mean rating on parental/guardians interference influencing their children/wards career choices in skill acquisition in technical colleges.

Table 3: T-test comparison of mean rating of students in rural and urban areas on parental/guardians interferences influencing their children/wards career choice in skill acquisition in technical colleges.

Students	N	\bar{X}	SD	Df	T-cal	T-crit	Decision
Urban	172	4.41	0.81	181	1.099	1.645	H ₀ Accepted
Rural	11	4.10	1.00				

As shown on Table 3, the calculated value of T-ratio (1.099) was less than the critical value of T-ratio (1.645); the null hypothesis was accepted. Implying that students in rural and urban areas expressed the same view on parental/guardians interference influencing their children/wards career choices in skills acquisition in technical colleges.

interference influencing their children/wards career choices in skills acquisition in technical colleges.

IV. DISCUSSION OF FINDINGS

The findings on the unconscious influence of the society as presented in Table 1 showed that 9 out of 10 items are factors that are responsible for the causes of gender disparity in technical-vocational skills acquisition programmes. The findings in item 7 and 9 agree with the assertion of Akpotohwo and Ehimen (2014) that gender disparity in technical skills is much, that a cursory look at different technical skills areas in Nigeria will reveal that it is dominated by male and the females into it are seen to have step out of line.

The findings associated with parents/guardians influences against technical-vocational skills acquisition in Table 2 revealed that the respondents agreed that career in technical-vocational skills have negative effect on female marriage opportunity and it is incompatible with mother's role or care at home. Items 5, 6, and 9 agree with the view of Akpotohwo and Ehimen (2014) that the disparity emanated from traditional image of working with technical profession as being related with heavy object, dirty and masculine in nature, that it requires much strength, that any women who wishes to succeed in this field has to be tough, aggressive and masculine.

The findings in Table 3 above indicates that students in rural and urban areas expressed the same view on parental/guardians

V. CONCLUSION

In any society where people both male and female are excluded from meaningful participation towards developmental effort, such society is bound to move at snail pace towards the achievement of developmental stride. The technological development of any nation is comparatively rapid if the male and female sex avail themselves the opportunity to acquire technical-vocational skills, without any form of stereotype that interfere with the interest of each individual. Therefore, everyone should be encouraged to explore his or her career ambition based on interest and ability so as to contribute immensely towards national development.

VI. RECOMMENDATION

Based on the findings of this study, the following recommendations are made:

1. Efforts should be made to carryout sensitization campaign in print and electronic media to parents and members of the public on issues of gender disparity in technical-vocational skilled programmes and its attendant effects on the society's in general and in the nation in particular.

2. Vocational guidance in schools should be strengthened to guide and encourage female students' participation in technical skills acquisition programmes.

3. Efforts should be made by the government, parents, teachers, and all stake holders in education industry to encourage

the female enrollment into technical skilled programmes to serve as role models to younger females to emulate.

4. The government should provide scholarship, bursaries to female students who enroll in technical skilled areas to make it attractive.

5. The government should make efforts to collect data to enhance planning in gender related issues in technical-vocational skilled programmes.

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The Relationship Between Preferred Reading Strategies and Language Achievement On the IELTS Reading Module of Students at Thai Nguyen University

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DOI: 10.29322/IJSRP.9.08.2019.p9290

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9290>

Abstract- The study tries to find the correlation between preferred reading strategies and language achievement of non-English majored students at two institutions at Thai Nguyen Universities; The International School and the Foreign Language Faculty. The participants are required to achieve IELTS 5.0-5.5 academic version for graduation. The study employs the Metacognitive Awareness of Reading Strategies Inventory, version 4.0 (MARSI) as a tool for data collection. The SPSS version 20.0 is used to analyze the data as well as to find out the preferred reading strategies of the students. The result of an IELTS which is adapted from Cambridge IELTS preparation 12 is used to compare the language achievement among different reading strategy users. The results of the study show that students use most reading strategies at moderate and high levels, except for GRS1, GRS2, GRS3 and PSRS3. The most preferred strategies include PSRS7, PSRS8, SRS1, SRS2, SRS6, SRS7, SRS9. The reading achievement is affected by GRS and PSRS. There is no significant different between the use of SRS and the reading achievement.

Index Terms- reading skill, reading strategy, reading comprehension, preferred reading strategies language achievement

I. INTRODUCTION

RTeading skill has long been regarded as a prerequisite for foreign language acquisition (Aebersold and Field, 1997) since it functions as an essential source of input for other skills to develop. The process of comprehending a text involves the activation of schemata, i.e. the readers' background knowledge about the reading texts, the ability to guess unknown words from context clues, the understanding of structures of the reading texts etc. These are named as reading strategies. Research discovered that readers spontaneously use reading strategies in the reading process (Pritchard, 1990). Literature also suggested that the use of appropriate reading strategies may improve reading comprehension (Oxford, 1990, Olsen and Gee, 1991). Using reading strategies can be of great help for non-native readers because it may serve as an effective way of overcoming language deficiency and obtaining better reading achievement both for regular school assignments and on language proficiency tests (Zhang, 1992).

As teachers of English at Thai Nguyen University, where students have to gain 6.0 overall band in the International English Language Testing System or IELTS, we notice that reading comprehension is one of the most difficult skill for those learners. This study attempts to find appropriate strategies that more or less can improve the reading scores at Thai Nguyen University, Vietnam.

There are many reasons for the poor reading achievement in an IELTS exam such as; types of readings, types of tasks, learners' schemata i.e. the background knowledge of the learners in processing the information from the reading materials. However, we assume that the inappropriate utilization of the reading strategies might be the causes. That is the impetus for this study.

1.1. Statement of the problem

The International English Language Testing System or IELTS is an international standardized test of English language proficiency for non-native English language speakers. The exam consists of four modules namely Reading, Listening, Writing and Speaking. Many international organizations and institutions worldwide use the result as the language requirement for accepting candidates from non-English speaking countries to study undergraduate or post-graduate programs in English speaking countries or even non-English speaking countries.

In Vietnam, many universities require IELTS result as a prerequisite for graduation. The overall band varies by different institutions as well as different major fields of study ranging from 5.5 to 6.0. Many test-takers fail the desire score because of the reading module. That inspires us to carry out this study with a hope that appropriate strategies can improve their reading achievement in the exam.

1.2. Scope of the study

The study is carried out with 93 students who are studying at International School and Foreign Language Faculty, Thai Nguyen University. All of these students have studied English for 3 semesters of English, focusing on the IELTS test. They all aim at the target of 6.0 overall band score.

1.3. Purpose of the study

This study aims to find what preferred reading strategies that IELTS test-takers use while they take the reading module. Besides, the relationship between preferred strategies and the real

achievement in the reading task will be explored. The results of the study will be used to raise awareness in the utilization of appropriate reading strategies for all IELTS test-takers. In addition, the findings from this study may have some implications for teachers who wish to do better in preparation courses.

1.4. Research questions

From the above mentioned aims, the study attempts to answer the following questions:

1. What are preferred reading strategies students reported using when they take the reading module in the IELTS exam?
2. To what extent do the uses of reading strategies affect the reading achievement?

II. LITERATURE REVIEW

In this part of the study, the first focus will be discussions about the importance of reading strategies while taking the IELTS test. In the second part a review of related literature on models of reading, reading strategies definitions as well as research findings in the field will be discussed.

2.1. The importance of reading strategies

Reading strategies or methods refers to a planned or established way of reading. The foundation of reading comprehension strategies is the ability to decode information using techniques and activities designed to help students become active, purposeful readers. Strategies may also be applied as individualized assessment tools. This analysis not only provide in-depth information about what strategies a reader is using, but also identifies areas that need attention for reading to develop.

There are a variety of reasons why IELTS reading is difficult, this may include; academic vocabulary that means the words in the IELTS readings are unusually used in daily life but common in topics of reading academic. In addition, the reading module is quite long in terms of three reading passages of approximately 3000 words. Another thing that makes reading is a challenge is the types of tasks, i.e. types of questions such as; multiple choice, gap-filling, summary or flow-chart completion. In order to gain high score test-takers are advised to use appropriate strategies while taking the reading module.

2.2. Models of reading comprehension

Research in the field of reading has identified theories of reading models such as; bottom-up, top-down, and interactive.

2.2.1. Bottom-up models

In bottom-up models, the reading process is considered a text-driven decoding process wherein the sole role of the reader is to reconstruct meaning embedded in the smallest units of text (Gough, 1972; Carrell, 1988; McKoon & Radcliff, 1992). It views the text as a "chain of isolated words, each of which is to be deciphered individually" (Martinez-Lang, 1995:70), and the reader as someone who "approaches the text by concentrating exclusively on the combination of letters and words in a purely linear manner" (p. 70). Meaning is understood through analysis of individual parts of the language and the reader processes language in a sequential manner, "combining sounds or letters to form

words, then combining words to form phrases, clauses, and sentences of the text" (Shrum & Glisan, 2000:123).

There are criticisms towards this model of reading. Firstly, it is entirely text-driven and the readers are simply passive recipients of the information provided (Paris and Hamilton, 2009). Secondly, meaning can only be constructed separately at word or sentence level, which hinders the process of achieving overall meaning (Nuttall, 1996). The reading speed is also significantly reduced when readers have to focus on every single word and try to understand every single detail.

2.2.2. Top-down models

In contrast, the top-down models take the opposite position and consider the reader and his/her interests, world knowledge, and reading skills as the driving force behind reading comprehension (Goodman, 1968; Graesser, Singer & Trabasso, 1994; Omaggio Hadley, 1979; Barnett, 1989). The top-down models emphasize the use of schemata in processing the information of the texts. Schema is defined as a mental structure of all the particular experiences a reader has, which can grow and change throughout his life (Nuttall, 1996:7). This concept-driven model was also advocated by other authors like Kollers (1972), Smith (1973) or Goodman (1976), emphasizing the active role of readers in approaching meaning. With the activation of schemata, the readers can interact with the texts by making and confirming predictions, asking oneself questions, evaluating the text information, etc. instead of just absorbing the contents passively. A more moderate top-down position is found in Goodman (1968), who depicts the reading process as a "psycholinguistic guessing game" (p. 126) where the reader reduces his or her dependence upon the text itself by employing strategies such as predicting and sampling. In other words the reader uses "general knowledge of the world or of particular text components to make intelligent guesses about what might come next in the text [and] samples only enough of the text to confirm or reject these guesses" (Barnett, 1989:13).

However, this model tends to undervalue the importance of word recognition and decoding in the reading process. According to Carrell and Eskey (1988), if readers do not pay enough attention to words or sentences in the text, they will find it harder to confirm the hypotheses already made. Furthermore, this model may not be appropriate for less fluent readers who lack certain background knowledge to generate predictions (Stanovich, 1980).

2.2.3. Interactive models

By taking the advantages of both above-mentioned models, interactive models suggest that readers should use bottom-up and top-down strategies as two complementary approaches in facilitating comprehension. Nuttall (1996) viewed bottom-up as the action of a "scientist with a magnifying glass examining the ecology of a transect" (17), and top-down as "an eagle's eye view of the landscape" (16). These metaphors illustrate the nature of both reading models: while bottom-up draws readers attention to small details through decoding letters and words, analyzing sentence structures or scrutinizing the lexis and syntax; top-down help readers draw an overview of the text based on their background knowledge and past experiences. The combination of an "eagle's eye view" and "a magnifying glass" is obviously effective for any reader in constructing meaning from the texts.

Stanovich (1980) and Rumelhart (1994) suggest that readers should make use of multiple sources of knowledge simultaneously to generate the best interpretation of the text input. Whether the knowledge is at lexical, semantic or syntactic level, they can be utilized in both bottom-up and top-down modes.

In general, most researchers have now agreed that the two models function as two complementary processes to aid comprehension, Carrell and Eskey (1988), Barnett (1988), McCarthy and Carter (1994), Day and Bamford (1998); Nunan (1999), McDonough and Shaw (2003), etc.

2.3. Definitions of reading strategies

Language learning strategies in general and reading strategies in particular have been defined differently by different researchers.

Winograd & Hare, 1998 (as cited in Anderson, 1999) defined reading strategies as “deliberate actions that learners select and control to achieve desired goal or objectives.” According to Paris et al. (1983:293), reading strategies are "skills under consideration" which closely depend on specific reading contexts as well as readers' awareness, control and intention. A strategic reader is described to have three sources of knowledge: declarative knowledge (what the strategies are), procedural knowledge (how to use the strategies), and conditional knowledge (when and why to use the strategies). Block (1986:465) suggested that reading strategies indicate "how readers conceive a task, what textual cues they attend to, how they make sense of what they read, and what they do when they do not understand". Barnett (1988) defined reading strategies as the mental operations conducted by readers when they purposely read a text for comprehension. Oxford and Crookall (1989) explained reading strategies as learning techniques, behaviors, problem-solving skills, or study skills that can lead learners to more effective and efficient learning

2.4. Review of related literature about reading strategies

There have been many attempts in finding the relationship between reading strategies and language proficiency. However, the results were different because of different subjects and different academic settings. Kate Tzu-Ching Chen and Sabina Chia Li Chen (2015) conducted a study about the use of reading strategies among high school students in Taiwan. The findings were that Students had a preference for global reading strategies, followed by problem-solving strategies and support strategies. Another study by Ngan Mai Hoang (2015) at Northumbria University- UK investigated the relationship between reading strategies use and reading proficiency of Vietnamese students in the United Kingdom. The focus of the study was on the correlation between reading strategy use and reading competence, as well as the differences between higher-proficiency readers and lower-proficiency readers in terms of strategy utilization. The results show that Vietnamese student were medium strategy users, and there was no statistically significant association between overall strategy use and reading comprehension. Poole (2005) used the

Survey of Reading Strategies (SORS) to explore the reading strategies of 248 university ESL students from the Midwest and South of the United States. The results revealed that problem-solving strategies were used with high frequency, while global and support strategies were used with medium frequency. Gorsuch and Taguchi (2008) found that Vietnamese college EFL students mostly used bottom-up, top-down, and cognitive strategies to assist comprehension in repeated reading sessions. Karbalaei (2010) compared reading strategy use in Iranian EFL and Indian ESL college students. They found that Indian ESL students used mostly global and support strategies, as well as metacognitive reading strategies, while Iranian EFL students used mostly problem-solving reading strategies.

Most of the above mentioned studies have been conducted outside Vietnam with participants from different academic settings with different purposes. This study firstly, attempts to find the preferred reading strategies used by students at Thai Nguyen University, Vietnam who are struggling the IELTS reading exam. Secondly, we would like to find the correlation between the preferred strategies and the language achievement of those test-takers.

III. METHODOLOGIES

3.1. Participants

The participants in this study consist of 75 students from two institutions of Thai Nguyen University; 30 students are from Foreign Language Faculty and 45 students come from The International School. These students have completed three semester of English focusing on the IELTS exam. The target overall score is 6.0. These students have taken the IELTS (institutional version) several times and the reading module seems to be the most challenge for them.

3.2. Instrument

The instrument used in this study was the Metacognitive Awareness of Reading Strategies Inventory (MARSII) version 1.0, which was originally developed by Mokhtari and Reichard (2002) as a tool to measure native English language learners’ awareness of reading strategy usage. Some of the items have been altered or reworded to be closed to the IELTS questions. The MARSII consists of 30 items that measure awareness reading strategies. In this questionnaire each item is accompanied with a 5-point, Likert-type scale, 1 (never or almost never do this), 2 (only occasionally do this), 3 (sometimes do this), 4 (usually do this), 5 (always or almost always do this) in which scores of 2.4 or below demonstrate low strategy use, 2.5 to 3.4 show moderate strategy use, and 3.5 or above signifies high strategy use.

The Cronbach alpha is 0.766 and Cronbach alpha based on standardized item is 0.826 reveal that the questionnaires are highly reliable. (Table 1)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.766	.826	30

Table 1: Reliability statistics

3.3. Procedures and statistical analysis

In this study, the MARSI was translated into Vietnamese to facilitate respondents' understanding. The translated version was then delivered to the students who participated in the study. The quantitative data were collected and analyzed using SPSS 20.0. Descriptive analysis was used to find out participants' preferred reading strategies; Global reading strategies (GLRS), Problem solving reading strategies (PSRS) or Support reading strategies (SRS). An IELTS reading test was given to three groups, the mean score of each group reveals the correlation between preferred reading strategies and the language proficiency.

The study uses Exploratory Factor Analysis (EFA) to test the correlation between the dependent variable and the independent variable as well as between the independent variables for the multi-collinear multipliers, the Pearson correlation coefficient will be used. If two variables are linear, one can model the causal relationship of these two variables by linear regression. The linear multivariable regression equation has the form:
 $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3$

In which
 Y: Mark
 X1: GRS
 X2: PSRS
 X3: SRS

The comprehensive statistical of the above approach for representing, estimating, and testing three hypothesis of the research.

- H1: GRS affect the reading achievement of students.
- H2: PSRS affect the reading achievement of students
- H3: SRS affect the reading achievement of students.

3.4. Results

The descriptive statistics (table 2) shows that most of the strategies are reported using at moderate and high level, except for GRS1, GRS2, GRS3 and PSRS3 (M<2.5). The most preferred strategies include PSRS7, PSRS8, SRS1, SRS2, SRS6, SRS7, SRS9 (M>3.5).

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Variance
GRS1	75	1	5	3.12	1.542	2.377
GRS2	75	1	5	2.19	.940	.884
GRS3	75	1	5	2.12	.958	.918
GRS4	75	1	5	2.97	1.385	1.918
GRS5	75	1	5	2.85	1.430	2.046
GRS6	75	1	5	3.28	.938	.880
GRS7	75	1	5	3.15	1.402	1.965
GRS8	75	2	5	3.47	.920	.847
GRS9	75	1	5	3.49	.876	.767
GRS10	75	2	5	3.71	.731	.534
GRS11	75	1	5	3.40	.870	.757
GRS12	75	1	5	3.37	.897	.805
GRS13	75	1	5	3.40	.885	.784
PSRS1	75	1	5	2.69	1.013	1.026
PSRS2	75	1	5	3.24	.956	.915
PSRS3	75	1	5	2.47	1.031	1.063
PSRS4	75	1	5	2.75	1.116	1.246
PSRS5	75	1	5	2.71	1.075	1.156
PSRS6	75	1	5	2.87	1.166	1.360
PSRS7	75	1	5	3.67	.935	.874
PSRS8	75	1	5	3.64	.939	.882
SRS1	75	1	5	3.77	.924	.853
SRS2	75	1	5	3.71	.882	.778
SRS3	75	1	5	2.92	1.440	2.075
SRS4	75	1	5	3.07	1.536	2.360
SRS5	75	1	5	3.05	1.506	2.267
SRS6	75	1	5	3.84	.855	.731
SRS7	75	1	5	3.88	.900	.810
SRS8	75	1	5	3.23	1.503	2.259
SRS9	75	1	5	3.79	.890	.792
Valid N (listwise)	75					

Table 2: Descriptive statistics of the mean scores of the use of reading strategies

In this research, the factor analysis process is repeated in 2 rounds due to the cross-factor loading of the variables. In all 2 rounds of the factor analysis process, KMO is about 0.8 (>0.5) with statistical significance (sig = .000) and each Total Variance Explained is over 70% (>50%) which prove the appropriateness of factor analysis.

In the first round, 4 initial components are converted into 4 components. 10 items are deleted because of cross-loading factor and 20 remaining items are kept for the next step. Finally, these 20 items are tested again in the final round.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.839
Approx. Chi-Square	1293.541
Bartlett's Test of Sphericity Df	190
Sig.	.000

Table 3: KMO and Bartlett's test

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.515	32.573	32.573	6.515	32.573	32.573	5.507	27.537	27.537
2	4.830	24.149	56.723	4.830	24.149	56.723	4.921	24.604	52.140
3	3.141	15.706	72.429	3.141	15.706	72.429	4.058	20.289	72.429
4	.840	4.198	76.627						
5	.706	3.531	80.158						
6	.640	3.198	83.357						
7	.557	2.784	86.140						
8	.458	2.290	88.430						
9	.403	2.016	90.446						
10	.366	1.830	92.276						
11	.262	1.312	93.588						
12	.214	1.070	94.657						
13	.207	1.034	95.692						
14	.191	.954	96.646						
15	.171	.856	97.502						
16	.164	.820	98.322						
17	.121	.606	98.927						
18	.094	.469	99.397						
19	.068	.341	99.738						
20	.052	.262	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix^a

	Component		
	1	2	3
GRS6		.876	
GRS8		.741	
GRS9		.800	
GRS10		.845	
GRS11		.704	
GRS12		.876	
GRS13		.923	
PSRS1			.828
PSRS2			.790
PSRS3			.749
PSRS5			.877
PSRS6			.892
PSRS7	.791		

PSRS8	.786		
SRS1	.898		
SRS2	.889		
SRS6	.896		
SRS7	.906		
SRS9	.912		
MAR2			.646

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 4 iterations.

Table 4: Total Variance Explained

3.5. Hypothesis testing

The next step includes all the other dependent variables in the model together with the above control variables to assess the overall impact of these control variables on the reading achievement of students dependent variable. Table 5 shows that independent variables that account for 35.3% of the variation of the dependent variable.

Model Summary

Model	R	R Square	Adjusted Square	Std. Error of the Estimate	Change Statistics				
					R Change	Square Change	F Change	df1	df2
1	.616 ^a	.379	.353	.6849	.379	14.464	3	71	.000

a. Predictors: (Constant), SRS, GRS, PSRS

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.663	.543		3.063	.003
	GRS	.269	.111	.228	2.432	.018
	PSRS	.520	.094	.542	5.532	.000
	SRS	.033	.105	.030	.310	.757

a. Dependent Variable: MAR2

Table 5: Variable summary

The linear regression model expresses the correlation between the factors as follows:
Mark = 1.663+0.269*GRS+0.52*PSRS

The research results of the author are basically consistent with previous quantitative studies. The test results show that the reading achievement of students is influenced by 2 factors: (1) GRS; (2) PSRS

IV. CONCLUSIONS

The findings of the research show that participants use most reading strategies at moderate and high levels, except for GRS1, GRS2, GRS3 and PSRS3. The most preferred strategies include PSRS7, PSRS8, SRS1, SRS2, SRS6, SRS7, SRS9. The reading achievement is affected by GRS and PSRS. There is no significant different between the use of SRS and the reading achievement.

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APPENDIX A: (MARSI - ENGLISH VERSION)

Metacognitive Awareness of Reading Strategies Inventory

(MARSI) Version 1.0

Kouider Mokhtari and Carla Reichard © 2002

DIRECTIONS: Listed below are statements about what people do when they read academic or schoolrelated materials such as textbooks, library books, etc. Five numbers follow each statement (1, 2, 3, 4, 5)

and each number means the following:

- **1** means "I **never or almost never** do this."
- **2** means "I do this **only occasionally**."
- **3** means "I **sometimes** do this." (About **50%** of the time.)
- **4** means "I **usually** do this."
- **5** means "I **always or almost always** do this."

After reading each statement, **circle the number** (1, 2, 3, 4, or 5) that applies to you using the scale provided. Please note that there are **no right or wrong answers** to the statements in this inventory.

PART A: GLOBAL READING STRATEGIES

#	STRATEGIES	SCALE				
1	I have a purpose in mind when I read.	1	2	3	4	5
2	I think about what I know to help me understand what I read.	1	2	3	4	5
3	I preview the text to see what it's about before reading it.	1	2	3	4	5

4	I think about whether the content of the text fits my reading purpose	1	2	3	4	5
5	I skim the text first by noting characteristics like length and organization.	1	2	3	4	5
6	I decide what to read closely and what to ignore.	1	2	3	4	5
7	I use tables, figures, and pictures in text to increase my understanding	1	2	3	4	5
8	I use context clues to help me better understand what I'm reading.	1	2	3	4	5
9	I use typographical aids like bold face and italics to identify key information.	1	2	3	4	5
10	I critically analyze and evaluate the information presented in the text.	1	2	3	4	5
11	I check my understanding when I come across conflicting information	1	2	3	4	5
12	I try to guess what the material is about when I read	1	2	3	4	5
13	I check to see if my guesses about the text are right or wrong	1	2	3	4	5

GLOB SCORE

GLOB MEAN

PART B: PROBLEM SOLVING READING STRATEGIES

#	STRATEGIES	SCALE				
1	I read slowly but carefully to be sure I understand what I'm reading	1	2	3	4	5
2	I try to get back on track when I lose concentration	1	2	3	4	5
3	I adjust my reading speed according to what I'm reading	1	2	3	4	5
4	When text becomes difficult, I pay closer attention to what I'm reading.	1	2	3	4	5
5	I stop from time to time and think about what I'm reading.	1	2	3	4	5
6	I try to picture or visualize information to help remember what I read.	1	2	3	4	5
7	When text becomes difficult, I re-read to increase my understanding.	1	2	3	4	5
8	I try to guess the meaning of unknown words or phrases	1	2	3	4	5

PROB SCORE

PROB MEAN

PART C: SUPPORT READING STRATEGIES

#	STRATEGIES	SCALE				
		1	2	3	4	5
1	I take notes while reading to help me understand what I read	1	2	3	4	5
2	When text becomes difficult, I read aloud to help me understand what I read	1	2	3	4	5
3	I summarize what I read to reflect on important information in the text.	1	2	3	4	5
4	I discuss what I read with others to check my understanding.	1	2	3	4	5
5	I underline or circle information in the text to help me remember it.	1	2	3	4	5
6	I use reference materials such as dictionaries to help me understand what I read	1	2	3	4	5
7	I paraphrase (restate ideas in my own words) to better understand what I read.	1	2	3	4	5
8	I go back and forth in the text to find relationships among ideas in it.	1	2	3	4	5
9	I ask myself questions I like to have answered in the text	1	2	3	4	5

SUP SCORE

SUP MEAN

Metacognitive Awareness of Reading Strategies Inventory

SCORING RUBRIC

Student Name: _____ Date: _____

1. Write your response to each statement (i.e., 1, 2, 3, 4, or 5) in each of the blanks.
2. Add up the scores under each column. Place the result on the line under each column.
3. Divide the score by the number of statements in each column to get the average for each subscale.
4. Calculate the average for the inventory by adding up the subscale scores and dividing by 30.

5. Compare your results to those shown below.

6. Discuss your results with your teacher or tutor.

KEY TO AVERAGES: 3.5 or higher = High 2.5 – 3.4 = Medium 2.4 or lower = Low

INTERPRETING YOUR SCORES: The overall average indicates how often you use reading strategies when reading academic materials. The average for each subscale of the inventory shows which group of strategies (i.e., global, problem-solving, and support strategies) you use most when reading. With this information, you can tell if you are very high or very low in any of these strategy groups. It is important to note, however, that the best possible use of these strategies depends on your reading ability in English, the type of material read, and your purpose for reading it. A low score on any of the subscales or parts of the inventory indicates that there may be some strategies in these parts that you might want to learn about and consider using when reading (adapted from Oxford 1990: 297-300)

Human Papilloma Virus Infection and Associated Risk Factors Among Pregnant Women Attending Outpatient Clinic In General Hospital Lapai, Niger State Nigeria

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DOI: 10.29322/IJSRP.9.08.2019.p9291

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9291>

Abstract- Cervical cancer caused by Human Papilloma Virus (HPV) has claimed the lives of many women worldwide. The study aimed at determining the prevalence and associated risk factors of HPV infection among pregnant women attending outpatient clinic in General Hospital, Lapai Niger State, Nigeria. A total of one hundred and eighty four (184) pregnant women were enrolled, blood samples were subjected to ELISA screening for HPV and further screened for HIV, Hepatitis B and C using determine and HBsAg/HCV Rapid test strip methods. While ABO blood grouping reagents were used to detect blood grouped types. Questionnaires were used to obtain data from participants and analyzed statistically. Of the 184 enrolled, the prevalence of HIV was 4 (2.17%) while the prevalence of HBV infection was 18 (9.78%), 7 (3.80%) positive to HCV and 43 (23.37%) positive to HPV infection, also, the prevalence of HPV/HIV infection was 2 (1.09%), 3 (1.63%) positive to HPV/HBV and lastly, 2 (1.09%) positive to HPV/HCV respectively. The result showed prevalence (28.79%) of HPV infection in women between 26-30 age groups, (28.24%) in women who had multiple sex partners and (27.73%) in women with multi-parity. Thus, Age, Marriage types and Parity shows statistically significant relationship between HPV infection ($P < 0.05$). Prevalence rate of HPV infection recorded high among other risk factors such as Civil Servant participants (26.32%), secondary school level participants (28.33%), women in Lapai Town (26.67%), no contraceptives use (24.42%) and women with history of blood transfusion (26.54%) respectively. With regard to blood group status, 'O' RhD+ve women, showed highest prevalent (27.54%). In relation to other viral infections, HPV/HBV recorded highest prevalence (1.63%). High HPV prevalence and associated risk factors observed among pregnant women attending prenatal clinic in General Hospital Lapai, regular HPV and other viral infections screening is recommended.

Index Terms- Prevalence, Associated risk factors, HPV infection, Pregnant women, Lapai.

I. INTRODUCTION

Cervical cancer caused by HPV, is the second most common cancer among women worldwide. HPV causes deformation of genomic integrity, control of cell cycle, cell

adhesion and apoptosis by suppressing tumor suppressor genes and interacting with cellular proteins via various proteins on carcinogenesis process (Jerome, *et al.*, 2018). The oncogenic human papilloma virus (HPV) types are the most significant risk factors in its aetiology (Quamrun. *et al.*, 2014). In a famous paper, the Italian physician Rigoni-Stern in 1760 to 1839 noted that cervical cancer was common among prostitutes, married women and widows but rare in virgins and nuns. Later, in 1898, McFadyean and Hobday successfully transmitted canine oral papillomatosis, while Codeac transmitted warts from horse to horse, in 1901. In 1934 Rous and Beard noted that papillomas of domestic rabbits frequently converted to squamous-cell carcinomas, although it was lately acknowledged in 1966. From this period, positive interest about role of HPV infection in cervical cancer began. In 1978, (Scheffner, *et al.*, 1993) in Italy, and Laverty *et al.*, in Australia, firstly demonstrated the presence of HPV virions within dense bodies of koilocytes, but deeper investigations were limited by the inability to propagate HPV in cultured cells or in simple animal models. Human Papilloma Virus (HPV) infection is a major health problem among women worldwide with a global prevalence of 11.7% resulting to Cervical Cancer.

More than 100 types of HPV genotypes have been isolated and characterized; among which 40 infect the mucosal epithelia, with 6.2 million new cases occurring annually. A prevalence rate of 24% has been recorded in Sub-Saharan Africa (IDSA. Journal of Infectious Diseases, 2010). The incidence rate of cervical cancer in Nigeria is reported as 25/100,000; prevalence rates for HPV in women being 44.9% (Musa, *et al.*, 2013), 26.3% (Thomas, *et al.*, 2004) and 24.0% (Okolo, *et al.*, 2012). HPV is also implicated in the genesis of several other cancers, such as head and neck (oral cavity, pharynx, and larynx) cancer and non-melanoma skin cancer and is suspected also to play a causal role in the genesis of a few other neoplasms (Trottier *et al.*, 2009). The predominant route of HPV transmission is via sexual contact and it is not easily detected at early stage of infection (Malloy, *et al.*, 2000), although HPV infection also may be transmitted by non-sexual routes (vertical and horizontal transmissions) such as transmission from a woman to a newborn infant at the time of birth (Center for Disease Control and Prevention 2010) and transmission from the anogenital region to hands via self-inoculation (Hernandez *et al.*,

2008).

II. MATERIALS AND METHODS

Study area

Present day of Lapai, was originally called Badeggi (meaning small area) and came into existence in 1800 founded by Abdullahi Nabadeggi, later renamed as Lapai after the migration of old Lapai to Badeggi in 1937 (Muhammadu Kobo 1980). Lapai is the Headquarters of one of the twenty five local government area in Niger State of Nigeria. It is bounded in the North – East by Paikoro and Gurara local government, on the West by Agaie local government and on the South by Federal Capital Abuja and Kogi State. The favourable climate conditions couple with the vast gentle slope environment make it possible for people to settle (Garba I.M. 2007).

Research Design

This research was a hospital based descriptive cross sectional survey conducted from the period of February, 2018 to May, 2018. Only consenting subjects were recruited and included in this study. Ethical approval was obtained from the ethical committee of the Hospital Management Board through the Medical Director of the Hospital. Informed consent and Demographic information was obtained from the participants using questionnaire.

Sample Collection and Storages

Blood samples used for this research were collected from pregnant women visiting prenatal clinic aseptically by vein puncture using 2ml sterile disposable syringes and needles. Drops of blood samples were placed each on the three depressions of the glass slides and blood grouped were determined, before dispensed into labelled specimen bottles. The samples were allowed to clot and centrifuged for approximately 20 minutes at 3000 rpm within 30 minutes after collection at 3,000 rpm for 5 minutes to separate the serum. The sera were collected into tubes and screened for HIV, Hepatitis B and C immediately before stored in a refrigerator at -80C to avoid loss of bioactivity and contamination. Thereafter, they were subjected to ELISA screening and HPV-IgG determination.

Blood Grouping Procedure:

All the materials required were set on the table and the Monoclonal Antibody (Mab) kit is placed in an Ice tray. Blood samples were brought to room temperature (18°C-25°C) A drop of blood sample was placed on the three depressions of the glass slide. A drop of Anti-A (blue bottle) was added into the 1st spot. A drop of Anti-B (yellow) was added into the 2nd spot. A drop Anti-D (colorless) was added into the 3rd spot. The content in each well was mixed using fresh mixing stick. Agglutination was observed in the form of fined red granules within 30seconds. (Anti RhD took slightly longer time to agglutinate compared to Anti A and Anti B).

HIV, HBV and HCV Rapid Test Determination:

Blood samples and buffer were brought to room temperature (15 – 30⁰c) before use. The test strips were removed from the sealed and the assay is performed immediately after

opening the foil pouch. 2 drops (approximately 50ul) of serum and 1drop of buffer were transferred to the sample pad of the HIV, HBV and HCV strips each with a disposable pipette and then the timer started. The results were read after red line(s) appeared in the control band at 10 minutes.

Interpretation of HCV, HBsAg and HIV Rapid Test Results:

A colored band appeared in the control band region (C) and another colored band appears in the T band region = Positive Result. One colored band appeared in the control band region (C) and no band appeared in the test band region (T) = Negative Result. No colored band appeared in the control band region (C) either band appeared or not in the test band region (T) = Invalid Result

Determination of HPV-IgG in Blood Samples

All reagents and samples were brought to room temperature (18°C-25°C) naturally for 30min before starting assay procedures. The Microelisa Strip plate is detachable, detached unused strips from the plate frame, were returned to the foil pouch with the desiccant pack, and resealed for preventing damp. Positive Control wells, Negative Control wells and Sample wells were set. 50µl Positive Control was added to each Positive Control well and 50µl Negative Control 50µl were added to each Negative Control well. 10µl sera blood and 40µl Sample Diluents' were added to each of the Sample wells. 100µl of HRP-conjugate reagent was added to Positive Control wells, Negative Control wells and Sample wells, the wells were all covered with an adhesive strip and incubated for 60 minutes at 37°C. The Microtitre Plate was washed 4 times. 50µl Chromogen Solution A and B were added to each well and then gently mixed. The plate was protected from light and incubated for 15 minutes at 37°C. 50µl Stop Solution was added to each well and gently taps. The colored in the wells changed from blue to yellow. The Optical Density (O.D.) was read at 450nm using an ELISA reader within 15 minutes after adding Stop Solution (Around 5 minutes is the best time.).

Statistical Analysis

Data obtained from the questionnaires used to obtain data from participants were analyzed using Chi-square(X^2) and the test of significance was determined at $P < 0.05$.

III. RESULTS

Table 1 showed the highest prevalence (28.99%) of HPV infection between ages of 26 to 30 years old and the lowest prevalence (0.00%) between ages of 36 to 40 years old. Statistics revealed a significant relationship between Age and HPV infection in pregnant women attending outpatient clinic in General Hospital Lapai ($P = 0.0260$).

Table 2 indicated a high prevalence (26.32 and 26.09%) of HPV infection among Civil Servants and Traders with the lowest prevalence (8.33%) among Teachers. $P = 0.7867$ therefore, no significant relationship between Occupation and HPV infection. Prevalence of HPV infection among pregnant women with reverence to Educational status presented in Table 3 indicated high prevalence (28.33%) in secondary School level and lowest (9.38%) in Quranic level. $P = 0.3306$ hence, no significant

relationship between Educational level and HPV infection among the women.

In relation to other risk factors, there was a higher prevalence (22.45%) of HPV infection among women who don't use contraceptives as compared to (24.42%) those who uses contraceptives. P=0.3633, no significant relationship between oral contraceptives use and HPV infection. Types of marriage recorded highest prevalence (28.24%) among women with multiple sex partner (Polygamy Marriages) and lowest prevalence (19.19%) among women with single sex partner (Monogamy Marriages). Statistics showed a significant relationship between the type of marriages and HPV infection (P=0.0240). In relation to area of domicile, results showed higher prevalence (26.57%) of HPV infection among women leaving in Lapai town and lower rate (20.21%) of women leaving in surrounded villages. P=0.3899 thus, no significant relationship between area of domicile and HPV infection. With respect to parity, the prevalence (26.05%) was highest among women with multi-parity pregnancies and lowest rate (18.46%) among primps pregnancies history. Statistics showed a significant relationship between numbers of pregnancies and HPV infection with P=0.0240. While history of blood transfusion recorded a higher prevalence (26.14%) in women who

had no history of blood transfusion and lowest rate (9.68%) in women who had transfusion history. P=0.9845 no significant relationship between transfusion history and HPV infection (Table 4).

Table 5 showed, highest prevalence (27.54%, 25.86% and 25.00%) of HPV infection among women with positives blood grouped respectively, but lowest prevalence (0.00%) were recorded among pregnant women who had negatives blood grouped. Though; no significant relationship between blood group type and HPV infection were recorded (P=0.1974).

Lastly, table 6 showed prevalence of HPV infection among pregnant women with other viral infections; out of 184 enrolled, the prevalence of HPV was (23.37%) while the prevalence of HBV infection was (9.78%), (3.80%) was HCV and (2.17%) was HIV infection respectively. There was a highest prevalence rate in women with HPV/HBV (1.63%) followed by HPV/HCV (1.09%) and lowest prevalence was recorded among women with history of HPV/HIV/HBV/HCV infections (0.00%). P=0.7274 therefore, no significant relationship between other viral infections and HPV infection among pregnant women visiting prenatal clinic in Lapai General Hospital.

Table 1: Prevalence of HPV Infection among Pregnant Women with Respect to Age

Age	No Samples	No (%) Positive
15 - 20	16	2 (12.50)
21 – 25	47	13 (27.66)
26 – 30	69	20 (28.99)
31 – 35	49	8 (16.33)
36 – 40	3	0 (0.00)
Total	184	43 (23.37)

$X^2 = 11.0491$ df = 4 p-value = 0.02602

Table 2: Prevalence of HPV Infection among Pregnant Women with Respect to Occupation

Occupation	No Samples	No (%) Positive
Farmer	33	8 (24.24)
Trader	23	6 (26.09)
Teacher	12	1 (8.33)
Civil Servant	19	5 (26.32)
House Wife	97	23 (23.71)
Total	184	43(23.37)

$X^2 = 1.7223$ df = 4 p-value = 0.7867

Table 3: Prevalence of HPV Infection among Pregnant Women with Respect to Education

Education	No Samples	No (%) Positive
Non Formal Education	45	12 (26.67)
Quranic	32	3 (9.38)
Primary	21	5 (23.81)
Secondary	60	17 (28.33)
Tertiary	26	6 (23.08)

Total **184** **43**

$X^2 = 4.6018$ df = 4 p-value = 0.3306

Table 5: Prevalence of HPV Infection among Pregnant Women with Respect to Blood Group

Blood Group	No Samples	No (%) positive
A' Rhesus D+VE	36	9 (25.00)
B' Rhesus D+VE	58	15 (25.86)
AB' Rhesus D+VE	18	0 (0.00)
O' Rhesus D+VE	69	19 (27.54)
A' Rhesus D-VE		0 (0.00)
B' Rhesus D-VE	1	0 (0.00)
AB' Rhesus D-VE		0 (0.00)
O' Rhesus D-VE	2	0 (0.00)
TOTAL	184	43

$X^2 = 7.3278$ df = 4 p-value = 0.1974

Table 4: Prevalence of HPV Infection among Pregnant Women in Relation to other Risk Factors

Risk Factors	No Samples	No (%) Positive	X ²	p-value
Contraceptives Use				
Yes	86	21 (24.42)	0.8263	0.3633
No	98	22 (22.45)		
Type of Marriage				
One Sex Partner (Monogamy)	99	19 (19.19)	10.0380	0.01501
Multiple Sex Partner (Polygamy)	85	24 (28.24)		
Area of domicile				
Lapai Town	90	24 (26.67)	0.7394	0.3899
Surrounding Villages	94	19 (20.21)		
Parity				
Primps	38	12 (18.46)	12.9398	0.02395
Multi-parity	119	31 (26.05)		
Transfusion History				
Yes	31	3 (9.68)	0.1552	0.9845
No	153	40 (26.14)		

Table 6: Prevalence of HPV Infection among Pregnant Women with other Viral Infections

Samples Size	HPV	HIV	HBV	HCV	HPV/H IV	HPV/ HBV	HPV/H CV	HPV/HBV/H CV
184	43 (23.37)	4 (2.17)	18 (9.78)	7 (3.80)	2 (1.09)	3 (1.63)	2 (1.09)	0 (0.00)

$$X^2 = 1.3073 \text{ df} = 3 \text{ p-value} = 0.7274$$

IV. DISCUSSION

This study evaluated the prevalence of HPV infection among women in Lapai, Niger State of Nigeria with a total prevalence of 23.37% which is lower than prevalence (24.47%) reported among pregnant women attending antenatal care in General Hospital Minna, (Terese, *et al.*, 2015). However, record showed consistent HPV infection prevalence rates of 24.8%, 26.3% and 36.5% among women in Ibadan and Lagos (Thomas, *et al.*, 2004, Okolo, *et al.*, 2012 and Kehinde, *et al.*, 2017).

Age specific, findings revealed an increase rate (28.99 and 27.66%) of HPV infection among women between 26-30 years with decrease rate (16.33%) between ≥ 31 years. Although early onset of sexual activity (≤ 15 age), multi-parity and sexual promiscuity have been recognized as some of the significant risk factors for HPV infection (Nejo, *et al.*, 2018). Similar work carried out by Terese, *et al.*, (2015) in Minna, Nigeria is in line with this findings indicating a significant relationship ($P=0.0260$) between aged and HPV infection.

In relation to occupational and educational status, the study shows high incident (26.32%) among Civil Servant follow by Traders (26.09%) $P=0.7867$. Whereas, prevalence rate were high among pregnant women in Secondary (28.33%) $P=0.3306$. These findings contradicted similar study by Terese, *et al.*, (2015). Who reported high prevalence (12.77%) in no formal education and lowest (2.84%) among Civil Servant. Consequently, these results may be attributed to lack of awareness about HPV infection and its implications at all level. However, statistics shows no significant relationship in the occupational and educational status. Our present study showed that the prevalence of HPV infection was higher in Multiple sex partner (28.24%), which was in agreement with a study conducted in China (Yanru, *et al.*, 2016). The low prevalence of HPV infection among single sex partner may be due to the protective effect against HPV infection generated by living with a partner. Statistic shows a significant relationship ($P=0.0150$) between HPV Infection and type of marriage. In relation to contraceptives, higher prevalence (22.45%) was among women that don't use contraceptives as compared to (24.42%) those that use contraceptives. It is reported that contraceptives use was significantly associated with HPV infection, while some other studies have failed to confirm such an association (Olusola, *et al.*, 2015). In our study, we didn't find a significant relationship between the use of contraceptives and HPV infection ($P=0.3633$).

The prevalence of HPV co-infected with other virus among women showed prevalence of 1.63, 1.09 and 1.09% in HPV/HIV, HPV/HBsAg and HPV/HCV respectively. The prevalence of HPV infection was high, in contrast to a much lower prevalence of other sexually transmitted infections (STIs) in the same geographical area (Jerome, *et al.*, 2018). $P=0.7274$ no significant relationship between HPV infection with co-virus. Although, various prospective and cross sectional studies from other parts of the world have shown that among HIV-1 infected patients, active,

chronic and persistent HPV infection is more common in those with features of significant immunosuppression AIDS defined as $CD4 < 200$ cells/ul (Quamrun, *et al.*, 2014)

The number of pregnancies was significantly associated ($P=0.0150$) with HPV infection, since the higher proportion of HPV infection was prevalent among women with multi-parity (26.05%) but was less amongst primip women (18.46%). This agrees with (Cancer research UK, 2013) which stipulate that women who have had 7 or more children had double the risk of HPV infection than women with only 1 or 2 children. They also found a doubling of risk of squamous cell cervical cancer with 3 or more children, compared to no children. This indicates that the risk of getting infected with the virus doubles with number of times a woman gives birth because of the occurrence of cervical trauma at the time of delivery. When a woman gives birth, there are tendencies of weakening and rupture of epithelial cells around the cervix there by enhancing chances of infection when in contact with the virus.

High prevalence rate among women with blood Group A, B, and O Rhesus positives (25.0, 25.86 and 27.54%) and low rate 0.00% among all women with Rhesus Negatives were correlated with report by Yuzhalin, *et al.*, who revealed that carriage of non-O blood types increased the risk of ovarian cancer by 40-60% in premenopausal, but not in postmenopausal women (Yuzhalin, *et al.*, 2012). We did not observe a statistical significant relationship between ABO Blood group types and HPV infection in women ($P=0.197$).

We recorded higher prevalence (26.14%) in women without history of blood transfusion as against lower prevalence (9.68%) in women with history of blood transfusions. This suggests that blood transfusion has nothing to do with increase HPV infection rate. This result was correlated with report in 2005, by Sohrab, *et al.*, which demonstrated that the HPV16 genome exists in HIV patients who acquired HIV infection via transfusion and vertical transmission and who were, according to clinical history, sexually naive. Further study demonstrated that the HPV16 genome was also present in blood of healthy blood donors, suggesting a potential for transmission via the bloodstream. However, blood transmission of HPV as well as transmission via breast milk is implausible since HPV infection does not produce viremia (Cason *et al.*, 2005). $P=0.9845$ no statistical significant relationship between HPV infection and blood transfusion history. HPV infection prevalence among pregnant women in relation to area of domicile, recorded high prevalence (26.67%) in women leaving in Lapai town as compared to surrounding villages (20.21%). This study agreed with report of high HPV prevalence and associated risk factors observed in the continuous transmission of the virus in Southwest Nigeria as against other part of Nigeria. (Nejo, *et al.*, 2018). $P=0.9845$ no statistical significant difference recorded.

V. CONCLUSION

The prevalence of HPV infection was 23.37% which demonstrates an alarming rate among pregnant women in Lapai considering the danger of infection posed to the health of the woman and her baby it is recommended among others, that there is urgent needs for advocacy for women of childbearing age to undergo regular HPV screening and also increase the availability and affordability of immunization facilities across the country.

ACKNOWLEDGEMENTS

The editor of this book would like to express sincere thanks to all authors for their high quality contributions.

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Relationship of ISO 9001: 2015 Certification and Learning Strategies on The Effectiveness of Education and Training Religion Education Supervisor / Madrasah in The Education and Religion Technical Education and Training Center of The Ministry of Religion, Jakarta

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DOI: 10.29322/IJSRP.9.08.2019.p9292

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9292>

Abstract- Mention This study aims to analyze the relationship between ISO 9001: 2015 certification and learning strategies on the effectiveness of education and substantive technical training of religious education / madrasah supervisors of class I and II at the education and training center of educational and religious technical personnel. The method used is correlational research. The population of all participants in education and training, with sampling techniques totaling 60 people. 3 The instruments were validated, validated with alpha cronbach = 0, 518 The results showed that the hypothesis of the relationship between ISO 9001: 2015 certification and training effectiveness was positive and significant with the contribution of R Square of 0.188 or 18.8%, and there was a positive relationship between learning strategies with training effectiveness, amounting to R Square 0.034 or 3.4%. Both of these variables influence the effectiveness of religious / madrasah education training, amounting to 75.5% together.

Keywords: ISO 9001: 2015 certification, learning strategies, effectiveness of education and training, religious education supervisors / madrasah.

I. INTRODUCTION

The State Civil Service / ASN is in a very central and The system for implementing government that is run optimally, in order to get recognition from the public, the government needs to be assessed and standardized on the suitability of the quality management system, both nationally and internationally. International recognition called ISO. ISO (International Organization /Standardization) is an independent, non-governmental international organization with a membership of 161 national standard bodies (Zulmawan: 2019: 53).

This National Standard aims to make everything go well, provide world-class specifications for products, services and systems, to ensure quality, safety and efficiency, and play a role in facilitating international trade. (Zulmawan: 2019: 53)

Now the certificate of ISO 9001: 2015 has been obtained by the Institute of Education and Training Center for Education and Religious Technical Training. With ISO 9001: 2015 it will certainly affect institutions that do have strategic functions to improve the quality of human resources.

Certification will be more perfect if it is balanced with human resources who carry out learning or become facilitators can apply learning strategies in the classroom, and employees who have a

desire for change.

Learning strategies are a set of material and learning procedures that are used together to generate learning outcomes for students. (Dick and Carey; 1985). Learning strategies are things that need to be considered by resource persons in the learning process.

Learning strategies are things that need to be considered by resource persons / teachers / widyaiswara in the learning process, there are 3 types of strategies related to learning namely: 1. Organizing strategies for learning. 2. Learning delivery strategies. 3. Learning management strategies. The three components must be understood by the human resource, and to be practiced in the process of education and training. Success in applying the linkages between the three components has an impact on the effectiveness of education and training.

Effectiveness is the achievement of mutually agreed targets. According to Bernard in Steera (1985:27)

The effectiveness of education and training which is part of the process of education and training activities, including master training, committee, facilities and infrastructure, training participants, programs, funding, learning process, evaluation. (Ministry of Education and Culture standards). Success in the effectiveness of education and training will run smoothly if the various factors above go according to purpose. The professionalism of the facilitator plays a role in improving the quality of learning in education and training, and in the end the religious/madrasah education supervisors who are attending this education and training can apply in each of their respective madrasah

There are various problems regarding the relationship of ISO 9001: 2015 certification, and learning strategies for the effectiveness of the implementation of substantive technical training in religious education / madrasah supervisors in the education and training centers of Jakarta's education and religious technical personnel, such as:

1. Participants lack knowledge about ISO 9001: 2015 certification,
2. Participants have not been facilitated with ISO 9001: 2015 standards,
3. Participants do not understand maintaining an ISO 9001: 2015 standardized Institution,
4. Institutions still do not provide facilities in accordance with ISO 9001: 2015 standards,
5. Institutions have not demanded resource persons to implement learning strategies in accordance with ISO 9001: 2015 standards

6. Facilitator do not understand about ISO 9001: 2015
7. Facilitator do not have the desire to implement ISO 9001: 2015 standards.
8. Facilitator have not been able to choose the right learning strategy,
9. Facilitator still lack knowledge about various learning strategies,

Researchers are interested in conducting research on the relationship of ISO 9001: 2015 certification and learning strategies on substantive training in religious education / madrasah supervisors at the education and training center of educational and religious technical personnel in Jakarta, because this education and training is the most potential as an effort to prepare religious education supervisors / professional madrasahs so that they can foster madrasah teachers who are professional in their fields and have the desire to bring a dignified and certified madrasah.

II. IDENTIFICATION OF PROBLEMS

The problems in this study can be formulated as follows:

1. What is the relationship between ISO 9001: 2015 certification on the effectiveness of substantive technical training in religious education / madrasah supervisors?
2. How is the learning strategy related to the effectiveness of substantive technical training in religious education / madrasah supervisors?
3. What is the relationship between ISO 9001: 2015 certification and learning strategies for the effectiveness of substantive technical training in religious education / madrasah supervisors?

III. IDENTIFY RESEARCH METHODOLOGY AND DISCUSSION

A. Research Methods

The method used in this study is a quantitative method that is an attempt to further pursue aspects of understanding in depth on one problem. Quantitative research is descriptive research, tends to use analysis and emphasize the process of meaning more. Quantitative research methods according to Sugiyono (2012: 11) state that: "Quantitative methods can be interpreted as research methods based on positivist philosophy, used to examine certain populations or samples, collecting data using research instruments, analyzing quantitative / statistical data, with the purpose of testing the predetermined hypothesis ". The researcher analyzes the data by enriching information, looking for relationships, comparing, finding patterns on the basis of original data. The results of data analysis in the form of exposure of the situation under study are

presented in the form of narrative descriptions.

B. Discussion

The research was conducted at the Education and Training Center for Education and Religious Workers of the Ministry of Religion, which organizes education and training for religious / madrasah education supervisors attended by 60 people (supervisors) of the Ministry of Religion's State Civil Apparatus, delegates from 34 provinces spread throughout the Republic of Indonesia. . As a population and at the same time a sample is a participant in Education and Training of Substantive Technical Education and Training for Religious / Madrasah Education at the Jakarta Education and Religious Technical Training Center, held on 31 October 10 November 2018.

The aim of Organizing Education and Training for Religious / Madrasah Education Supervisors is to improve competence in the fields of knowledge, attitudes and skills of religious education / madrasah supervisors. The curriculum used in this training is in accordance with the rules in the substantive technical training curriculum for religious education / madrasah supervisors. The regulation on supervision of religious / madrasah education is further explained in the Minister of Religion Regulation No. 31 of 2013.

The training program this time is somewhat different from the previous one because, now the Education and Religious Technical Training Center has a status of ISO 9001: 2015 certified. For this reason, organizations must provide human resources that are in accordance with the competence of education, training and experience whose work can affect the effectiveness of the implementation of a quality management system (Muhammad, 2019: 75). Now there are training institutions in the era of industrialization 4.0, if you want to win the competition you need to pay attention to quality.

The training program is somewhat different from the previous one because now the Education and Religious Technical Training Center has a status of ISO 9001: 2015 certified. For this reason, organizations must provide human resources that are in accordance with the competence of education, training and experience which can affect the effectiveness of a quality management system (Muhammad, 2019: 75). Now there are training institutions in the era of industrialization 4.0, if you want to win the competition need to pay attention to quality.

Quality Management System is applied as a form of guarantee system to customers with the aim of achieving customer satisfaction.

This new clause on ISO 9001: 2015 consists of 10 clause, these are Muhamad(2019:64-65)

Clause 1. SCOPE

Scope or scope of certification must be written clearly what type of business, product or service, including wherever ISO 9001: 2015 will be implemented.

Clause 2. NORMATIVE REFERENCE

Documents that are used as a reference in implementing ISO 9001: 2015 QMS, in this case are ISO 9000: 2015 ISO 9001: 2015 Vocabulary

Clause 3. TERMS AND DEFINITIONS

Terms and definition explain the definition of several terms that are often used in ISO 9001: 2015

Clause 4. ORGANIZATIONAL CONTEXT

Understand the organization and its context, organization's products and services, and the scope of management systems.

Clause 5. LEADERSHIP

Top Management must provide evidence of leadership and commitment to the development and implementation of a Quality Management System and continuously improve effectiveness.

Clause 6. PLANNING

Actions to overcome the risks and opportunities of the organization must take the opportunities that exist and also make identification and risks that will be faced in the future. The quality objectives made must be consistent with quality management, relevant to the suitability of products and services to enhance customer satisfaction.

Clause 7. SUPPORT

The clause regarding documented information, infrastructure, human resources is all summarized in this clause. Training, management of infrastructure and work environment, are included in this clause.

Clause 8. OPERATION

This clause discusses operational starting from product realization planning to delivery and even after sales. Design and development, control the output that is not appropriate.

Clause 9. PERFORMANCA EVALUATION

Customer satisfaction is one measure of management system performance. The organization monitors information relating to customer perceptions whether the organization has met customer requirements. The method for this is a customer satisfaction

survey procedure.

Clause 10. IMPROVEMENT

Contains efforts for continuous improvement that must be carried out by the organization Nonconformity and corrective action.

ISO 900 Certificate Validity Period for 3 Years, but every 6 or 12 months the certification body will conduct a surveillance audit to ascertain whether the implementation of ISO 9001 is still running well and whether the company can still maintain it is ISO 9001 Certificate (Indonesian K3 Consultant)

To support the above, educational institutions need to continue to collaborate with all employees, as leaders can provide support to employees, the need to understand the vision and mission of the education center, remain committed to carrying out agreements, there are improvements and always make improvements / evaluations for progress.

Similarly, the facilitator will make it easier when teaching facilitators, as evidenced by the existence of LCD equipment (liquid crystal display). Various training materials, examples-2, assignments can be displayed easily, and can be done with the help of technology. Participants were happy to have gained the knowledge that had been prepared by the facilitator with adequate and interesting preparation to be listened to so that it could be implemented, later when it was back in their respective areas with readiness to foster madrasa teachers who became nurturers.

Innovation, ideas that are difficult to make can be easily understood so that making them more flexible through interactive widescreen information & communication technology (ICT) can offer many things (Daniel, 2008: 348) Various results of innovation have been felt by teachers, supervisors, widyaiswara, as well as facilitators and even the wider community. The progress of science and technology brings changes to the learning strategies used by teachers, widyaiswara, facilitators because it will bring its own impact to the world of education.

The curriculum has always undergone a change in time, in finding meeting points for experts who want to try to find the identity of the field of education in Indonesia. Changes in the curriculum must be quickly responded by religious education supervisors, so that they do not miss out, even teachers who know better before the supervisor, this should not happen to participants who are following this training. Effective teaching is very dependent on the selection and use of learning strategies, the selection and use of learning strategies in the

right teaching and learning process will be fun and make the training participants interested. The learning strategy used aims to improve the quality of learning better.

In the training of religious education / madrasah supervisors that only these few days really have extraordinary meaning for training participants. Their experience in participating in religious / madrasah education supervisory training has long been waiting for, because opportunities will not be available at any time, given the large number of religious education / madrasah supervisors throughout Indonesia that need training.

Education and training are very much needed by religious education / madrasah supervisors, because by participating in education and training, they will get a variety of benefits, which are certain to be carried out by these activities to improve the quality and competence of individuals and institutions / madrassas. Every strategy and learning method with all its advantages intends to bring change to a better direction, because the learning strategies are interesting, according to the purpose of being a reference in facilitating learning objectives. Creativity is very necessary, all of us, because creative potential is human nature, some creative suggestions such as getting out of the intelligence trap (James J, 2003: 24).

Facilitators are required to be able to create the right learning environment such as creating a comfortable and relaxed atmosphere, use music to feel relaxed, awake and ready to concentrate, create and adjust moods with various types of music, use visual reminders to maintain a positive attitude, react with environment (Booby, 2005: 65). Create and adjust the atmosphere of various types of learning strategies to be the choice of each facilitator in order to support the objectives of achieving the training eye being taught.

Learning strategies will be more interesting, and fun when synergized with disruption of technology, especially in learning on substantive education and technical training for religious education / madrasah supervisors. The learning process will run more effectively and efficiently if supported by selection, a combination of interesting learning strategies, fun to achieve learning goals. Learning strategies are essentially systematically planned activities aimed at mobilizing students to do learning activities with their own willingness and ability (Abuddin, 2009: 215).

Knowless's opinion (1980) as written in (Gunawan, 2016: 65) confirms the difference between learning for adults and learning for

children in terms of their cognitive development.

The strength that must be prepared for the facilitator is to broaden the knowledge and skills to always be updated with endless changes. Likewise the committee to remain motivated to follow the continuous stream of disruption, especially as an education and training institution, is still updating the data so that this institution remains exemplary and is in demand by participants.

ISO 9001: 2015 certificates and learning strategies are two things that support each other and are related to the effectiveness of organizing substantive technical training for religious education / madrasah supervisors in Jakarta's educational and religious technical training centers. Learning strategies cannot be left behind in the education and training process, as an effort to achieve effective and quality education and training. Likewise with ownership of the status of ISO 9001: 2015 which has a validity period of only 3 (three) years, of course it must be endeavored to at least survive to be able to continue to hold an internationally certified status. Various efforts were made such as providing the best service for training participants, improving employee performance, increasing agency efficiency, increasing trust in participants, conducting internal audits.

IV. CONCLUSION

Based on the results of the study, a number of conclusions were obtained, including:

1. ISO 9001: 2015 certification has a significant 18.8% effect on the effectiveness of education and training in religious education / madrasah supervisors. This means that ISO 9001: 2015 certification plays a role in determining the effectiveness or effectiveness of education and training in religious education supervisors, because the effectiveness of education and training will bring progress to the education and religious technical training institutions.
2. Learning strategies have an effect of 3.4% on the effectiveness of the effectiveness of education and training in religious education supervisors / madrasah. This shows that the presence of resource persons who have little concern that has an impact on the effectiveness of education and training in religious education / madrasah supervisors, especially the

responsibilities of facilitators, is still needed, as a form of ownership towards certified institutions.

3. Relationship of ISO 9001: 2015 Certification, Learning Strategy has an effect of 75.5% on the effectiveness of education and training in religious education/madrasah supervisors. still not maximal, because to achieve effectiveness it requires adequate facilities and infrastructure, the participation of facilitators who are loyal to the profession, have a sense of responsibility, integrity that brings the fragrance of the name of the education center. (moncalesa@yahoo.co.id)

Ketentuan Pelaksanaan Peraturan
Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi RI Nomor 22
Tahun 2014 tentang Jabatan Widyaiswara dan Angka Kreditnya.

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Livelihoods Strategies of Satar/Santhal: A Resilience Perspective

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DOI: 10.29322/IJSRP.9.08.2019.p9293
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9293>

Abstract- This paper tries to explore the livelihoods strategies of Santhal; a minority and socially isolated group, in the context of Nepalese community through the resilience perspective with narrative inquiry paradigm. It moreover, argues the long terms social issues of livelihood where they have been facing in the society. Again, this paper advances a resiliency perspective towards enriching livelihoods analysis, and taking livelihoods inquiry toward in the context of current dynamics. Even though they have maintained their livelihood adversities whether economical or physical or social or psychological throughout their indigenous skills and knowledge. In this research I have looked Santhal livelihood strategies and opportunities in local community of Gaurigunj Rural Municipality who are linguistically and culturally different with others. The issues of sustainability particularly of marginal group like Santhals are deeply practicing in the developing countries like Nepal. Sustainable livelihood practice has become multifaceted problem in our country. Even though highly marginalized community like Santhals have been attempted to cope their indigenous knowledge, skills, expertise in order to maintain the daily livelihood practices.

Index Terms- Santhal, livelihood, community, resilience, adversity

I. SATAR/SANTHAL COMMUNITY

“*It is not that just change is fast; it is getting faster and faster*” Chambers and Conway, 1992

Though written two decades ago, the quoted statement by Robert Chambers and Gordon Conway from their seminal paper on livelihoods (*Sustainable rural livelihoods: practical concepts for the 21st century*) appears prophetic and more valid in today's world than it was at that time. Between then and now, the changes and related risks and uncertainties in as far as livelihoods are concerned have assumed an even more rapid pace. This paper advances a resiliency perspective towards enriching livelihoods analysis, and taking livelihoods inquiry toward in the context of current dynamics. In operationalising this perspective, the paper utilized the case of a marginal rural community of Sathal situated in the Gaurigunj Municipality area of Jhapa; the easternmost district of Nepal and lies in the fertile terai plains.

However Santhal community is far away from sustainable livelihood and never been to achieve that position. The situation of ethnical groups including Santhal deprived from their identity and they have been facing serious problem. Again they have been facing the various challenges in the daily livelihood affairs. Most

importantly the Santhal community what I found that the word 'satar' really humiliate to them and feel inferior calling them 'satar' and their complexion from others. The poverty is the reason which is curse to them and suppose to be away from healthy life style which have the interrelation with livelihood insecurity (Upreti., 2010). The Santhal community in Gaurijung is suffered highly with socially, economically, culturally, and politically. And it is supposed to be broad threat to include in development process for poor and disadvantage community like them (Upreti & Boker 2010). However they have tried to cope these problems with their indigenous knowledge and skills for the sake of independent livelihood strategies.

I recalled an event which occurred a couple of decades before while I started going school for the achievement of knowledge and skills, at the same time my colleagues who were same age as like as myself; bound to go for the fields own by us and relative. They were engaged whole day and in the evening too working hard in the field by all means to solve their hand to mouth problems. Even though they had utmost desired and wishing to send their children to the schools unfortunately, they could not act because of saving and fund rather compelled them to be accompanied with them in the field thinking to make more money and foods from the landlords. During that moment I started thinking why they were not sending their children with me to school rather forced them to work and ploughing into the fields always which is owned by us and our relative, again why I were told to maintain distance with them neither going to their huts nor having foods and play with their children whereas they were investing their labor, time, sweating for the sake of us. This sort of circumstance I frequently saw during my school tenure and decided to make some inquiries as well as research when I would be eligible for the same.

As soon as early I migrated and having acquired new urbanizing livelihood atmosphere when I joined my MPhil degree at Kathmandu University. I started to adopt new horizon of attitude and societal daily behavior. Then I blended my past with rural perspective particularly of Santhal livelihood. Eventually I tried to compare in different livelihood strategies adopted by the rural and urban communities specifically Santhal family. Handful of Santhals have limited excess of land and home to some extent but largely depend upon others' land and commodity.

The purpose of this paper is to explore the livelihood of Santhal community. Specifically, my research intends to explore the adaptation livelihood strategies of Santhals' against adversities they are facing in their context of living. Since my paper is based on livelihood of Santhals so, need to bring these issues under their

livelihood strategies, resources/assets, capability and capitals. I also tried to investigate the ways they have adjusted to cope their current livelihood practice. How do Santhal experience adversities in their livelihood?

II. SOCIAL STATUS OF SANTHAL

I was born on the early eighties in Jhapa; the easternmost district of Nepal and lies in the fertile Terai plains. I along with my sibling were born, up brought and got the education in the same area and also had a in dept opportunities to engage with various Terai ethnical communities such as tharus, rajbanshis ,doms, including satar (santhal) during my childhood to adulthood even today. Thus I was, am fortunate to understand their daily living style, socio-economic apparatus and cultural affairs broadly.

According to (NEFIN,1999), the far-easternmost foothills and inner Terai of Nepal from Jhapa to Sunsari are inhabited by the highly marginalized group of Santhal. Satars (Santhals) are one of the highly marginalized ethnic groups of Nepal. Their ancestral are strong hold of the dark-skinned, curly-haired and stoutly built. Proto Australoid Satars or Santhals are the Nepalese Plain and the Santhal Pargana of West Bengal in India. Santhals also call themselves Hor. They have their own unique religion and culture. They are animist. Their ancestral deity is Thakurju and their paternal guardian deity is Maranburu. Bow and arrows are their traditional weapons. Their favorite meat is pork. Most Satars are engaged in farming, fishing, collecting herbs and labour respectively.

The said ethnic community used to be living nearby forest for many years and practicing foraging and fishing as a livelihood, however as soon as almost forests have been drastically under deforestation then they were compelled to reside mostly around river side and the distance from urban location at all. Since most of the settlements are near rivers, fishing is one of the main livelihood activities of the community. Furthermore, freshwater shrimps, crabs and smaller fishes are eaten up throughout the year for sustainable practice.

Santhal, until recently, have been considered as tribal people living nomadic lifestyles. Santhal are found in India and Bangladesh as well where as in India they are living densely in Southern part of the country. Traditionally this community was relying on hunting and fishing as their livelihood as mentioned above however the modernization of the society and geo-political changes forced them to shift into other occupation mainly working as daily wage laborer in agriculture and other areas.

In Nepal, they are considered as one of the first settlers in eastern plain area. As per the census data of 2001, the total populations of this community was 42,689 and were found scattered in almost 30 districts; however the number is very negligible in other districts except Jhapa and Morang. Jhapa is the district where large numbers of Santhals are living and their population was recorded as 23,172. They are scattered throughout the district but are highly concentrated in 15 southern Village Development Communities bordering or near to India. Santhal people, who were considered to be 'sons of the soil', are now almost landlessness. Very few households now have their own land and most live on public land or rented land. The public land they live on tends to be nearby rivers/streams so are more prone to disaster.

Various native ethnic groups inhabit scattered in many places of Nepal. They do have their own customs, traditions and culture. There was not a system of keeping records of these ethnic groups in the past. The censuses from 1911 to 1981 AD did not keep any records of population and habitats of these ethnic groups. Largest ethnic groups are the Brahmans and Chhetris. Some of the ethnic groups are very small. Many languages spoken by these groups in Nepal are in danger of disappearing. The total number of people inhabiting in a specific area is the size of human population. Major ethnicities in Gaurigunj are Bahmin, Chhetri, Satar, Kami, Damai, Newar, Tamang, Rajbanshi, Dhimal, Sarki, Magar, Rai, Limbu and among others. Out of all the ethnicities, Satar and Rajbanshi are underprivileged in Gaurigunj Rural Municipality.

III. RESILIENCE AND SUSTAINABLE LIVELIHOOD APPROACH

In this research I try to bring resilience as theoretical base putting other relevant input for the sustainable livelihood approach. The definition of the concept of resilience may be traced to the Latin word *resilio* which means 'to jump back' (Manyena, 2006: 433). The fundamental issue of assets also adapted which is an unalienable issue of the livelihood particularly cultural aspect of livelihood that is probable interlinked with the resilience thinking in my research. Basically resilience notion concerns on the magnitude of change that the system can cope with while still being able to function, and to the ways in which social system are capable to taking this sort of changes. Further I focus towards the spontaneous movement in between the ecological and social systems which for grants to assess the environment impacts on livelihood. Under this observation that I enforce that vulnerability would be regarded flip side of resilience because it explains the limitations in the face of challenges.

Resilience perspective assures the main point around the difference between livelihood resilience and ecological resilience is the emphasis on different aspects of stability – where stability is characterized as persistence of a system near or close to an equilibrium state, thus drawing attention to the distinction between efficiency and persistence, constancy and change, and predictability and unpredictability (Gunderson, 2000).

Again it could be taken other perspective from sustainable livelihood approach to enhance the theoretical framework since these details as too for assessing resilience. This approaches aptly deals the character of assets, activities and capabilities which makes people to cope their livelihoods in the way whereby sustainable appears in the face of changes and outside stress. All in all the fundamental notion behind this strategy only follows resemblance ways as the resilience theory, as a livelihood that is sustainable can cope with and recover from stress and shocks, and maintain or enhance its capabilities both now and in the future, without harming the natural resource base (DFID, 2001). Because as in the perspective of sustainable livelihood, the local tribe or people are taken to be both objects and subjects of change, under broad knowledge, skills, expertise over their individual circumstance and the challenges and possibilities that they are facing with. In order to address the Santhal current adversities against sustainable livelihood. The unemployment situation could be addressed properly to pave the way for better life and prosperity throughout the various strategies like skill training,

social inclusion approach, humanistic perspective, transformacy and good governance and else. The targeted community will have taught and made skilled training towards modern equipments, also put their indigenous knowledge and skills with this latest technology so that they can produce the product more than before with minimum time frame. Moreover, they will be made awareness towards the equitable participation in the mainstream of the society and raise their minimum human rights affairs such as education, health and so on.

IV. RESEARCH METHODOLOGY: NARRATIVE INQUIRY

So far the methodology was concerned I tied to relay my stories with narrative inquiry to reveal the understanding the livelihood of Santhal in Gaurijung Rural Municipality through "collaboration between researcher and participants, over time, in a place or series of places, and in social interaction with milieus" (Clandinin & Connelly, 2000, p. 20). Further the explanation of narration, I talked with my participants and tell their stories asking questions and listening their life stories whether personal or groups and reflect it accordingly. Further Lather clarifies that Subjective reality and constructed by individual (Lather 2006).

V. OVERVIEW OF SITA HEMRAN & MUNSA HUSDA STORIES

Pragmatic Indigenous Knowledge and Skill of Santhal

Throughout the story of participant, I took some assumption that this sort of efforts assures them for good income, food security and importantly, the quality of life so far. "A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base."(DFID, 2000). As they catch and clean the fishes and else on time so that they can sale it in the market and get their necessarily commodities in return. They supplied their livelihood supporting goods which were not locally produced from the market very far from the native place and moved seasonally. It explores to me that they" were mobile, that was limited to the bringing of salt and cloths from the markets (Adhikari & Bohle, 2008. p.45). They have maintained their livelihood uder give and take strategies however this could not be for sustainable efforts.

Similarly indigenous people posses in-depth knowledge of traditional skill, knowledge, food and medicine for the business purpose (Griffiths and Anselmo, 2010). As Santhal do need more things for sustainable livelihood whether education, health security and the like. To address the mention commodities fund is an unalienable issues. Thus, to make fund resource they have to act as businessmen selling the the product whatever they produce like fishes, crabs and so on. This is transforming Santhal's life into to prosperity and security from probable risks. However, I observed some challenges also appear in front of them because of the lack of appropriate market, limited mobility and its recommendable values as well. Since they work hard for whole days collecting as well as catching the fishes and else yet, they are not assured whether they get able to sale it or not in the market.

As I snapshot of my past when one of my neighborhoods daily went to the forest in order to collect NIGUROS (this is a kind

of vegetable mostly available in rainy season in the forest), he spent whole day collecting and trimming it for sale in the market but when this was not sale appropriately in the market then he had dumping it badly. I just wanted to correlate this event to one and other since both of the activities require hard and careful skills if they did not get selling security of their products then they obliged to waste their labor and time both.

In nutshell, Resilience notion concerns on the magnitude of change that the system can cope with while still being able to function, and to the ways in which social system are capable to taking this sort of changes. Further I focus towards the spontaneous movement in between the ecological and social systems which for grants to assess the environment impacts on livelihood. Under this observation that I enforce that vulnerability would be regarded flip side of resilience because it explains the limitations in the face of challenges.

VI. APPROACH TOWARDS QUALITY OF LIFE

Throughout the interaction with the Santhal people, I appalled! And revised my perspective as I had misassumption towards them previously when I recalled the past that they were like uneducated, barbaric, and uncivilized tribes as they were out of the societal mainstream. Since they were found of livelihood supporting goods like fishes, wild foods, traditional farming rather than going schools, learning skills. But it was their one the strategies of livelihood that catching up these stuffs mean to sell it in the market and buy the daily and periodical household necessities. This technique of economical adversity is carried out from their predecessor to current time i.e. one of these skills they have been continuing for survival till today.

Moreover I examined that they have saved adequate fund for the sake of well fare not only for themselves but also for their children's education, fooding, health and happiness. These attempts definitely assure their secure as well as prosperous future. Thus they are striving for excellent quality of life, as a livelihood that is sustainable can cope with and recover from stress and socks, and maintain or enhance its capabilities both now and in the future, without harming the natural resource base (DFID, 2001). The act of catching up and clean fishes, shrimps, crabs and else on time so that they can sale it in the market and get their necessarily commodities in return. Further they supplied their livelihood supporting goods which do not locally produce from the market very far from the native place and moved seasonally. Because as in the perspective of sustainable livelihood, the local tribe or people are taken to be both objects and subjects of change, under broad knowledge, skills, expertise over their individual circumstance and the challenges and possibilities that they are facing with.

Further, I reexamined that their indigenous knowledge linked with their traditional skills whether catching fishes or cropping the rice, maize, millet or searching herbs from forest were appeared as a medium of cash and fund so that they could continue their existence and up coming generation ahead in the society. I would like to term this process as, "Survival of the fittest", in the life span. However, Sathals have been using empirical-analytic knowledge, historical-hermeneutic knowledge, and critical emancipator knowledge in typical fish catching, herbs collecting, farming as asset vehicle to achieve resilient livelihood.

But, the sustainable livelihood is questionable due to shocks and stresses. Furthermore, they have adopted multiple livelihood adversities of business, public service, typical agriculture, folk dancing and cardamom farming practices in combination to transform more distinct asset types into income.

VII. CULTURAL HERITAGE: MEANS OF INCOME

I concluded that they utmost fond of and love dancing and dancing is one activity which is in their blood and mind, it is a significant part of their fair and festival. They have strived not only for this generation but also preserving their next generation for quality of life. These attempts of livelihood strategy through cultural adversity also make them self-dependant and awareness of the counterparts in the society and it makes low resilience of their present and future as well ahead. They have learnt and implement culture as a sustainable tool for income, security and the prosperity.

As Ungar (2004) writes “a constructionist interpretation of resilience reflects a postmodern understanding of the construct that better accounts for cultural and contextual differences in how resilience is expressed by individuals, families, and communities” (p. 341). Through the folk dancing they have benefited multiple aspects, initially they collect fund which is fundamental part of sustainability and next they are preserving their culture and custom and lastly the others (society) understand them and their root of reality via this activity at all.

Resilience perspective assures the main point around the difference between livelihood resilience and ecological resilience is the emphasis on different aspects of stability – where stability is characterized as persistence of a system near or close to an equilibrium state, thus drawing attention to the distinction between efficiency and persistence, constancy and change, and predictability and unpredictability (Gunderson, 2000).

VIII. CRUX OF THE RESEARCH

The Santhals who were originally from Jharkhanda-India since inception and settle Gaurigunj along with other parts of Nepal particularly Jhapa, Morong and Sunsari respectively. In the beginning they had broadly lived by foraging, hunting and later they have adopted farming, fishing and dancing as their source of livelihood practices. As soon as forests wiped out and alternatively they were bound to look for different living strategies as a result, they implemented fishing, cultivation, dancing as a tool

of survival. But they were marginalized farmers since their lands were controlled by elites. As Camey states that if people have better access to assets, they will have more ability to influence structures and processes (Carney, 2000). However the unequal property i.e., land distribution in between elites and poor, Santhal make them economically deteriorate, poor, socially backward, educationally illiterate and politically unidentified.

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The Effect of Quartet Cards Media to Social Science Learning Outcomes On Kingdom Material for Fifth-Grade Students

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DOI: 10.29322/IJSRP.9.08.2019.p9294

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9294>

Abstract: This study aims to determine how significant the influence of quartet cards media learning media on learning outcomes of fifth-grade students of elementary school. This study is a *quasi-experimental* study (*quasy experiment*) with the research design used is none equivalent control group design. The experimental class uses quartet cards learning media, while the control class uses conventional learning media. The research data was obtained through pretest and posttest in the experimental class and the control class. The results showed that the average value of the experimental class was 77.17% and the control class value was 43.45%. So, the difference between the experimental class and the control class is 32.75%. And also the results of the t-test which shows that t_{count} is 9.2 > from t table 2.030. So it was concluded that the quartet cards media on kingdom material gave significant results to the learning outcomes of fifth-grade elementary school students.

Keywords: learning outcomes, social science, quartet cards learning media.

INTRODUCTION

Elementary school education is an effort to educate and print the life of a nation that is devoted, love and proud of the nation and state, skilled, creative, polite and capable of solving problems in their environment. In (law no. 20 of 2003 concerning the national education system) the definition of education is a conscious and planned effort that is contained in national education goals and to create a learning atmosphere and process of religious learning, self-control, personality, intelligence, noble character, as well as the skills that are needed by him and the community.

In its implementation, primary school education is given to students with a number of material or meta lessons that must be mastered. These subjects include religious education, citizenship education, Indonesian language, natural sciences, social sciences, mathematics, physical education and sports, cultural arts and crafts, and added subjects that are local content. The provision of material that is local in nature is intended so that cultures and traditions in their area are not eroded by the development of foreign cultures or new cultures that are present in the student environment. So that, the cultivation of local culture in every region throughout Indonesia remains sustainable and its authenticity is maintained as a nation's asset that is rich in cultural diversity. With the diversity of cultures owned by the Indonesian nation, the background of education refers to the roots of national culture, where it can be confirmed based on Law No. 20 of 2003 article 31 which will be explained by the author in the next section.

Quartets is a commercial card game. The game was invented in the Netherlands where it is known as *kwartet*. The game was originally created by Austrian card game company Piatnik during the 1960s, but later began being released by Dubreq, Ace, Waddingtons and other companies. Quartets, like Ace Trumps, were usually non-licensed. Each pack originally contained 32 cards, divided into 8 groups of 4 cards, unlike a normal 52 pack of playing cards, but the number of groups changed from company to company. The game went on to inspire Top Trumps. In The Netherlands the game is now frequently used as an educational tool. Quartets is played with three or more players, with the aim to win all the quartets (sets of four). Each card usually has a number and letter (1A, 1B, 1C, 1D, 2A, 2B etc.) in the top right or left corner of the card. The cards are shuffled and dealt evenly between all the players and the cards get held face up in a players hand. The player to the dealer's left starts by asking another player if they had a certain card (example, card 4C) which would help the player create a quartet. If the player does have the card, then they hand it over. If the player doesn't, then it becomes her or his turn to ask. When a quartet is created, or a

complete quartet was dealt, then the cards creating the quartet are placed in front of the player. The game ends when all the quartets have been created. The winner is the person with the most quartets.

The material of the kingdom is the material that learns the island of nusantara that has a lot of kingdoms. Various kinds of cultural patterns colored these kingdoms. Some are hindu, buddhist or islamic. These kingdoms have their own historical heritage.

According to Abdurrahman (2009), learning outcomes are abilities acquired by children after going through learning activities. Learning itself is a process of someone trying to obtain a form of behavior change that is rationally settled. In programmed and controlled learning activities called learning activities or instructional activities, the learning objectives are predetermined by the teacher.

Researchers conduct observations and interviews to find out and explore information about learning Social science at SDN Demangan 1 Bangkalan. And the results of the observation indicate that in the Social Sciences learning well but it looks less interactive in learning. Students tend to only listen to the teacher calmly but there is no participation of students in the learning. The progress that took place was fully carried out by the teacher who only used the lecture method without and package books as questions and answers with students. With conventional methods like that of course, students will only be learning outcomes that are not significant and of course students will be bored in learning when not accompanied by innovative learning.

By using innovative media 'quartet cards learning media', it is expected that there will be significant results on the learning outcomes of social science in elementary schools. Based on this background, the formulation of the research problems is as follows (1) quartet cards on kingdom material on the learning outcomes of Class V Social Sciences in elementary school? (2) What is the process of using quartet cards on kingdom material learning media on grade V social science lessons in elementary school ?. While the purpose of this research is to (1) find out how much the application of quartet cards on kingdom material learning media to the learning outcomes of fifth-grade elementary school social science learning. (2) Knowing the process of using quartet cards on kingdom material learning media on the fifth-grade social science of elementary school.

RESEARCH METHOD

This study merged into experimental research. Experimental research was conducted to examine whether there is a causal relationship between variables (between quartet cards on kingdom material learning media and learning outcomes of elementary school students). This study uses none equivalent control group design. Sugiono (2008) suggested that this design was not different from the pretest-posttest group design, there was only this design the experimental group and the group were not randomly selected. This research was conducted in three stages, namely the preparation, implementation, and completion stages.

O1	X	O2
O1		O2

The location taken in the study was SDN Demangan 1Bangkalan, the respondents of this study involved V-A class SDN Demangan 1Bangkalan which amounted to 17 students and Class V-B which amounted to 19 Students, Where class V- as the experimental group and V-B class as the control group. The research period is conducted from November to December 2018 in the odd semester of the school year 2018-2019.

The technique used to collect data in this study is (1) Test. Tests include giving written questions in the form of descriptions to students in accordance with the indicators of learning outcomes in social science, the questions given to respondents are multiple-choice questions. The test questions for the pretest consisted of 15 items and the posttest questions which amounted to 15 items. This test was conducted to determine the effect of giving quartet cards on kingdom material media to the results of learning social science. (2) observation. Observations were made to collect data on the process of using media quartet cards in the experimental class. Observations were carried out with the help of class teachers as observers who had received an explanation related to the observation activities during the study. The class teacher as an observer will help observe the research activities totaling two people, namely the V-A class teacher and the V-B teacher and the two observers will get the same observation sheet.

The instruments developed in this study are evaluation sheets. Evaluation sheet is given twice namely before being given treatment (pretest) and after being given treatment (posttest). Evaluation sheets are given to students to find out the contribution

of learning media to quartet cards media on the results of learning social science. The evaluation sheet developed in the form of multiple-choice questions with material on cultural diversity in Indonesia in the question each student will get the same problem but the number of each student is different from one another. This is done in order to get maximum results in taking data from students.

Before analyzing the data relating to the results of the study, it must first be conducted a feasibility trial of the research instrument consisting of validity and reliability testing.

The data analysis technique used in this study is descriptive and inferential analysis techniques. Descriptive data analysis aims to assess the extent to which the variables studied are in accordance with predetermined benchmarks. While inferential data analysis is used to test the hypothesis that has been proposed (Arikunto, 2010)

Data from observations related to student learning motivation were analyzed using the following formula

$$: P = \frac{f}{N} \times 100\%$$

While data on student learning outcomes in learning social science are analyzed by the following formula:

$$Average = \frac{\text{the total value obtained by students}}{\text{the number of students}}$$

Inferential analysis begins with a normality test and homogeneity test as a prerequisite for the t test to test the hypothesis proposed by the researcher. The hypotheses put forward in this study are: 1) There is an influence of the use of quartet cards on kingdom material learning media on the results of V class social science learning in elementary schools.

RESULTS AND DISCUSSION

The results of the research on expert validation, the results of research in the field and the results of the inferential analysis. The following are presented in the results of the validation of learning tools and research instruments used in this study, which have been validated by two competent experts in the field of social sciences and learning media.

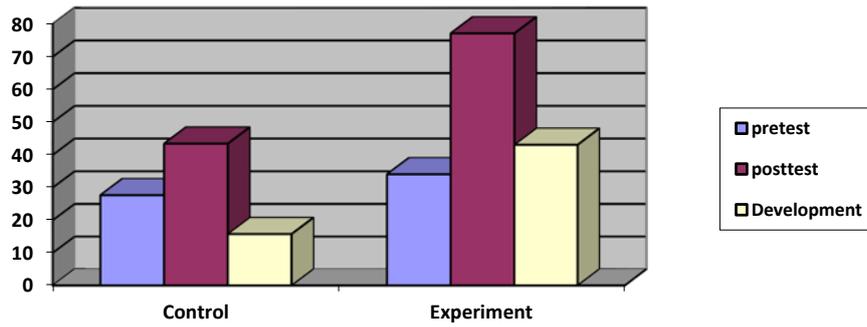
Table 1. Results of Validation of Learning Devices and Research Instruments.

Validation	Category	Description
Silabus	B+ / Valid	Valid Syllabus Can be used with a slight revision
RPP	B +/- Valid	Valid Can be used with a little revision
Media Pembelajaran	B +/- Valid	Valid Learning Media Can be used with a little revision
Instrumen penelitian	B +/- Valid	Valid research instrument can be used with a slight revision

The results of the validation of the syllabus, RPP, Observation Sheet, and learning media in the tael indicated the average validity of the four learning devices and the learning media from the validator to get a good category. So it can be concluded that learning devices and learning media are feasible to use with little revision.

In addition to the results of the validation of learning devices and learning media from experts, the results of research in the field will also be presented relating to the influence of quartet cards on kingdom material on the learning outcomes of fifth-grade elementary school. The following is a graph that illustrates the comparison of the results of the analysis of student learning outcomes in the experimental group and the control group.

Table 2. Posttest Pretest Results and Comparison.



Based on the graph shows the results of learning social science when students have not been given treatment (pretest) in the experimental class that is equal to 34.08%. While at the time after being treated (posttest) that is equal to 77.17%. So that the average difference obtained is 43.09%. There was a significant increase that occurred in the experimental class. Whereas in the control class there was no significant increase, ie when the control class pretested the scores obtained were (27.69%) and the scores obtained at the posttest were 43.46%. So that the average obtained is 15.77%.

Furthermore, the results of inferential data analysis will be presented relating to the testing of hypotheses from the researcher. The following is the result of inferential data analysis to test the hypothesis proposed by the researcher. Because the required data is available, the t-test can be done. The following data are processed in the t-test;

- 1) The average control class difference is 15.77%
- 2) Average Differences in Experimental class of 43.09%
- 3) Variant of the control class which is equal to 1437.63
- 4) Experimental class variants which are equal to 1252.69

After entering into the following formula:

$$t = \frac{Mx - My}{\sqrt{\left(\frac{\sum x^2 + \sum y^2}{Nx + Ny - 2}\right) \left(\frac{1}{Nx} + \frac{1}{Ny}\right)}}$$

Then the results of t arithmetic will be 9.2 with a t table of 2.030,

so t-count > t-table

means that the results of the t-test show significant results in the learning outcomes of students who have been given treatment. Students who use quartet cards learning media get better results when compared to students who are not given treatment.

So that it can be concluded that the use of quartet cards on kingdom material learning media can improve the results of learning social science in the fifth grade of public elementary school 1 with the condition of the city.

CONCLUSIONS AND SUGGESTIONS

Based on the discussion of the results of the research presented, it can be concluded that there is a positive and significant influence between the quartet cards on kingdom material media on the results of learning social science. The results showed that groups of students using quartet cards on kingdom material learning media (experimental group) got better scores than using conventional learning media (control group). As well as a positive influence in the use of learning media, students are more enthusiastic in participating in learning because the quartet cards learning media is a medium that according to students is

classified as new. So that it provides significant data that the quartet cards learning media can improve the results of learning social science.

Based on these conclusions, the researcher can provide the following suggestions. Based on the results of observations conducted by the observer when using quartet cards learning media, digital quartet cards on kingdom material learning media can be used as an alternative for teachers because this media follows technological developments and is relatively new among students. Which makes students become more enthusiastic in participating in learning. In use, it can be concluded that learning media that use game technique makes students more interested. And teachers should be able to use the latest technological techniques to be used as an innovative media so that students do not feel bored in following the learning presented.

Which can include computers, smartphones, or LCD's. The development of the era is so fast, it is expected that teachers also have to keep up with the times when teachers are less skilled in following the development of this modern era, not only teachers will be left behind but also students will also be left behind. Both in terms of learning and in terms of technological development.

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Bringing Mindfulness into the Schools: A Psychological perspective on improving students' attention

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DOI: 10.29322/IJSRP.9.08.2019.p9295

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9295>

Abstract- Considering the complexity of the various facets of school education and multilayered challenges that obstacle achieving the goals of quality learning, this article attempts to analyze the role and importance of introducing mindfulness in the school educational scheme. The article discusses the findings obtained from an eight-week mindfulness-based intervention with middle school children to assess the effects of mindfulness practices on students' attention. The study examined how mindfulness practices help in improving attention of children. Middle school students (n=40) completed the Mindful Awareness Scale for children (MAAS-C). Pre and post-test (MAAS-C) was administered on the single group.

Index Terms- Mindfulness, Middle school, Attention

I. INTRODUCTION

In the life-cycle of humans, middle childhood and early adolescence is a period of rapid change in physiology and in development of the brain. Beginning of this phase is also marked by the emotional upheavals and behavioural issues of the children. Especially at this technology dominated world, changes in the societal structures and its challenges that is overfilled with constant stimulation it is no surprise that children find it difficult to focus on what they are working on. Children at this stage are constantly under distractions of screens, conversation, movement and thoughts of what is next.



Researches in this area suggest that understanding the role of attention regulation may help in getting insight to understand the developmental aspects and psychological problems in school-age children. Mindfulness-based interventions stimulate positive change in attention regulation as shown and described through researches. Theoretically, the very construct of mindfulness and attention regulation are inherently related.

Traditionally, school education focus is centred on imparting information and knowledge and not giving enough attention to the socio-emotional developmental aspects of children which plays a crucial role in children's learning. However, gradually schools are now realising the importance of addressing the issues pertaining to the mental health and its correlation in children's academic success.

Deconstructing the idea of Mindfulness

The idea of mindfulness is the quality of human consciousness which could be defined as a state of being aware and living in the present moment. Mindfulness is experiencing the present moment without getting trapped into past or future. Mindfulness is about enriching one's experiences at present moment with openness and in non-judgemental way.

Mindfulness is the attribute of consciousness that can be defined as the ability of paying intellectual attention to present moment experience with a open, curious and non-judgmental attitude (Brown and Ryan 2003; Bishop et al. 2004). Mindfulness is the practices that can help students of all ages tune their instruments of learning. Strengthens mental muscle for bringing focus back where we want, when we want. The practice of mindfulness teaches how to pay attention, and this way of paying attention enhances both academic and social-emotional learning.

Mindfulness: The Quality of human consciousness

Mindfulness has been defined in more than one way within the literature; however all definitions share common element that mindfulness is the way of directing attention. Mindfulness is considered to be a state of consciousness that incorporates self-awareness and attention with a core characteristic of being open, receptive and non-judgemental (Brown and Ryan 2003; Kabat-Zinn 1990; Segal et al. 2003). Within the literature concerning mindfulness-based intervention for therapeutic settings mindfulness has been defined as "the awareness that emerges through paying attention on purpose, in the present moment, and

non-judgmentally to the unfolding of experiences moment by moment” Kabat-Zinn 2003, p. 145). Being mindful requires awareness and focus on current experience, versus “automatic pilot”, which involves engaging in the behaviour that is out of awareness and attention, that is compulsive or automatic (Kabat-Zinn 1990; Segal et al. 2003)

How mindfulness can be helpful to the children

Childhood is a developmental period marked as a time when children develop a sense of competence and personal self-esteem. During middle childhood cognitive thinking and conceptual skills are refined and consolidated. This period entails advances in understanding, meta-cognition and self-regulation. Mindfulness encompasses an active process to attend to the present moment, which requires the ability to control attention and exercise cognitive functions.

According to developmental theory and research, middle childhood is a time where the processes necessary for the active components of mindfulness (i.e., meta-cognition) are developed.

Mindfulness practices enhance the core ability to human learning is to pay attention and focused concentration on the process and object of learning. Likewise the ability for students to find meaningful understanding in their work is likely related to focusing and paying attention to the tasks they are to perform. A level of attention is obligatory for students to reach a mastery of scholastic concepts.

Black and Fernado (2014) discussed the importance of a learning environment that is free from disruption to support focused academic learning. Various Studies on mindfulness training have shown results in terms of increase in the self-regulation, increased span of attention and reduced psychological stress.

Mindfulness based Programme intervention with Middle school children

In the recent years there has been an increase in the studies related to mindfulness exercises and their ability to help children to concentrate. Much of the research in educational settings tested whether a mindfulness curriculum was able to improve students’ achievement and success. The eight-week long mindfulness programme was structured incorporating various mindfulness exercises and activities. The objective of the study was to assess the effect of mindfulness practices on students’ attention at the middle school level. The intervention was conducted on 40 children from middle school level at The Aarambh School, a CBSE affiliated school based at Raipur, Chhattisgarh. The study was conducted with both, boys and girls,

age group 11 to 14 years. The programme was scheduled during the school morning assembly. A pre-test MAAS-C (Mindful Attention Awareness Scale for Children, Developed by Brown and Ryan, 2003, adapted by Benn, 2004) was conducted on the test group to record the initial level of awareness of attention with the purpose of comparing the data with that of the post-test. The programme included simple mindful breathing exercises, mindful body movements, mindful eating, mindful listening, body scan, awareness of thoughts and associated feelings, mindfulness meditation Children were asked to write their experiences and reflection post-exercises in their mindfulness journal. Beginning of the session, each day, was dedicated for reflection and sharing by the students. After eight-week programme completion post-test MASS-C was conducted to assess the development of attention as a result of mindfulness exercises. Non-structured interview was conducted with middle school teachers to seek their regular classroom observation in terms of children’s engagement and behavioral aspect.

Mindfulness based programme components

Mindful breathing- breathing with awareness

Mindful body movement: awareness of body

Mindful eating: conscious eating the food with the sense of gratitude

Awareness of body, thought and emotions: developing awareness of the interconnection between thought and emotions

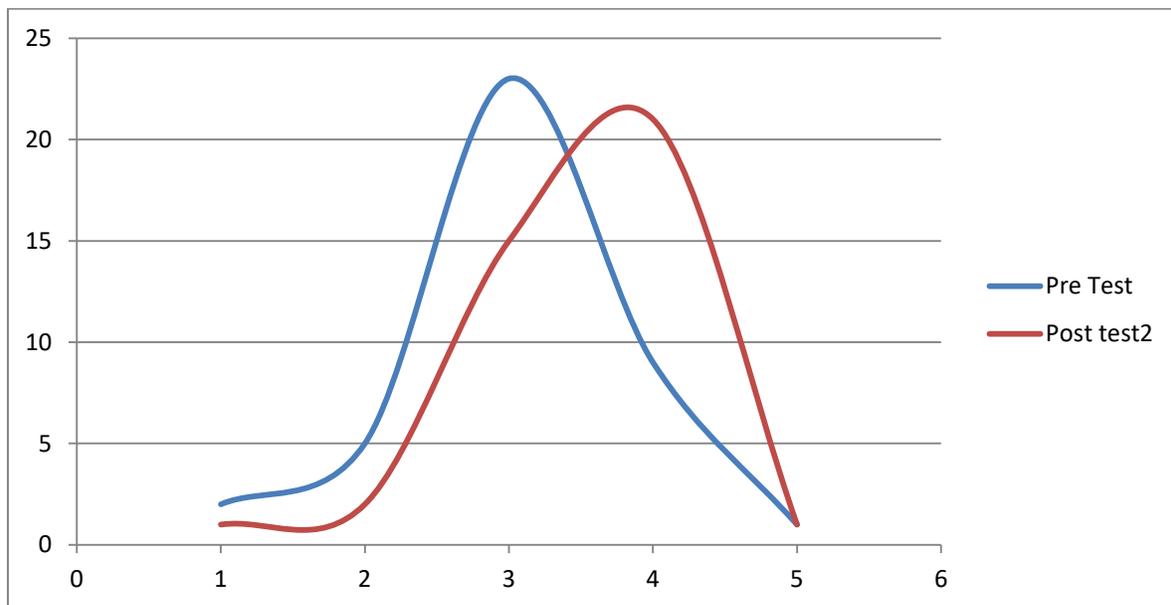
Mindful listening: active listening

Body scan: focusing attention at each of the body parts, awareness of bodily sensation

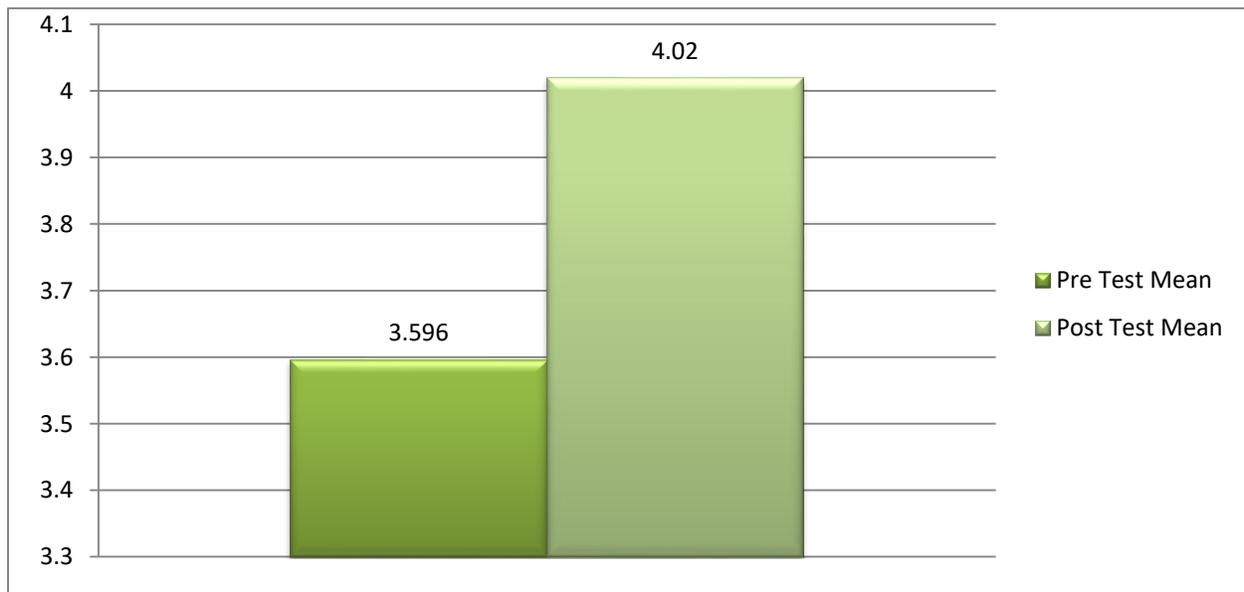
Practicing Gratitude and empathy

Guided meditation- visualization and regulating one’s focus of attention





Pre and Post-MAAS-C test mean score of Children



Comparative data- Pre- and Post MAAS-C test mean scores

The effect of Mindfulness based programme on Students' Attention

Comparing the two data obtained from pre-and post-intervention test shows improvement in the attention span of students. Teachers' classroom observation, during the intervention phase corroborates with the idea that students were able to focus their attention in the classroom learning and improvement in scholastic achievement was recorded. Analysis of the data obtained, from pre-intervention and post-intervention test score of MAAS-C questionnaire shows increase in the students' mindfulness attention awareness from a pre-group mean (x) of 3.596 to a post-group mean of 4.02 on the mindfulness scale of 6. There is 11.67 percent growth recorded statistically in terms of mean square obtained from pre-test and post test intervention. Based on the observation during the sessions and mindfulness journals shared by the students shows improvement in their attention span. Students shared their

experiences during interviews that they feel more relaxed, calm and peaceful after mindfulness sessions.

The statistical results align with that of the informal feedback provided by students in the concluding session indicated that: the majority of students who attended the mindfulness sessions on regular basis found it helpful; it had modest but significant effects on students' attention span, dealing with minor stress and emotional turbulences.

Some of the experiences shared by students' in their mindfulness journal are quoted in their words; *"I feel peace and fresh. It's not difficult for me. I feel very relax after completing mindfulness session"*

"I feel very good when I put my full attention. Sometimes it is very hard to focus on my breath. After completing the session I feel very fresh. The session helps me a lot to focus in the class"

"Today we had a very good morning with mindfulness exercises. We did some exciting activitieswe enjoyed this session a lot"

“I enjoy mindfulness sessions a lot. This brings peace, relax and freshness. I can focus better in my studies”

Results of Mindfulness based intervention with middle school children shows improvement in students’ attention and therefore improvement in students’ academic success. Taking into consideration the importance of addressing psycho-emotional issues of children can help them to do well in academics. Practicing mindfulness can support them in getting aware of their difficulties, challenges, accepting them and seeking support to overcome. Mindfulness could be a way of treating children and adolescents with conditions ranging from attention deficiency, anxiety, anger-management, depression and stress. The benefits of mindfulness are encouraging and proven empirically. The educational journey of a child is the journey of self-exploration, from being to becoming and mindfulness practices could be instrumental in bringing about the harmony between internal and external world, clarity of thought, developed emotional literacy and attunement of cognitive system. More than improved cognitive functions, mindfulness helps in perceiving the self beyond the epidermal boundaries of as an individual. The future of humanity now needs more of compassionate and empathetic hearts than of intellectual minds! Mindfulness practices could be one way that can help children to develop as rational, critical thinkers and evolve as independent thinkers.



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Occupational and Socio-economic status of Bhutias in Sikkim

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DOI: 10.29322/IJSRP.9.08.2019.p9296
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9296>

Abstract- Sikkim, a tiny Himalayan kingdom till its merger with India in 1975, is one of the smallest states of North East India sharing multiple boundaries with China to the North, Bhutan to the east, Nepal to the west and West Bengal (India) in the south. Though demographically small in size with total 6, 07,688 number of people (2011 census), it is the homeland of multiple cultural-racial ethnic groups. Bhutias, Lepchas, Limboos and Nepalese are the different communities that live in Sikkim, of which the Nepalese constitute the majority of the population.

According to historians, the Lepchas are the original inhabitants of Sikkim. The others have migrated over different phases in the history of Sikkim. The Bhutias were the earliest migrants. However, historians like Chie Nakane, 1966 argue that Limboos and Magars too existed in Sikkim before the Bhutia migration. The Bhutias are basically Tibetan settlers from Kham province in eastern Tibet. According to Namgyal and Dolma (1908), they started migrating to Sikkim from the western and northern passes of Sikkim from 13th century onwards.

Bhutia after settling in Sikkim established its rule in 1642. Till the merger of Sikkim with India in 1975, Bhutias ruled Sikkim and accorded the highest position in political and socio-economic status. In the light of this discussion, the paper intends to discuss the occupational and socio-economic status of Bhutias in Sikkim.

Index Terms- Bhutias, Occupation, Socio-Economic, Status, Sikkim.

I. INTRODUCTION

Sikkim is a state of multi-ethnic cultural group and communities. Initially it was a barren land before people started migrating. Lepchas were the only original inhabitant of Sikkim. Bhutias migrated from Tibet to Sikkim and became the ruling authority of Sikkim in 1642. The Bhutia monarchy ruled Sikkim for 333years (1642 -1975).

Bhutias who were identified as traders and Lepchas as agriculturists were the two dominant communities that existed in Sikkim initially. However, the arrival of the Nepalese from the 18th century onwards brought some changes in the socio-economic structure of Sikkim (T.B Subba, 1992). The Nepali settlement in Sikkim relates partly to the migration with the territorial conquest by Nepal in 1700 and 1740 and the arrival of British in 1887 to a great extent. The first political officer of Sikkim, J.C White, to a large extent was responsible for migration of the Nepalese (Basnet, 1974). Since then the Nepalese started outnumbering the other ethnic groups in terms of population and occupation.

The first population survey of Sikkim in 1891 recorded total population of 30,455, out of which Nepalese had the highest number with 15,458, followed by Lepchas with total 5,762 persons, Bhutias with 4,894 numbers and Limboos with 3,356 total population. Nepalese recorded 50% of the total population in the country. Subsequently, the Nepalese were the leading group in terms of numbers in all the census reports.

According to State Socio Economic Census, Govt. of Sikkim, 2006, Sikkim records 76,070 (13.08%) of Bhutias, 45239 (8.57%) of Lepchas, 56650 (10.7%) of Limboos and 349543 (60%) with Nepalese. There appeared a tremendous change in demographic structure which also led to change in the political and socio-economic structure in Sikkim.

1. Occupational and economic status of Bhutias in pre-merger Sikkim

For the assessment of the occupational and economic status of Bhutias in Sikkim, the study on the lines of pre and post-merger periods may be considered. The discussion on the traditional and the present occupational engagement of Bhutias allows us to draw a comparative understanding on the occupational and economic status of Bhutias in pre and post-merger period. As presented by various studies on Sikkim, the Bhutias accorded the position as the ruling community and enjoyed highest socio-economic status in the society in the pre-merger period.

The social stratification amongst the Bhutia community that existed during the pre-merger period gives a picture of the socio-economic status of Bhutias visa-vis other existing communities. During the monarchical set up in Sikkim (i.e. before 1975) the Bhutia society was structured into four social strata; Royal family, lamas (monks), kazis and the commoners. After the royal family, the lamas during those time occupied most respected position in the society. The lamas were entrusted as the custodian of the important monasteries in Sikkim. Monasteries possessed huge lands under them which made the lamas enjoy both revenue and administrative control in Sikkim. The Lamas also acted as the chief advisers to the Chogyal (maharaja) in both political and administrative affairs of the state. After lamas, the kazis, mostly belonging to Bhutia-Lepcha were the next high positioned group. Kazis were mostly the landlords and zamindars. The feudalistic state structure of Sikkim created a separate entity for the kazis. Lowest stratum was a mix of Lepchas, Bhutias and Nepalese who worked for the Chogyal and the Kazis as agriculturalist and unpaid laborers (Sinha, 2009).

Bhutia rulers began to establish their dominance because the central administration was maintained according to the Tibetan

style of state craft. The creation of new class of Kazis further accelerated the powers of Bhutias in Sikkim. After the royal family it was this class of people who commanded power over their regional territories. They also acquired traditional education basically entrusted towards religious learning. The kazis wielded considerable authority in the realm of economic and administrative arenas. In the later phases of the Chogyal rule, the kazis established themselves to be more influential and more powerful than the rulers. They were responsible for insulating feudalism and zamindari system to its peak in Sikkim. They were indeed responsible for promoting the main policies of aggravating administrative powers into their hands, specifically when Sikkim was encroached by foreign invaders, especially Nepal and Bhutan in the 18th century.

However, this administration of Sikkim underwent severe changes during the period of Colonial intervention. The change in the administrative structure was seen since the appointment of first British political officer in 1887. A new pattern of administration was introduced and new bureaucratic system was proposed by John Claude White in 1888, the first Political Officer of Sikkim. Hence, it is seen that the change in the wave in socio-economic and occupation pattern of people in Sikkim was brought by the British entry into Sikkim.

This new administrative structure opened new occupational avenues for the people of Sikkim. The agriculture based society slowly turned towards modern society which created avenues for many government services and new occupations. Bhutias being the most educated lot got the possible entry into these new occupations.

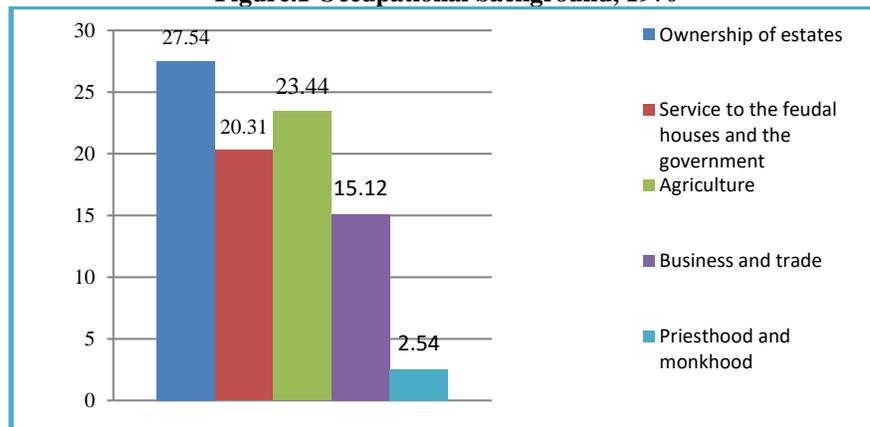
Secondly, the abolition of landlordism during the reign of Tashi Namgyal (1893-1963) further changed the occupational

pattern. The system of government during this period was based on absolute monarchy with deeply rooted feudalism. Many agitations took place in Sikkim for the abolition of landlordism. The abolition of landlordism made the kazis and land holders to opt for other means of occupation. By then many commercial networks were established in Sikkim. They moved towards different commercial occupations like household industries, banking, transport services, communication and construction works. Majority of the traders and contractors belonged to the Bhutia aristocrats and kazis. After they lost their privileges as landlords they got into state's best service sectors. However, the trade and market was captured by Marwaris and other traders from the plains.

Today, Bhutias are found working in different sectors in the state. Substantial amount of Bhutias still practice agriculture as the source of income along with pasturage. Apart from this they also practiced other existing occupations for their livelihood. Influenced by Chinese arts and crafts, carving and weaving (yarning) are some of the occupations followed by them. The main products being carpets and woolen clothes and this practice is been carried forward under Sikkim Handloom and technical institutions in modern Sikkim.

The study conducted on the occupational background of the Bhutia families by A.C Sinha in 1970 revealed that in Sikkim more than 90% of the people were engaged in agriculture. The figure below reveals the percentage of people engaged in different occupational patterns. It shows that 27.54% were the ownership of estate, 23.44% were agriculturists, 20.31% gave their service to the nobility and the aristocracy, and 15.12% were into trade and business.

Figure.1 Occupational background, 1970



Source: A.C Sinha, 1975.

It is evident from the field study conducted by A.C Sinha in 1970 that the major occupation of the Sikkimese people was agriculture. The highest percentage of the Bhutias were the owners of estates and second highest were in agriculture and then into government services.

Right after the merger, people got entry into the service sector of newly created state of Sikkim. According to A.C Sinha

(1975), Bhutias were the highest in number to get into the higher bureaucracy, followed by Kazis, who are also of Bhutia and Lepcha origin. Secondly, Bhutias got entry as Contractor-cum soldiers in voluntary politics. Table below presents the occupational affiliation of the dominant ethnic groups- 1975.

Table 1. Occupational affiliation of the dominant ethnic groups- 1975

[1] Sl. No	[3] Occupation	[4] Bhutias	[5] Lepcha	[6] Khasi	[7] Newars	[8] Nepalese	[9] Indian	[10] Unidentified	[11] Total
[12] 1	[13] Higher bureaucracy	[14] 45	[15] 2	[16] 34	[17] 9	[18] 2	[19] 1	[20] 31	[21] 124
[22] 2	[23] Trade and business	[24] 3	[25] -	[26] -	[27] 1	[28] 3	[29]	[30] 11	[31] 55
[32] 3	[33] Contractor-cum soldiers in voluntary politics	[34] 12	[35] 1	[36] 2	[37] 1	[38] 2	[39] 37	[40] 33	[41] 51
[42] 4	[43] Agriculture	[44] 2	[45] -	[46] 4	[47] -	[48] 8	[49] -	[50] 33	[51] 47
[52] 5	[53] Professions	[54] 1	[55] -	[56] 1	[57] -	[58] 2	[59] -	[60] 9	[61] 17
[62] 6	[63] Priesthood and monkhood	[64] 8	[65] 3	[66] -	[67] -	[68] -	[69] 4	[70] 4	[71] 15
[72] 7	[73] Ownership of estate	[74] -	[75] -	[76] 5	[77] -	[78] -	[79] --	[80] -	[81] 5
[82] 8	[83] Others*	[84] 1	[85] -	[86] -	[87] -	[88] -	[89] 4	[90] 12	[91] 17

Source: A C Sinha, 1975.

So far we have seen the status and position of Bhutias in the pre-merger period. The assessment of community wise occupation and socio-economic status in Sikkim in pre-merger period sheds light that Bhutias dominated Sikkim politics after the establishment of their kingdom in 1642. And no doubt, they started enjoying the highest degree of social and economic status in the society. The Nepalese migration and settlement, however, brought some changes in the socio-economic structure, yet Bhutias retained their position as the highest among the social strata.

2. Occupation and socio-economic status of Bhutias in Post-merger period

This part of the paper tries to discuss the occupation and socio-economic status of Bhutias in the post-merger period. The assessment of occupational pattern and socio-economic status of Bhutias (visa-vis other communities) is discussed under the headings: occupational pattern, income status, landholding status in the state.

3.1 Occupational pattern

Since merger in 1975, various avenues for jobs and new occupational patterns emerged in Sikkim. This led to migration of people especially from India and neighbouring countries like Nepal in the search of new jobs which changed the demographic profile of the state. Sikkim in its initial period of statehood faced the challenge of meeting the demands of the new service sectors. There was great demand of skilled and educated manpower which Sikkim lacked during the time. In such situations the migrated Nepalese and Bhutias who were more educated among the communities in Sikkim were able to occupy better places in the service sectors in the state.

The occupational status of the existing communities captured in 1998 reflects that the Nepali group consisting of Bahun/Sharma, Chhetri, Pradhan/ Newar, Gurung, Manger/Thapa, Tamang, Limbo, Rai, Sunwar and Dewan are the group with highest number occupying gazette posts in the state. Schedule tribes including Bhutia and Lepcha have the second highest number of employees in all cadre of job in 38 departments. Table.2. provides the information on the employment status of different communities in 38 departments in the state in 1998.

Table 2. Community-wise Employment Status in 38 Departments, 1998

Sl. No.	Communities	Selection IAS/IPS/IFS	Gazetted Grade I	Gazetted Grade II	Non Gazetted III	Class IV
1	Scheduled Tribe	23	95	120	888	1115

2	Scheduled caste	2	7	15	143	450
3	Nepali	20	86	220	1634	4618

Source: Report of the OBC Commission, 1998.

The Comparative study of the communities reflects that Nepalese being the greater in number in the state, employment number is also large. Schedule tribe which also includes Bhutia and Lepcha has the second highest number of employees distributed across all categories of employments in the state. The data of community wise employees in the state elicits that Nepalese group has the highest percent (74.3%) of total employees whereas Bhutia records 17.2% of employees and Lepchas are 8.5%.

To find out the working status of the people (community wise) living in the State, five types of nature of employment has been discussed, which covers the entire nature of employment pattern the State of Sikkim has been adopting; Regular, Work-charged, Ad-hoc, Muster Roll and employees working in private and other sectors. Table 3 presents the distribution of employees in the state in 2002.

Table 3. Community wise total numbers of employees - 2002

Community/Caste	Regular	Work-charged	Ad-hoc	MusterRoll	Others/PSU	Total
Nepali (Bahun, Bhujel, Chettri, Damai, Gurung, Jogi, Kami, Majhi, Manger, Pradhan, Rai, Sarki, Sherpa, Subba (limbo), Sunuwar, Tamang, Thami).	15026 (71%)	1205 (80%)	124 (67.8%)	7890 (81%)	1565 (74.6%)	25810 (74.3%)
Lepcha	1902 (8.9%)	72(4.8%)	19 (10.3%)	789 (8.1%)	171 (8.2%)	2953(8.5)
Bhutia	4275 (20.2%)	229(15.2%)	40 (21.9%)	1070 (10.9%)	361 (17.2%)	5975 (17.2%)
Total	21203	1506	183	9749	2097	34,738

Source: Sikkim – A Statistical Profile- 2004-05, Government of Sikkim.

The table sheds light that Nepalese has 71% of the regular employees, 80% as worked charged, 67.8% as adhoc, 81% employees working on muster-roll basis and 74.6% working in other sectors. Among the Bhutias 20.2% are regular employees, 15.2% are working as worked charged, 21.9 as adhoc employees, 10.9 % on muster roll and 17.2% working in other sectors. 8.9% of Lepchas are regular employees, 4.8% working on work charged, 10.3% on adhoc basis, 8.1% as muster roll and 8.2% working in other sectors in the state.

Similarly, we can see consistency in the increase in the number of employees amongst all three groups in 2006. Nepalese is the leading group followed by Bhutia and Lepcha communities. The available data on community wise number of employees in 2006 highlights on the total number of employees; regular and non-regular employees in the state. It also presents total number of employees working in the Private sector Units, including regular and non- regular. The following table presents the Community wise number of employees in the state in 2006.

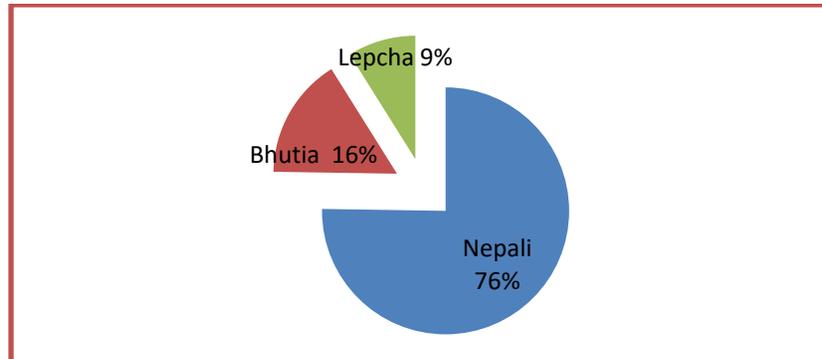
Table 4. Community wise total numbers of employees – 2006

Community	Government		PSU	Total
	Regular	Non Regular	Regular + Non Regular	
Nepali	21479 (73%)	20,878 (77.3%)	2584 (78.3%)	44941 (76%)
Bhutia	5367 (18.4%)	3481 (13%)	530 (16.1%)	9378 (16%)
Lepcha	2325 (10%)	2646 (10%)	183 (5.6%)	5154 (9%)
Total	29171	27005	3297	59473

Source: Department of Economics, Statistics, Monitoring and Evaluation, Govt. of Sikkim, 2006.

It is presented that in both government and non-government sector, Nepali community has the highest number (76%) of employees in the state. After Nepalese, Bhutias has the second highest number of employees (16%) and Lepchas has total of 9% employees share in the state.

Figure.2.Total numbers of employees (Regular + Non Regular) 2006



Source: Department of Economics, Statistics, Monitoring and Evaluation, Govt. of Sikkim, 2006.

Sihha (2009) argues that there are many reasons for Bhutias to get into the higher bureaucratic posts in the state, one being their affiliation to the royal family as well as their socio-economic status. Secondly, as mentioned earlier the educational background of the Bhutias keeps them edge above the other communities.

According to the available statistics provided by the Department of Personnel & Administrative Reform & Training, Government of Sikkim, 1999 and 2005, the ethnic background of the bureaucrats in Sikkim – 1999 & 2005 is provided in the following table.

Table 5. Ethnic Background of the Bureaucrats in Sikkim – 1999 & 2005

Number of cadres and percentage								
Ethnic Communities	1999				2005			
	IAS	IPS	IFS	Total	IAS	IPS	IFS	Total
Lepcha	-	-	-	-	01(2.1)	-	-	01
Bhutias	12 (44.5)	04 (17.4)	05(21.7)	21	13(28.3)	03(12.0)	05(17.8)	21
Nepalis	06(22.2)	05(21.7)	06(26.1)	17	9(19.6)	4(16.0)	6(21.4)	19
Sherpas	-	-	-	-	01(2.1)	-	-	01
Others	09(33.3)	14(60.9)	12(52.2)	35	22(47.8)	18(72.0)	17(60.7)	57
Total	27	23	23	73	46	25	28	99

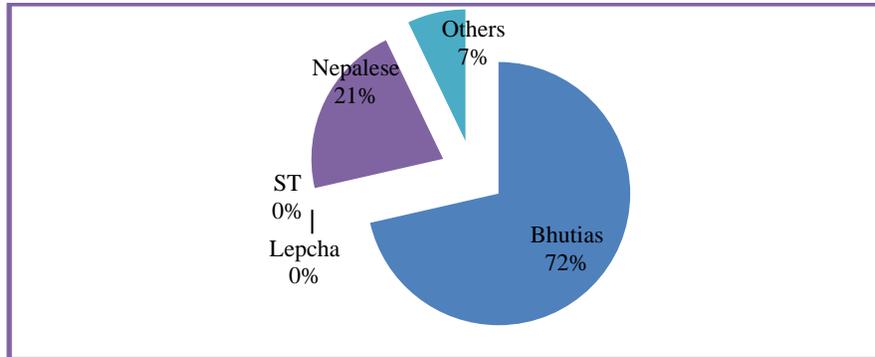
Source: Department of Personnel & Administrative Reform & Training, Government of Sikkim, 1999 and 2005.

It shows that the Bhutias are in the highest administrative posts in the state. In the highest category of administrative posts like IAS, Bhutias are represented 44.5%, 17.4 % in IPS and 21.7% in IFS. In total, Bhutia makes 28.7% of administrators in 1999. However, the percentage of the Bhutia bureaucrats in 2005 has

slightly decreased to 21% as compared to 1999. But as a community as a whole it has the highest percentage in the state.

There was not only high participation of Bhutias in the state administration; the number of civil servants in higher bureaucratic posts is also highest in the state.

Figure 3: List of highest cadre (IAS) in Sikkim, 2006



Source: Statistical Report, DESME, 2006.

The above figure is an indicative of the fact that the Bhutias are highest in the cadre of IAS in the state government.

3.2 Income status

Income as a determinant factor of socio-economic status can be measured in a variety of ways, including family income and

assessments of wealth. The collection of income includes the measurement of total income, earned or unearned.

The socio-economic survey conducted by the Department of Economics, Statistics, Monitoring and Evaluation, Govt. of Sikkim in 2006 presents the distribution of income of different communities in 2006.

Table 6. Community wise percentage distribution of household by income category, 2006

Community	Household	0 - 2500	2501-5000	5001-10000	10001-25000	25001-Above
Bhutia	14769 (7.81)	11.48	11.46	13.69	16.73	21.52
Lepcha	8041 (4.3)	7.70	7.59	6.88	6.44	5.59
Nepali	188915 (88.1)	80.82	80.95	79.43	76.83	72.89
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Department of Economics, Statistics, Monitoring and Evaluation, Govt. of Sikkim-2006.

Considering the distribution of population in the state, the Nepalese are more employed and as expected they are the highest income bearers.

It is seen that the Nepalese have the highest percentage of income. Bhutias as always comes after Nepalese, followed by Lepchas.

3.3 Landholding status

The pattern of land distribution is one of the major determining factors of studying economic status of the people. In this study we have also been able to categorize communities on the lines of distribution of land by land size.

Table 7. Community wise Distribution of Land in Sikkim (Area in Hectares), 2006

Communities	Total Paddy fields (Area %)	Total Dry Land (Area %)	Waste land (Area %)	Cardamom (Area %)	Total Cultivable land (Area %)
Bhutia	21.12	16.13	24.18	27.05	20.32
Lepcha	14.97	---	17.53	32.72	20.38
Nepali	57.19	64.95	62.00	22.37	58.66

Source: Land Record Section, Department of Land Revenue, Govt. of Sikkim, Gangtok, 2006.

The distribution of land by size, 2006 gives us an understanding that Bhutia as a community possesses 20.32 % of cultivated land area and Lepcha possesses 20.38% of cultivated land. Nepalese (total of land owned by Bahun, Bhujel, Chettri, Damai, Gurung, Jogi, Kami, Majhi, Manger, Pradhan, Rai, Sarki, Sherpa, Subba (limbo), Sunuwar, Tamang, Thami) is the group possessing 58.66% of the total land in the state.

Table 8. Community wise distribution of land by land size, 2006

Community	Less Than 1 Acre	More than 1 Acre less than 2.5 Acre	More than 2.5 Acre less than 5 Acre	More than 5 Acre less than 10 Acre	More than 10 Acre less than 25 Acre	More than 25 Acre	Grand Total
Bhutias	83.17	10.58	2.40	2.40	0.96	0.48	100.00
Lepcha	78.81	13.91	3.97	0.00	3.31	0.00	100.00
Tamang	86.84	7.89	0.00	2.63	2.63	0.00	100.00
Limbo	91.45	4.61	1.97	1.97	0.00	0.00	100.00
Bahun	88.15	11.11	0.00	0.00	0.00	0.74	100.00
Chettri	84.83	12.36	2.25	0.00	0.56	0.00	100.00
Pradhan	87.50	7.50	2.50	2.50	0.00	0.00	100.00
Rai	89.21	8.27	2.16	0.36	0.00	0.00	100.00
Manger	85.48	14.52	0.00	0.00	0.00	0.00	100.00
Gurung	95.31	1.56	1.56	1.56	0.00	0.00	100.00
Suwar/Mukhia	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Thami	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jogi	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Dewan	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bhujel	83.33	16.67	0.00	0.00	0.00	0.00	100.00
Kami	87.50	12.50	0.00	0.00	0.00	0.00	100.00
Damai	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Sarki	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maji	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sanyasi/giri	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Others	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Grand total	86.80	9.60	1.91	0.88	0.66	0.15	100.00

Source: Department of Economics, Statistics, Monitoring and Evaluation, DESME, 2006.

Detailed status of land holding by land size presents that 83.17% of Bhutia households possess less than 1 Acre of land. 10.58% of households possess more than 1 acre and less than 2.5 acres of land, 2.40% Bhutia households possess more than 2.5 Acre less than 5 Acre of land, 0.96% possess more than 10 Acre and less than 25 Acre and 0.48% households possess more than 25 Acre of land.

Referring to the earlier works on Sikkim, Bhutias were identified as elites in the pre-merger period. According to AC Sinha (1975), Bhutia community possessed high political, social and economic status in Sikkim. Today, Bhutias accounts to 13.08% of the total population yet, they have good share in the state's employment, landholding and household income in the

state. It may be said that with the increasing population, Bhutias have been able to represent in almost all sections of the state.

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Design Analysis of Gear in Horizontal Milling Machine

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DOI: 10.29322/IJSRP.9.08.2019.p9297

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9297>

Abstract- In this paper, speed changing system for Horizontal Milling Machine (low speed position) is designed. In machine tool applications, the variety of speed are very important because of the cutting conditions. Cutting conditions, specially cutting speed, and feed speed depend mainly on the machined material properties and the surface finish accuracy. The purpose of a gearbox system is to convert input speed and torque into a different output speed and torques. The transmission consists of a train of gears of different size contain in a case. This paper emphasizes on the design consideration of speed changing system of gearbox for horizontal milling machine which has three speed two steps gear ratio. This gearbox is designed to transmit the power of motor. The maximum power is 2.2 kW at 1430 rpm. In this paper, the analyzing and designing of gears results are expressed. In gear design, the number of teeth, face width, gear teeth features and pitch diameter are calculated by using Lewis equation.

Keywords— horizontal milling machine, gearbox, transmission, gear teeth.

I. INTRODUCTION

A milling machine is a power driven machine that cuts by means of a multitooth rotating cutter. The mill is constructed in such a manner that the fixed workpiece is fed into the rotating cutter. Varieties of cutters and holding devices allow a wide range of cutting possibilities.

Milling is a process of producing flat and complex shapes with the use of multi-tooth cutting tool, which is called a milling cutter and the cutting edges are called teeth. Unlike lathes, which have been known for thousands of years, milling machines are less than two hundred years old. Because they require much more power than hand-driven lathes, their introduction had to wait for the invention of industrial water and steam power. Also, all their mechanical components had to first be made available, such as accurately fitted slides, large castings to resist cutting forces, calibrated leadscrews, and hardened steel cutting tools. Mills are classified on the basis of the position of their spindle. The spindle operates in either a vertical or horizontal position. The amount of horsepower the mill is able to supply to the cutter is also often important.

II. HORIZONTAL MILLING MACHINE

Horizontal milling machine have a spindle or cutters mounted on a horizontal arbor above an X-Y table. Some horizontal mills have a table, known as universal table that features a

rotary function for machining at different angles. Horizontal mills are optimal for machining heavier pieces because the cutters have support from the arbor, as well as a bigger cross-section area than a vertical mill. The design of the horizontal milling machine allows for the rapid removal of material off of the piece one is machining. These types of milling machines can range in size from something small enough to fit on a tabletop to room-sized machines”.

1.1 Milling Machine Operation

Milling is the removal of metal by feeding the work past a rotating multitoothed cutter. In this operation the material removal rate (MRR) is enhanced as the cutter rotates at a high cutting speed. The surface quality is also improved due to the multicutting edges of the milling cutter. The action of the milling cutter is totally different from that of a drill or a turning tool. In turning and drilling, the tools are kept continuously in contact with the material to be cut, whereas milling is an intermittent process, as each tooth produces a chip of variable thickness.

1.2 Horizontal Milling Machine Gearbox

In speed changing system of horizontal milling machine gearbox is used six speed two step gearbox (multispeed gearbox). In this gearbox consists of three shafts, input, counter and output shaft. They are parallel. The motor power is sent to the input shaft. The main point to be noticed is that the gears on the input shaft are fixed to the shaft but the gear on the counter shaft can slide across the shaft on splines horizontally. The gears can be moved using the selector fork mechanism that pushes the gears. In this gearbox first, second and third speed sliding mesh type. For all speed high and low speed gears are fixed on the output shaft

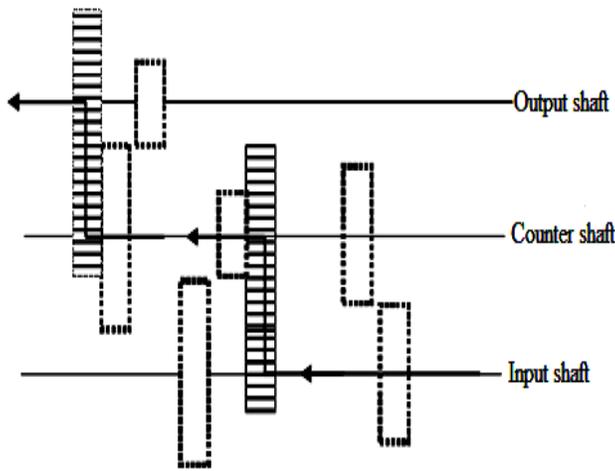


Fig.1 First Gear Low Speed Position

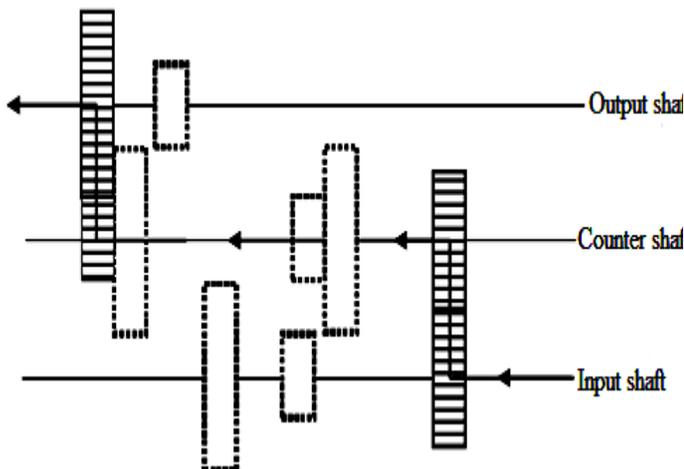


Fig.2 Second Gear Low Speed Position

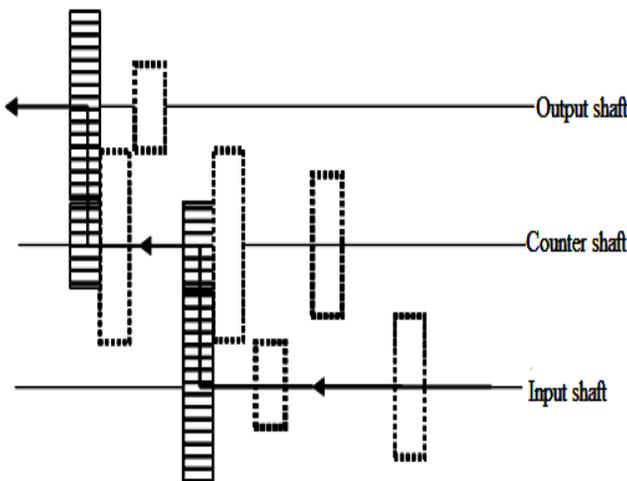


Fig.3 Third Gear Low Speed Position

III. DESIGN ANALYSIS IN GEAR

Type of gear = Spur gear
 Teeth depth, ϕ = 20°
 Velocity ratio, VR = 1.966

Pinion speed, p = 340.476 rpm
 Number of teeth of pinion, n_p = 29
 Ultimate strength, S_u = 2220 MP_a
 Yield strength, S_y = 2170 MP_a
 Endurance strength, $S_0 = \frac{S_u}{3} = 740$ MPa
 Module of elasticity, E = 207 GPa
 BHN = 627

All gears and pinion are made up of AISI 5160 OQT 400 (same material). The design weak occur on pinion. Therefore design is based on pinion.

Transmission power = 2.2 kW

Torque ,
$$M_t = \frac{9550 \times \text{kW}}{\text{rpm}} = 61.7 \text{ Nm}$$

Unknown diameter case,
 $n_p = 29, y = 0.113$

Induce stress,
$$S_{ind} = \frac{2M_t}{k\pi^2 y n m^3} = \frac{0.954}{m^3}$$

$$S_0 = \frac{1}{3} S_u = 740 \times 10^6 \text{ Pa}$$

$$S_{ind} = \frac{S_0}{2} = \frac{740 \times 10^6}{2}$$

$$370 \times 10^6 = \frac{0.954}{m^3}$$

$$m = 1.37 \text{ mm}$$

Standard Module Series

Preferred ; 1, 1.25, 1.5, 2, 2.5, 3, 4, 6

Second choice; 1.125, 1.375, 1.75, 2.25, 3.5, 4.5, 5.5

Try $m = 1.375 \text{ mm}$

$$\frac{D_p}{n_p} = 1.375$$

$$D_p = 39.875 \text{ mm}$$

$$V_p = \frac{\pi \times D_p \times N_p}{60} = 0.71 \text{ m/s} < 10 \text{ m/s}$$

$$S_{all} = S_0 \left[\frac{3}{3 + V} \right] \text{ for velocity } < 10 \text{ m/s}$$

$$= 1042.24 \text{ MP}_a$$

$$S_{ind} = \frac{0.954}{m^3}$$

$$= 366.97 \text{ MP}_a$$

$S_{ind} < S_{all}$
Design is satisfied

Try $m = 1.25 \text{ mm}$

$$\frac{D_p}{n_p} = 1.25$$

$$D_p = 36.25 \text{ mm}$$

$S_{ind} < S_{all}$
Design is satisfied

Reduce k , $k_{red} = 4 \times \frac{S_{ind}}{S_{all}}$

$$= 3.2$$

Face width, $b_{min} = k_{red} \times \pi \times m$

$$= 12.6 \text{ mm}$$

$b_{max} = k_{max} \times \pi \times m$

$$= 15.707 \text{ mm}$$

Tangential force, $F_t = \frac{2M_t}{D_p}$

$$= 3404.14 \text{ N}$$

$V = 0.65 \text{ m/s}$ permissible error = 0.16
First class commercial error = 0.05
 $C = 570 \times 10^3 \text{ N/m}$
Dynamic force ,

$$F_d = F_t + \frac{21V(bC + F_t)}{21V + \sqrt{bC + F_t}}$$

$$= 4730.91 \text{ N}$$

the endurance load, $F_o = S_o b \nu \pi$

$$= 4925.62 \text{ N}$$

$$VR = \frac{D_g}{36.25}$$

$$D_g = 71.29 \text{ mm}$$

$$Q = \frac{2D_g}{D_p + D_g}$$

$$= 1.32$$

$$S_{es} = (2.75 \times \text{BHN}) - 70$$

$$= 6.46 \times 10^6 \text{ Pa}$$

Specification	Gear	Pinion
Material	AISI 5160 OQT	AISI 5160 OQT
Yield strength, S_y (MP_a)	2170	2170
Ultimate strength, S_u (MP_a)	2220	2220
Endurance strength, S_o (MP_a)	740	740
Module of elasticity, (N/m^2)	207×10^9	207×10^9
BHN	627	627
No of teeth	57	29
Pitch diameter, D (mm)	78.36	31.625
RPM	173.18	340.476
Speed ratio, V.R	1.966	1.966
Module , m	1.25	1.25
Face width, b (mm)	15.707	15.707

$$K = \frac{S_{es}^2 (\sin \phi)}{1.4} \left[\frac{1}{E_p} + \frac{1}{E_g} \right]$$

$$= 6.45 \text{ MPa}$$

the wear load, $F_w = D_p b K Q$

$$= 4636.66 \text{ N}$$

$$\% \text{ error} = \frac{F_d - F_w}{F_d}$$

$$= 0.019 = 1.9\%$$

Permissible error from velocity = 16%
 $= 1.9\% < 16\%$

Table 1.Design Data For First Speed Gear Mesh

Table 2 Strength check and Dynamic check for first speed gear Mesh

Strength check $S_{allowable}$ (MPa) S_{ind} (MPa)	608.22 488.448 $S_{all} > S_{ind}$
Dynamic Check Endurance Force, F_o (N) Wear Force, F_w (N) Dynamic Force, F_d (N)	4925.62 4636.66 4730.91 $F_o > F_d, F_w < F_d$ $\% \text{ error} = \frac{F_d - F_w}{F_d} = 1.9\% < 16\%$

Table.3 Design Data For Second Speed Gear Mesh

Specification	Gear	Pinion
---------------	------	--------

Strength check $S_{allowable}$ (MPa) S_{ind} (MPa)	462.5 335.71 $S_{all} > S_{ind}$	
Dynamic Check Endurance Force, F_o (N) Wear Force, F_w (N) Dynamic Force, F_d (N)	5064.239 4688.77 4053.66 $F_o, F_w > F_d$	
Material	AISI5160 OQT400	AISI5160 OQT 400
Yield strength, S_y (MP _a)	1790	1790
Ultimate strength, S_u (MP _a)	2220	2220
Endurance strength, S_o (MP _a)	740	740
Module of elasticity, E (N/m ²)	207×10^9	207×10^9
BHN	627	627
No of teeth	46	40
Pitch diameter, D (mm)	57.5	50
RPM	296.07	340.476
Speed ratio, V.R	1.15	1.15
Module ,m	1.25	1.25
Face width, b (mm)	15	15

Table 6.Strength check and Dynamic check for Third speed gear Mesh

IV.CONCLUSION

In this paper, the speed sliding mesh gearbox is designed. The maximum power of the motor is 2.2 kW and the maximum revolution of the motor is 1340 rpm. In designing of the gear, design satisfactions of all gear are checked by its dynamic load that induced to gear by the transmitted torque. For the safety of the gears in normal operation condition, the static load and the wear tooth loads of all gears must greater than that of the dynamic load. The strength check wear also carried out to get the gear parameters. The gear designs wear satisfied not only from the strength but also from the dynamic point of view. Gear is designed with AISI 5160 OQT 400 heat treated alloy steel, which has brinell hardness 627, yield stress 1790 MPa and ultimate stress 2220 MPa. The require design calculation of gears can also be calculated through both strength and dynamic check.

ACKNOWLEDGMENT

We would like to sincerely acknowledge the encourageous efforts of our department of mechanical engineering, Technological University (Meiktila). I wish to express my sincere thanks to all my friends for their goodwill and constructive ideas

Table.4 Strength check and Dynamic check for Second speed gear Mesh

Specification	Gear	Pinion
Material	AISI 5160 OQT 400	AISI 5160 OQT 400
Yield strength, S_y (MP _a)	1790	1790
Ultimate strength, S_u (MP _a)	2220	2220
Endurance strength, S_o (MP _a)	740	740
Module of elasticity, E (N/m ²)	207×10^9	207×10^9
BHN	627	627
No of teeth	59	27
Pitch diameter, D (mm)	73.74	33.75
RPM	339.69	742.237
Speed ratio, V.R	2.185	2.185
Module ,m	1.25	1.25
Face width, b (mm)	15.7	15.7
Strength check $S_{allowable}$ (MPa) S_{ind} (MPa)	545.454 323.584 $S_{all} > S_{ind}$	
Dynamic Check Endurance Force, F_o (N) Wear Force, F_w (N) Dynamic Force, F_d (N)	5387.67 5127.75 4410.72 $F_o, F_w > F_d$	

Table.5 Result data for third speed gear Mesh

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Design Calculation and Performance Analysis of Single Suction Centrifugal Pump

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DOI: 10.29322/IJSRP.9.08.2019.p9298
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9298>

Abstract- Centrifugal pumps are used widely for hydraulic transportation of liquids through pipelines where the requirement of head and discharge are moderate. This paper presents the design of impeller and casing of single suction centrifugal pump and performance analysis of losses. The impeller and the casing are a rotating component and a stationary component. Water enters axial flow through the impeller eyes and exits radial flow in centrifugal pump. The pump casing is to control the liquid to the impeller, transfers into pressure the high velocity kinetic energy of the flow from the impeller discharge and leaves liquid away of the energy having imparted to the liquid comes from the volute casing. The design calculation and performance analysis of single suction centrifugal pump are describe because it is the most essential useful mechanical dynamic machine in fluid works which used for water supply plants, irrigation, industry, steam power plants, hydraulic power service, mine and river water pumping system,

In this paper, pump is single stage single suction centrifugal pump and it has a head of 50 m, the flow rate of 200 m³ /hr and the motor speed is 1480 rpm. The value of specific speed is 18.46. The number of blades is 6 blades. The pump power is 29.98KW electric motor and the design is Berman Method is used. The performance analysis of centrifugal pump is carried out the dimensions of centrifugal pump. So shock losses, impeller friction losses, volute friction losses of centrifugal pump are determine in performance analysis of centrifugal pump.

Index Terms- impeller, centrifugal pump design, performance, Berman Method, Euler's Equation

I. INTRODUCTION

The centrifugal pump is a mechanical device which transports water from a lower level to higher level or from a lower pressure area to a higher pressure area. Mechanical energy is given to the pump and it converts into hydraulic energy of fluid. It consist an impeller rotating within a pump casing. In dynamics pump, the energy is transferred by rotary motion is dynamic action. The input power of the pump is mechanical energy of the drive shaft and the output power is hydraulic energy. The rotating blade system imparts a force on the fluid, thereby making the fluid to move. The fluid coming into the pump is pushed towards the outlet mechanically where positive pressure is generated. Pumps are classified in number of the ways based on their purpose, specifications, design and environment.

In a centrifugal pump, the liquid forces by atmospheric and other pressure into a set of rotating vanes. A centrifugal pump consists of a set of rotating vanes enclosed within a housing or casing that is used to impart energy to a fluid through centrifugal force.

A pump transfer mechanical energy from some external source to the liquid flowing through it and losses occur in any energy conversion process. The energy transferred is predicted by the Euler equation. The energy transfer quantities are losses between fluid power and mechanical power of the impeller or runner.

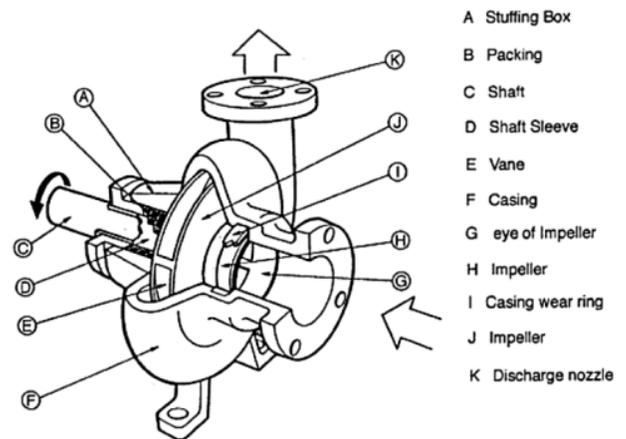


Figure 1: Single Suction centrifugal Pump

II. DESIGN CALCULATION AND PERFORMANCE ANALYSIS OF SINGLE SUCTION CENTRIFUGAL PUMP

A. Design of Centrifugal pump

The design pump is single stage centrifugal pump. Impeller is designed on the basic of design flow rate, pump head and pump specific speed. So, the design data are required to design the centrifugal pump. For design calculation, the design parameters are taken as follows:

Flow rate, Q	= 200 m ³ /hr
Head, H	= 10 m
Rotational speed, N	= 1480 rpm
Density of water, ρ	= 1000 kg/m ³
Inlet impeller diameter, D ₁	= 110 mm

Outlet impeller diameter, $D_2 = 310$ mm
 Impeller width at inlet, $b_1 = 40$ mm
 Impeller width at outlet, $b_2 = 25$ mm
 Overall efficiency, $\eta_0 = 90\%$
 Suction pipe diameter = 6 inch
 Discharge pipe diameter = 3 inch

The design of centrifugal pump includes a large number of interdependent variables so there are several possible designs for the same duty. One of the most difficult design problems is to predict the impeller head slip. The difference between the theoretical head for a number of impeller vanes and the theoretical head deduced from the net horse power given to the fluid passing through the impeller. Before pump design or selection can be got, specification is needed to be established which express several requirements.

Specific speed is used to classify impeller on the basis of their performance, and proportions regardless of their actual size or the speed at which they operate.

$$\text{Specific speed; } n_s = 3.65N \frac{\sqrt{Q}}{H^{3/4}} \quad (1)$$

Where, n_s = specific speed
 Q = flow rate
 N = rotational speed
 H = head

Capacity, volume flow rate of a pump is the amount of water pumped per unit time and it is also known traditionally as volume flow rate. The capacity is directly related with the velocity of flow in the suction pipe.

$$\text{Capacity; } Q = AV \quad (2)$$

Where, A = area of pipe
 V = volume flow rate

Water power and shaft power

The water power is the power imported to the water by the pump. To calculate the water power, the flow rate and the pump head must be known. As a result, to provide a certain amount of power to the water a large amount of power must be provided to the pump shaft. The power is called brake power. The efficiency of the pump determines how much more power is required at the shaft.

The water power is determined from the relationship

$$N = \rho gHQ \quad (3)$$

Where, ρ = density of water
 g = gravitational acceleration

The shaft power is;

$$\text{shaft power} = \frac{\text{waterpower}}{\eta_0} \quad (4)$$

Where, η_0 = overall efficiency

Pump efficiency is

$$\eta_0 = \eta_m \times \eta_v \times \eta_r \quad (5)$$

Where, η_m = mechanical efficiency
 η_r = hydraulic efficiency
 η_v = volumetric efficiency

The inlet area of an impeller is;

$$A_1 = \frac{\pi}{4} D_1^2 \quad (6)$$

Where, D_1 = inlet impeller diameter
 The outlet area of an impeller is;

$$A_2 = \pi D_2 b_2 \quad (7)$$

Where, D_2 = outlet impeller diameter
 b_2 = impeller width at outlet

Velocity diagram

A study of the several component velocities of flow through an impeller is best carried out graphically by means of velocity vectors. The shape of such vector diagram is triangular and they are called velocity triangles. It can be drawn for any point of the flow path through the impeller, but usually attention is focused on the inlet and outlet triangles.

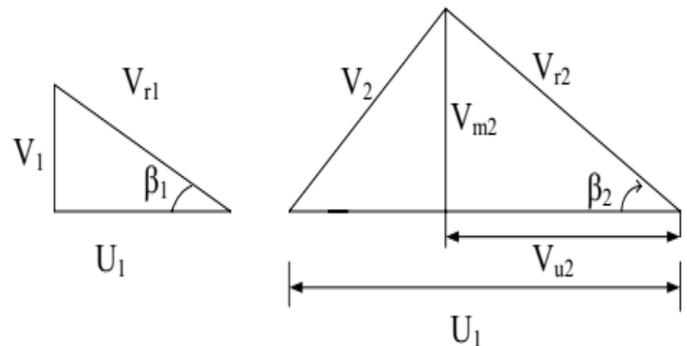


Figure 2: Inlet Flow Velocity and Outlet Flow Velocity Diagram

The blade velocity at inlet is;

$$U_1 = \frac{\pi D_1 N}{60} \quad (8)$$

Where, U_1 = blade velocity
 N = rotational speed

The relative velocity at inlet is;

$$V_{f1} = \frac{Q}{\pi D_1 b_1} \quad (9)$$

Where, V_{f1} = radial velocity at inlet
 b_1 = impeller width at inlet

The blade angle at inlet is;

$$\tan\beta_1 = \frac{V_{f1}}{U_1 - V_{\omega 1}} \quad (10)$$

Where, $V_{\omega 1}$ = tangential velocity
 β_1 = blade angle at inlet

The blade velocity at outlet is;

$$U_2 = \frac{\pi D_2 N}{60} \quad (11)$$

Where; U_2 = tangential blade velocity

The relative velocity at outlet is;

$$V_{f2} = \frac{Q}{\pi D_2 b_2} \quad (12)$$

Where, V_{f2} = radial velocity at outlet
 b_2 = impeller width at outlet

the blade angle at outlet is;

$$\tan\alpha_2 = \frac{V_{f2}}{V_{\omega 2}} \quad (13)$$

Where; α_2 = guide vane angle at outlet
 $V_{\omega 2}$ = tangential velocity at outlet

$$\tan\beta_2 = \frac{V_{f2}}{U_2 - V_{\omega 2}} \quad (14)$$

Where; $V_{\omega 2}$ = tangential velocity at outlet
 β_2 = blade angle at outlet

Theoretical head is;

$$H_{th} = \frac{1}{g} U_2 V_{\omega 2} \quad (15)$$

Where; H_{th} = theoretical head

Blade number

Higher friction losses are related to many blade casing low blade loading. The choice of fewer blades leading to a higher blade loading hydraulic losses may rise due to increasing secondary flow and stronger deviating between blade and flow direction.

$$Z \approx k \frac{D_2 + D_1}{D_2 - D_1} \sin \frac{\beta_1 + \beta_2}{2} \quad (16)$$

Where, σ = slip factor

$$\sigma = 1 - \frac{(\sin\beta_2)^{0.5}}{\beta_1 Z^{0.7}} \quad (19)$$

Shock Losses

The shock loss is considered major losses at the impeller inlet caused by the mismatch of fluid and metal angles. Shock losses are finding everywhere in the flow range of the pump. Shock loss is given by following equation;

$$h_s = k(Q_s - Q_N)^2 \quad (20)$$

Maximum flow rate;

$$Q_N = \pi D_1 b_1 V_{\omega 1} \quad (21)$$

The shut off head;

$$H_{shut-off} = \frac{U_2^2 - U_1^2}{2g} \quad (22)$$

In the shut off condition is, $Q = 0$ and $h_s = H_{shut-off}$

III. PERFORMANCE ANALYSIS OF SINGLE SUCTION CENTRIFUGAL PUMP

Net Theoretical Head

If the slip factor is known, the net theoretical head may be obtained from Euler's head. By using Euler's equation, It is possible to relate the theoretical characteristic obtained to the actual characteristic for various losses responsible for the difference. The slip factor is used which varies with flow rate, enables the net theoretical head curve to be obtained. At flow rate below design flow rate, separation occurs on the suction side of the blade.

The net theoretical head is calculated by;

$$H_{thn} = \frac{U_2 V_{\omega 2}}{g} \quad (17)$$

At the outlet, the whirl velocity is ;

$$V_{\omega 2} = U_2 \sigma - V_{\omega 2} \cot\beta_2 \quad (18)$$

The hydraulic efficiency is;

$$\eta_r = 1 - \frac{0.42}{(\log D_1 - 0.172)^2} \quad (23)$$

The flow rate and the shock loss of head is showed in Figure 3. The shock loss of head is increasing when the flow rate is decreasing. Shock loss is not in the design point condition. If this condition is over, the value of the shock loss of head is high.

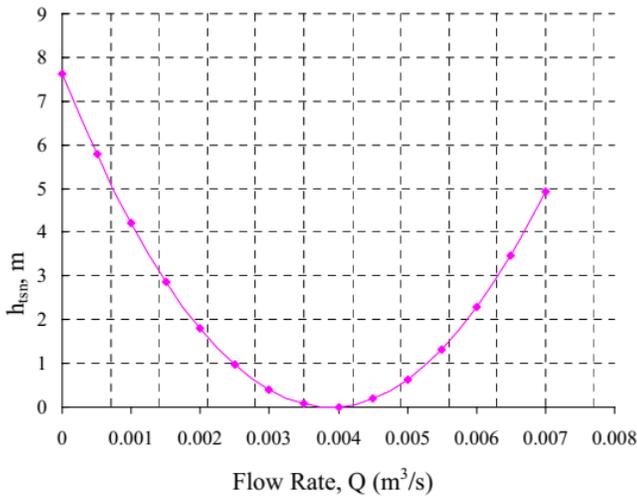


Figure 3 Shock Losses and Flow Rate Graph

Impeller Friction losses

The impeller was designed that the width of the impeller would become small and friction loss at the flow passage would become large. Therefore to relieve the increase in friction losses, radial flow passage on the plane of the impeller was adopted. The friction losses can be found for energy dissipation due to contact of the fluid with solid boundaries such as stationary vanes, impeller, casing, disk and diffuser.

The impeller friction losses are;

$$h_1 = \frac{b_2(D_2 - D_1)(V_{r1} - V_{r2})^2}{2\sin\beta_2 H_r 4g} \quad (24)$$

The hydraulic radius;

$$H_r = \frac{b_2 \left(\frac{\pi D_2}{Z} \right) \sin\beta_2}{b_2 + \left(\frac{\pi D_2}{Z} \right) \sin\beta_2} \quad (25)$$

The inlet relative velocity is;

$$V_{r1} = \frac{V_{\omega 1}}{\sin\beta_1} \quad (26)$$

The outlet relative velocity;

$$V_{r2} = \frac{V_{\omega 2}}{\sin\beta_2} \quad (27)$$

In figure 4 is showed the influence of the geometry of the impeller friction losses. The analysis of the curves describes that small difference between the points for the flow rate and the impeller friction loss of head. The impeller loss of head is increasing when the flow rate is increasing.

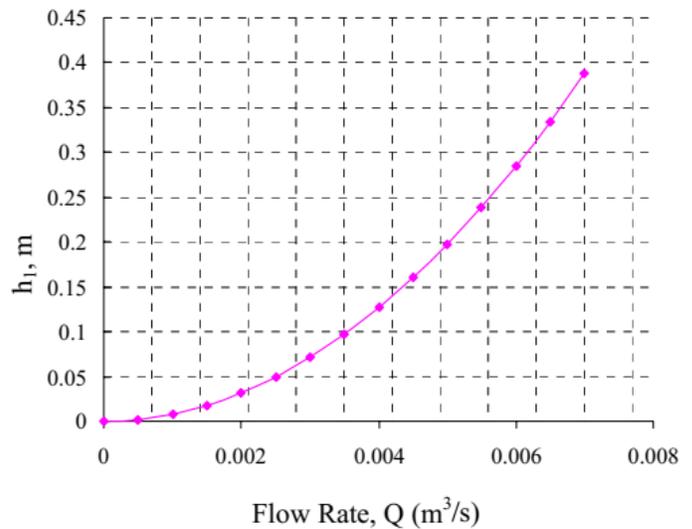


Figure 4 Impeller Friction Losses and Flow Rate Graph

The losses of Volute Friction

The losses of volute friction results from a mismatch of the velocity is outer the impeller and the velocity in the volute throat. If the velocity reaching the volute throat is larger than the velocity at the throat, the velocity head difference is less. The velocity reaching the volute throat by assuming that the velocity is leaving the impeller decreases in proportional to the radius because of the conservation of angular momentum.

The volute friction loss are;

$$h_2 = \frac{C_v V_3^2}{2g} \quad (28)$$

The volute throat velocity is;

$$V_3 = \frac{Q}{A_3} \quad (29)$$

The volute throat area;

$$A_3 = V_{u2} \left(\frac{D_2}{D_3} \right) \quad (30)$$

Whirl velocity;

$$V_{u2} = U_2 - V_{\omega 2} \cot \beta_2 \quad (31)$$

The volute flow coefficient is;

$$C_v = 1 + \left(0.02 \times \frac{L_{vm}}{D_{vm}} \right) \quad (32)$$

The volute circumferential length;

$$L_{vm} = \frac{\pi D_1}{8} \quad (33)$$

The diameter of volute is get tangent circle from the geometry of volute casing.

The volute mean diameter is;

$$D_{vm} = \frac{D_1}{8} \quad (34)$$

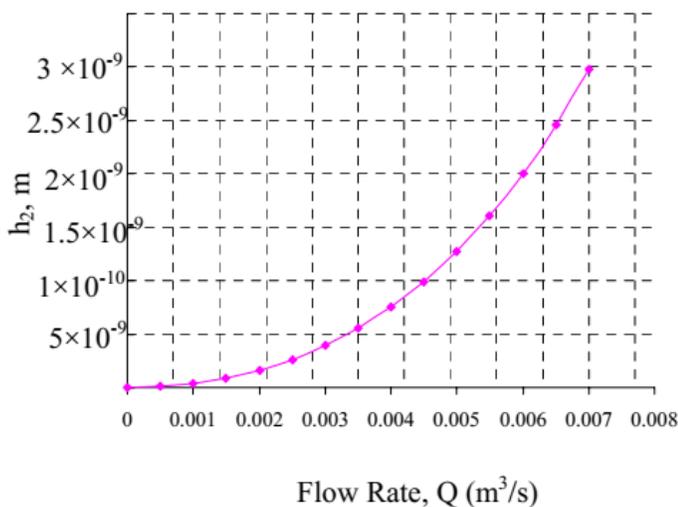


Figure 5 Volute Friction Losses and Flow Rate Graph

The volute losses and flow rate graph are figure 5. When the flow rate is increased, the volute friction loss of head increases. The volute friction coefficient is decrease for small values of the volute flow coefficient.

IV. DESIGN RESULTS OF CENTRIFUGAL PUMP

Table I: calculation Result of single suction centrifugal pump

No	Descriptions	Symbol	Results
1	Guide Vane angle at inlet	α_1	0
2	Guide Vane angle at outlet	α_2	6.23°
3	Blade angle at inlet	β_1	24.98°
4	Blade angle at outlet	β_2	32°
5	Number of blades	Z	6
6	Inlet area of impeller	A_1	0.0863 m²
7	Outlet area of impeller	A_2	0.0243 m²
8	Specific Speed	n_s	18.46
9	Water power		20.12Hp
10	Shaft power		29.98 KW

V. CONCLUSION

Centrifugal pump are fluid kinetic machines designed for increasing power within a rotating impeller. In centrifugal pumps, the delivery head is depended on the flow rate. This relationship, are called pump performance, is illustrated by curves. Characteristic curve of a centrifugal pump value is getting of theoretical head, slip, shock losses, impeller losses and volute losses are calculated by varying volume flow rate. The performance analysis of centrifugal pump is predicted in this paper.

A centrifugal pump is using a rotating impeller to increase the pressure and flow rate of a fluid. The fluid is entering the pump impeller along to the rotating axis and is accelerating by the impeller, flowing radial outwards into a diffuser or volute chamber, from where it exits into the downstream piping system. The angle value of inlet and outlet blade angel degree are large the pump pressure is fall down. The impeller is very important in pump because that can be change many performance of a fluid work.

ACKNOWLEDGMENT

The author likes to express her special thanks to Dr. Aye Aye Thin, Professor, Department of Mechanical Engineering Technological University (Pathein). The author is mentioning all of her teachers and parents who taught her everything from childhood until now, and her colleagues for their encouragement, helpful suggestion, true-line guidance, supervision this paper.

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Pattern Classification Methods: A Survey

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DOI: 10.29322/IJSRP.9.08.2019.p9299

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p9299>

ABSTRACT

In this paper overview of few pattern classification methods and comparison of some aspects of pattern recognition system are presented. The paper also contains the research topics and applications of pattern recognition system. Pattern recognition is the research area that studies the operation and design of systems that recognize patterns in data. New and emerging applications, such as data mining, web searching, retrieval of multimedia data, face recognition, and cursive handwriting recognition, require robust and efficient pattern recognition techniques.

Keywords: *Pattern Recognition, classification, probabilistic*

1. INTRODUCTION

Pattern recognition is finding and labeling smaller desired patterns in a big pattern. Pattern recognition is emerging as exciting and challenging field; in this paper discussion and comparison of some features of pattern recognition are presented. The basic types of pattern recognition are supervised and unsupervised classification [1]. The neural network techniques extracted from statistical learning theory are getting more attention in recent pattern recognition methodologies. The following issues need to be considered while designing a pattern recognition system: definition of pattern classes, sensing environment, pattern representation, feature extraction and selection, classifier design and learning, selection of training and test samples and performance evaluation [2]. The most common problems in the pattern recognition field are identifying complex patterns with arbitrary orientation, location, and scale remains unsolved [3].

The organization of this paper is as follows: In section 2, information on several classifiers is given focusing on Statistical Pattern recognition system. The classifiers are categorized according to the design methodology; as using similarity maximization, probability, and geometric information on deciding. Later in section 3 the different pattern classification techniques are discussed and in section 4 comparison of pattern classification methods are discussed along with conclusion [4].

2. STATISTICAL PATTERN RECOGNITION

A number of commercial recognition systems have been designed based on statistical pattern recognition [5]. In this method a set of d features (attributes) are used to represent a pattern, the pattern can be viewed as d -dimensional feature vector. Statistical theory concepts are used to create decision boundaries between pattern classes. Training and Classification are two modes in statistical recognition system. The preprocessing module segments the pattern of interest from the background, removes noise and normalizes the pattern. Preprocessing unit will do all operations to define clear representation of the pattern. The feature extraction/selection module will search for the appropriate features to represent the input patterns and to train the classifier. The designer can optimize the preprocessing and feature extraction/selection strategies using the feedback path [6]. Finally in classification mode the input patterns

are categorized as one of the pattern classes based on the measured features. Fig. 1 gives the components of a statistical pattern recognition system.

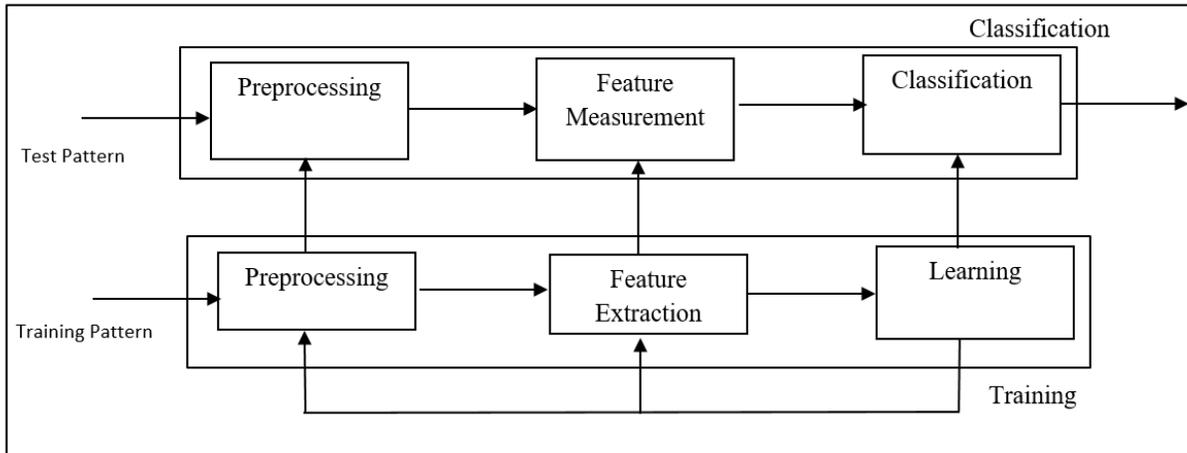


Figure 1: The components of a statistical pattern recognition system.

Several iterations are given for training to optimize the selected features. The ability to classify the pattern correctly depends upon the output of the feature extraction algorithm. The input data also contributes to the quality of extracted features. The main aim of the classifier is to group objects in a category based on variance in their measured features. Objects in the same category possess similar feature values and in different categories the similarity reduces. The classifiers can handle several inconsistencies in feature sets; still each classifier has its pros and cons when dealing with precise feature sets [7].

Another contrast learning method in statistical pattern recognition is that of supervised learning (labeled training samples) versus unsupervised learning (unlabeled training samples). The category of a pattern is represented by its label. In unsupervised learning the number of classes must be learnt along with the structure of each class. The several categories that belong to statistical pattern recognition are shown in fig. 2.

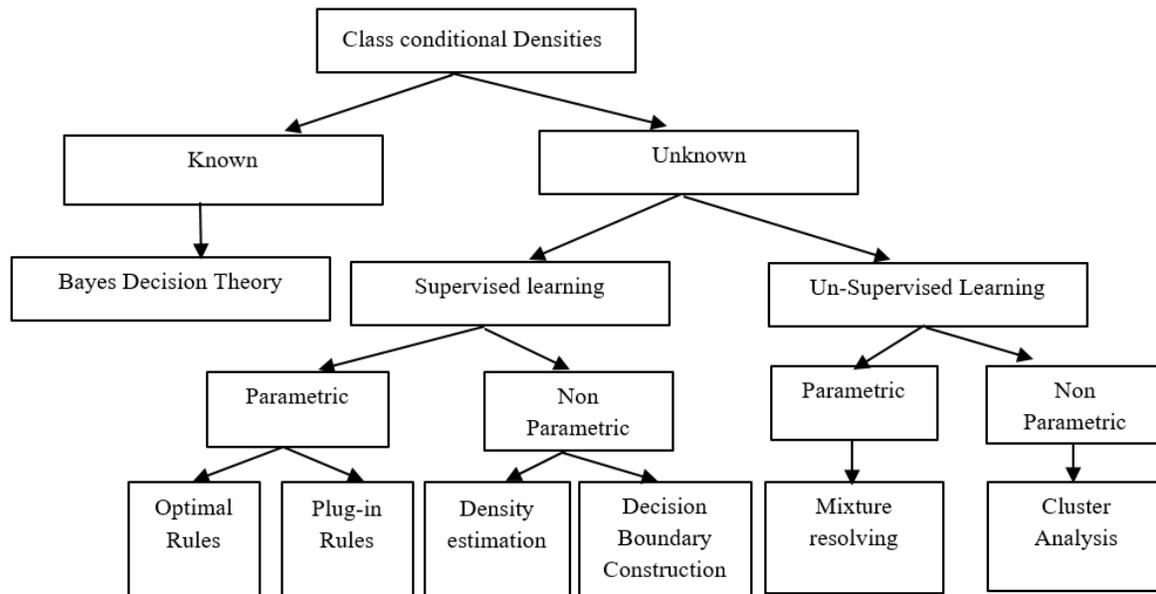


Fig. 2. Various approaches in statistical pattern recognition.

The information available to the system designer reduces as we move from top to bottom and left to right in fig. 2. This results in increased difficulty in classification problems. Several categories in statistical pattern recognition try to implement Bayes decision

rule. In the nonparametric and unsupervised learning mode cluster analysis handles decision making problems, where the number of categories or clusters is not specified [8].

The statistical pattern recognition can be further classified as geometric approach and probabilistic density-based approach based on whether the decision boundaries are obtained directly or indirectly as shown in Fig. 2. In probabilistic approach the density functions have to be estimated first, and then discriminant functions which specify the decision boundaries have to be constructed. The geometric approach constructs decision boundaries directly from optimizing certain cost functions. All classification or decision rules require precise training using available training samples. Hence the competence of classifier depends on both the number of available training samples and specific values of the samples. Finally the pattern recognition system should classify future test samples which are probable to be different from the training samples. Therefore optimizing classifier on the training set may not always result in the desired performance on a test set [9].

The efficiency of pattern recognition system in classifying test patterns which were not used during the training stage is known as generalization ability of classifier. The following are some of the reasons for poor generalization ability of a classifier.

- 1) The number of features is too large relative to the number of training samples [10],
- 2) The number of unknown parameters associated with the classifier is large,
- 3) A classifier is too intensively optimized on the training set (overtrained);

The novel work by Cover [5] on capacity of classifier and complexity provides a good understanding of mechanisms by overtraining.

3. PATTERN CLASSIFICATION

Basically there are three types in classifiers [11]. In all types the training set and the feature selection algorithm decides outcomes. Each classifier has its own advantage. These classifiers depend upon similarity maximization methods, probabilistic methods, and geometric methods, respectively.

3.1 Similarity Maximization Methods

In this method classifiers will have some similarity metrics and assign class labels for maximizing the similarity. The similarity between patterns is used to decide on good classification. The nearest mean classifiers define the features of a class as a vector and represent the class with the mean of the elements of this vector. Thus, any unlabeled vector of features will be classified as the class with nearest mean value. This method finds problem in classifying face images as it needs to supply a template for each face label.

Nearest neighbor Algorithm [7, 8] is another important classifier where the data is represented as points in space, and classification is done based on the Euclidean distance of the data to the labeled classes. For the k-NN, the classifier checks the k nearest points and decides in favor of the majority

3.2 Probabilistic Methods

Bayes decision theory is used extensively in well-known probabilistic methods. The decision rule assigns class labels to samples which have maximum posterior probability. The posterior can be calculated by the well-known Bayes rule:

$$\text{posterior} = \frac{\text{likelihood} \times \text{prior}}{\text{Evidence}} \quad (1)$$

Bayesian Belief Nets [12, 13, and 14] represent the functional dependencies and independencies among model variables, i.e. features. Whenever some parameters take some values, the nodes of the network are affected and take a probability value, by the Bayes' rule [12].

3.3 Geometric Classifiers

Geometric classifiers build decision boundaries by directly minimizing the error criterion, since no related experiments are supplied. An example to these classifiers is Fisher's linear discriminant, which mainly aim to reduce the size of the feature space to lower dimensions in case of a huge number of features. It minimizes the mean squared error between the class labels and the tested instance. Additionally, neural networks are examples of geometric classifiers [13]

3.4 Decision Trees

The decision trees, take the instance described by its features as input, and outputs a decision, denoting the class information. Each node denotes a feature, and each iteration we go down to the lower depth, selecting a child node depending on the feature value

for the particular instance. There are several issues of decision trees, such as how to create a good one. There are several decision tree classifiers such as ID3 or C4.5 .

4. CONCLUSION

Pattern recognition is generally categorized according to the type of learning procedure used to generate the output value. In simple sense pattern recognition is the heart of all scientific inquiry, including understanding ourselves and the real-world around us. Now a day the development of pattern recognition is increasing very fast.

A survey on the pattern recognition has been presented. It has been shown that powerful methods exist, however, care has to be taken to build robust and consistent classifiers. The best approach for the inexperienced user seems to be the use of classical statistical tools, since plug and play works in this case. Pattern recognition can be done both in normal computers and neural networks. Computers use conventional arithmetic algorithms to detect whether the given pattern matches an existing one. It is a straightforward method. It will say either yes or no. It does not tolerate noisy patterns.

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Operational Hedging to Foreign Exchange Risk – Case of Kosovo Pension Savings (KPST)

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DOI: 10.29322/IJSRP.9.08.2019.p92100

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92100>

Abstract- Nowadays, investors face a lot of challenges in the business environment, especially in the investments on stock markets. The challenges and responsibilities are even greater when moneys which have to be invested are public funds, as in the case of Kosovo Pension Savings (KPST). Since investors face multiple risks during investments, the world of money investments would not be developed as it is without proper strategies to hedge. This paper will analyze and study hedging in foreign exchange risk. A broader focus will be given to the operational hedging strategies used from KPST in their investments.

Index Terms - diversification, global market, money market, and portfolio.

I. INTRODUCTION

Nowadays, investors face a lot of challenges in the business environment, especially in the investments on stock markets. The challenges and responsibilities are even greater when moneys which have to be invested are public funds, as in the case of Kosovo Pension Savings (KPST). KPST is an independent not for profit public institution of Republic of Kosovo, which is established as an obligatory plan to manage pension contributions until retirement (KPST, 2019). According to KSPT 2019), the main objective of the organization is to keep, manage and invest pension contributions, saved by the citizens of Kosovo. The investments decisions are made from the Governing Board of KPST. According to Konrad (2015), by the end of 2012 on the global market were over 7238 mutual funds which have offered a lot of investments opportunities. Since investors face multiple risks during investments, the world of money investments would not be developed as it is without proper strategies to hedge. This paper will analyze and study hedging in foreign exchange risk. A broader focus will be given to the operational hedging strategies used from KPST in their investments.

II. HEDGING – AN OVERVIEW

Was mentioned in the introduction part that business environment offers a lot of opportunities to invest. Investments all the time bring risks which need to be managed. The best way to manage risk is to hedge from it. The well-known American author and finance practitioner Aaron C. Brown has pointed out that “Many financial disasters can be traced to people who thought they were hedging”. From this quote it is obviously clear that hedging is a very important part in the world of investments, but how hedging can be defined? In the literature there are numerous definitions about hedging. Prindl (1976), defines hedging as an action taken to protect company’s exposed positions in foreign currencies. Clark et.al (1993), pointed out that hedging represent a strategy created from company to minimize the impact of adverse outcomes in the case of investments on foreign currencies. Bash (2015), defines hedging as an action that protect companies which are exposed to foreign exchange risk from the unexpected changes in exchange raise. We can see that all these definitions are very similar to each other and suggest that hedging is the strategy implemented from companies to protect their investments from the fluctuations in the exchange rate. The way how the company decides to hedge depends to the profile of company, whether the companies are more open to risks or not. Usually companies use two techniques of hedging: Operational Hedging and Financial Hedging. While financial hedging deals with financial assets, operational hedging

III. OPERATIONAL HEDGING

Boyabalti & Toktay (2004), define operational hedging as actions which are taken by the company to hedge from currency risk through the use of non-financial assets, in other words, operational hedging deals the operational side of company. Similar to the authors mentioned above, the author Kaplan (2012), pointed out that operational hedging involves hedging techniques that are also known as internal hedging techniques. Operational hedging is known as internal hedging because it deals with internal environment of hedging and should be considered before using the financial hedging techniques (Kaplan, 2012). According to Bash (2015), the operational hedging techniques include: Lead and Lag, Currency Diversification, Exposure Netting, Currency of Invoicing, Price Variation, Risk Sharing Arrangements, Currency Collars and Hybrid.

Abor (2005), pointed out that a lead strategy involves an aim to collect foreign currency receivables, when a foreign currency is expected to depreciate and to pay foreign currency payables when a currency is expected to appreciate. In the other hand lag strategy according to Hill (2001), represents situations when companies seek to delay collection of foreign currency receivables when currency is expected to appreciate and to delay payables when currency is expected to depreciate.

According to Warwick-Ching (2011), the currency diversification represents the case when companies use more than one currency to invest as a hedging strategy. The author mentioned above shows the benefits of investing on different currencies, mostly of non-facing exchange rate risk.

Abor (2005), explained exposure netting technique as a strategy used in international transactions by companies which involves reducing fund transfers between affiliates to only a netted amount.

According to Bash (2015), price variation is a hedging technique that is based on changing the price of exports when the exchange rate changes.

Risk Sharing Arrangements are an operational hedging technique where both importer and exporter deal with the burden of foreign exchange risk when they use domestic currency terms in the invoice part of shipment (Moosa, 2010 & Bash, 2015).

Currency collars determine two exchange rate values, the minimum and the maximum value (Bash, 2015). Bash (2015), clarifies that in the cases when exchange rate exceeds maximum value, both exporter and importer use maximum value. In the other hand according to Bash (2015), in the cases when exchange rate falls below the minimum value, both exporter and importer use the minimum value.

The Hybrid technique is a combination of risk sharing arrangements and currency collars. Bash (2015), pointed out that hybrid technique is based on the weighted average of two exchange rates under a risk sharing arrangements and currency collars.

This part of the paper presented operational hedging and its techniques. Operational hedging is a very important part of decision making in the companies that face foreign exchange risk during their activity.

IV. OPERATIONAL HEDGING - KOSOVO PENSION SAVINGS

In the introduction part was mentioned that Kosovo Pension Savings (KPST) is an independent not for profit public institution of Republic of Kosovo, which is established as an obligatory plan to manage pension contributions until retirement (KPST, 2019). KPST was established in 2001 and started to operate on August 2002. Since then KPST has an ongoing positive performance.

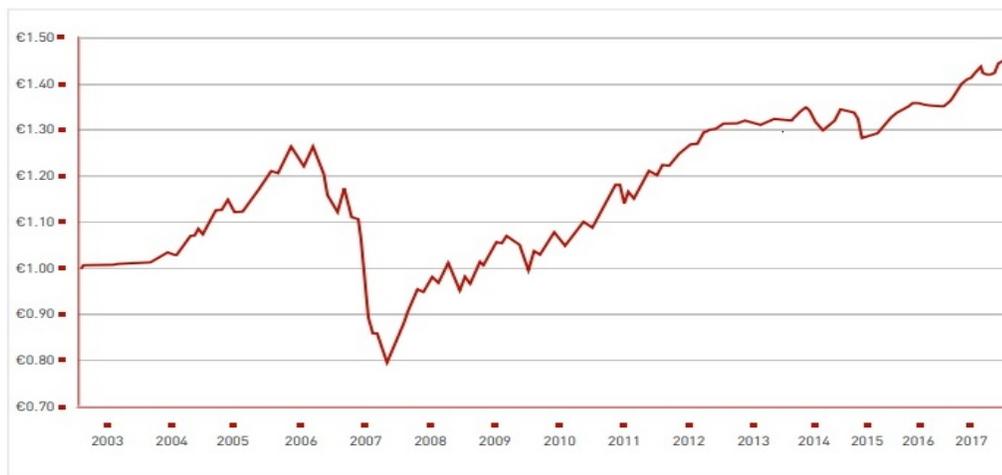


Figure 1: Cumulative performance of KPST

Source: http://www.trusti.org/wp-content/uploads/2017/12/2017_TM4_shq.pdf

From the figure we can see, that KPST has faced difficult times just in the years 2007-2008 in the period of global crisis, but we can see that it was a very well managed situation, because share price is increased year by year.

By the end of 2017, share price was 1.4648 € with an increase of 6.5% from 2016 (KPST, 2018). Net assets under the management of KPST at the end of 2017 were 1,634,648,056 €, with an increase of 15.3% from 2016 (KPST, 2018).

PERFORMANCE	2017	2016
Share price at the end of the year	€1.4648	€1.3756
Share price increase during the year	6.5%	4.4%
Gross investment return for the year	€102,172,681	€64,120,284
Other returns for the year	€385,000	€440,000

ASSETS UNDER MANAGEMENT (AUM)	2017	2016
Net AUM at the end of the year	€1,634,648,056	€1,417,970,874
Increase in net AUM during the year	216,677,182	€188,637,546

Figure 2: Performance and AUM of KPST 2016-2017

Source: http://www.trusti.org/wp-content/uploads/2017/12/AR21017_eng.pdf

As was mentioned, investments bring all the time risks and investors need to implement different hedging techniques to hedge from adverse outcomes. KPST has published a document called “Key Investments Information” which provides information about investments portfolio. On the goals of prudent investments mentioned on this document is also diversity of investments. In fact from the reports published from KPST we can see that one of the most applied operational hedging techniques from KPST is diversification of portfolio. The next figure shows the global spread of KPST’s investments.

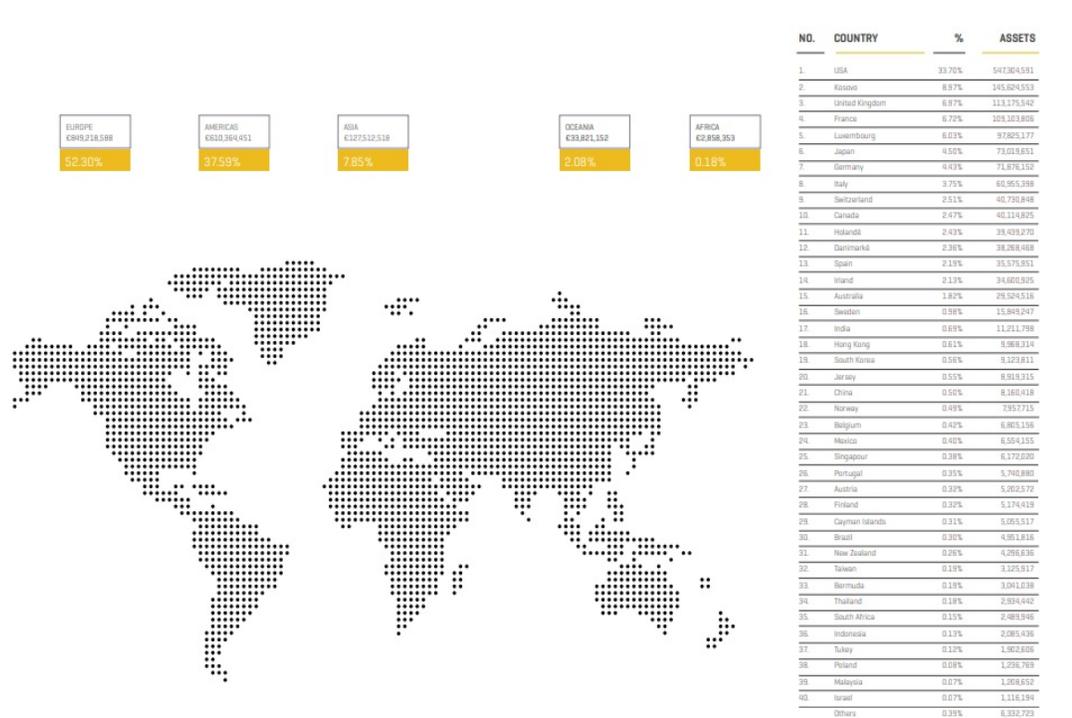


Figure 3: Global Spread of KPST's Investments

Source: http://www.trusti.org/wp-content/uploads/2017/12/AR21017_eng.pdf

V. CONCLUSION

This paper showed the importance of hedging to Foreign Exchange Risk with a focus on Kosovo Pension Savings. Investors face a lot of challenges and difficulties in the business environment, especially in the investments in stock markets. Since investors face multiple risks during investments, the world of money investments would not be developed as it is without proper strategies to hedge. The paper had in focus operational hedging and showed the importance of its techniques for investors. A broader focus was given to the KPST operational hedging strategies and from the reports of this institution we can see that a very common strategy used from KPST is diversification. The paper concludes that KPST has chosen appropriate hedging strategies as long as its performance is ongoing positive through the years.

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Determination of the Prevalence of *Salmonella* in Drinking Bottled Water

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DOI: 10.29322/IJSRP.9.08.2019.p92101

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92101>

Abstract- The chief aim of this study is to determine the presence of *Salmonella* in bottled drinking water collected from different districts in Sri Lanka. *Salmonella* is a gram negative, non-lactose fermenting bacterium belonging to the Enterobacteriaceae family. *Salmonella* is considered to be one of the leading causes of intestinal illness around the world. It also has been regarded as the etiological agent causing sever systemic diseases including typhoid and paratyphoid fevers. Contaminated water plays a major part in the transmission of *Salmonella*. In this study, a total of 50 samples were collected from different stores. As the initial procedure, MacConkey agar test was carried out, which differentiated the non-lactose fermenting bacteria from the lactose fermenting bacteria based upon the basis of the lactose fermentation of the MacConkey agar. Following this, other biochemical test including Kovac's Indole test, Urease test, Motility test and Triple Sugar Iron Agar (TSI) Test were carried out for further confirmation. TSI test was used as the last confirmatory test in this study.

Analysing the results of the MacConkey and biochemical tests, out of the 50 selected samples, 44 samples (88%) were contaminated with both lactose-fermenting bacteria and non-lactose fermenting bacteria (NLF). Out of this 88% of contaminated water sample, 34 samples (68%) were contaminated with NLF. Kovac's indole test showed that 32 samples were positive. Evaluating the results of the remaining biochemical tests, it was evident that 11 (22%) samples out of the total sample size were contaminated with *Salmonella*. Since only the basic biochemical tests were performed, further analysis is required for better confirmation.

Key words- Bacteria; *Salmonella*; Enterobacteriaceae; Serovar; Typhoid.

Abbreviations- TSI: Triple Sugar Iron; NLF: Non-Lactose Fermenting; WHO: World Health Organization; MDR: Multidrug-resistant.

I. INTRODUCTION

Being able to access safe and healthy drinking water is inadequate in most parts of the world, especially the developing countries and where the level of income is low or average (Mogasale et al, 2014).

On a global scale, the World Health Organisation has evaluated drinking water pollution by pathogens as the most important risk for human health (WHO, 2008). According to Barati, 2011, there are two types of microorganisms in drinking water, first type is the persistent microorganisms which are naturally present in the water and the other types is the transient microorganism which are transmitted to the water via humans, animals, other pathogens, soil or the environment.

Salmonella is a rod shaped (bacillus), gram negative bacteria belonging to the Enterobacteriaceae family. It is also classified as facultative anaerobic bacteria due to their ability of being able to survive with or without the presence of oxygen. *Salmonella* species are non-spore-forming and motile, because of the presence of flagella. The diameter of the cell lies between 0.7 and 1.5 μm and lengths from 2 to 5 μm . Out of the various types of the *Salmonella* species present, the two main types which are widely recognized are *Salmonella enterica* and *Salmonella bongori*. The reason for the development of these species is the alteration in their 16S rRNA sequence (Tindall et al., 2005). *Salmonella enterica* can be further divided into six subspecies depending on their biochemical and genomic modifications, which are enterica, salamae, arizonae, diarizonae, houtenae, and indica.

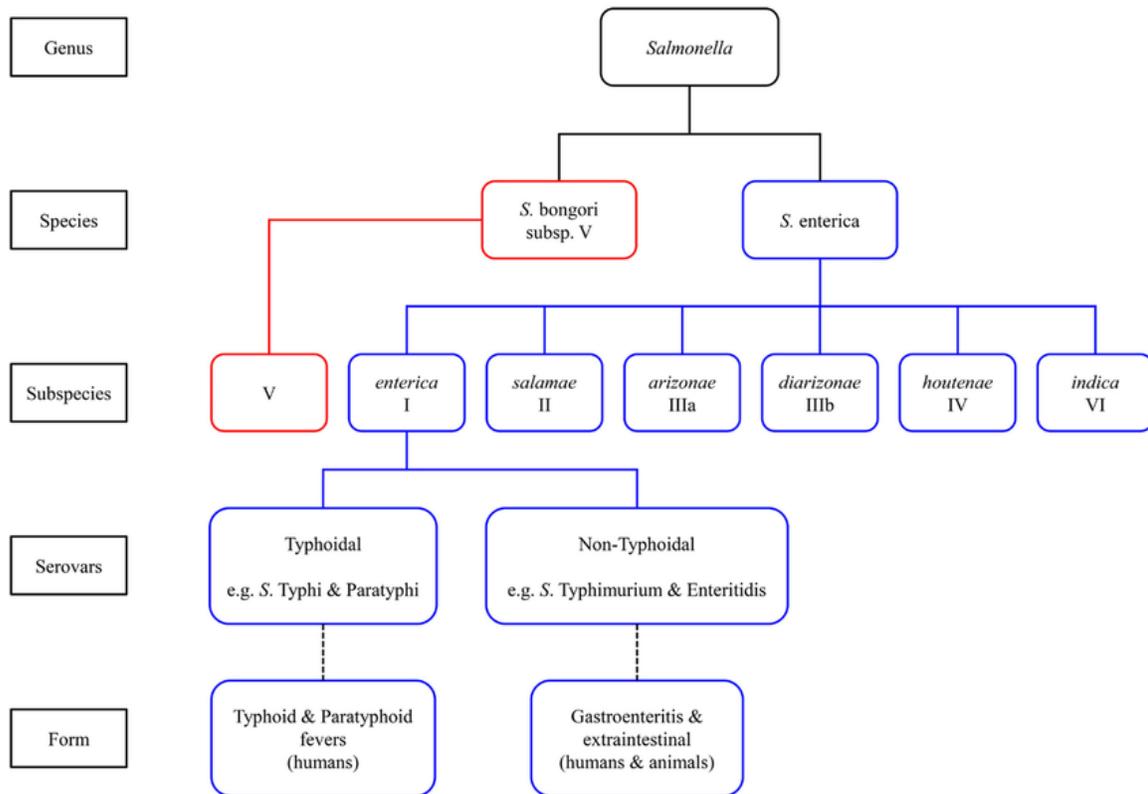


Figure 1: Classification of the *Salmonella* bacteria

Several studies have shown that there are more than 2500 serovar of *Salmonella* out of which *S. enteritidis* and *S. typhimurium* are the ones commonly found serotypes from water (Salem & Metawea, 2013).

Most of the *Salmonella* species are non-lactose fermenters, oxidase negative, catalase positive and hydrogen sulfite producers besides also being able to decarboxylate lysine and hydrolyze urea (Ahmed et al., 2004).

Salmonella is considered to be one of the leading causes of intestinal illness around the world (Levantesi et al., 2011). It also has been regarded as the etiological agent causing sever systemic diseases including typhoid and paratyphoid fevers (Levantesi et al., 2011). The most common form of transmission of these typhoidal *Salmonella* serovars is the consumption of contaminated food and drinking water (Brooke et al., 2015). A few symptoms of typhoid fever include, abdominal pain, diarrhea, headache, nausea and vomiting, gastroenteritis and septicemia (Chandra et al., 2013).

Contamination of water by water-borne pathogens and the diseases related to them is a major water quality concern throughout the world (Pandey et al., 2014). Contaminated water plays a major part in the transmission of diseases and public health, especially in rural parts of developing countries (Nazemi, Salari and Eskandani, 2016).

Salmonella is the most commonly involved bacteria in gastrointestinal tract infections. One of the major health concerns is its involvement in human morbidity and mortality. Consuming unsafe drinking water and poor hygienic conditions are also causing an increased rate of typhoid fever. Farooqui and colleagues have reported that in remote places people generally depend on private and unsafe drinking water reservoirs (Farooqui, Khan and Kazmi, 2009). Farooqui and colleagues also mentioned that “According to an estimate in 2003, water borne infections claim 250,000 deaths each year in Pakistan among which typhoid fever is the leading cause” (Farooqui, Khan and Kazmi, 2009).

In 2006, The World Health Organization (WHO) estimated incidence of 16 to 33 million typhoid fever cases globally every year, with 500,000 to 600,000 deaths and case fatality rate of between 1.5 and 3.8%. South Asia is considered to be the most commonly reported region for the occurrence of typhoid fever since 1996 to 2005 with 80% of the global cases and the rate of incidence being 110 cases/100,000. In remote areas people live without the basic necessities of life such as water, food, shelter and electricity, i.e. under very low socioeconomic conditions. It is in these areas, where the rate of incidence is much higher and is reported of having small disease outbreaks.

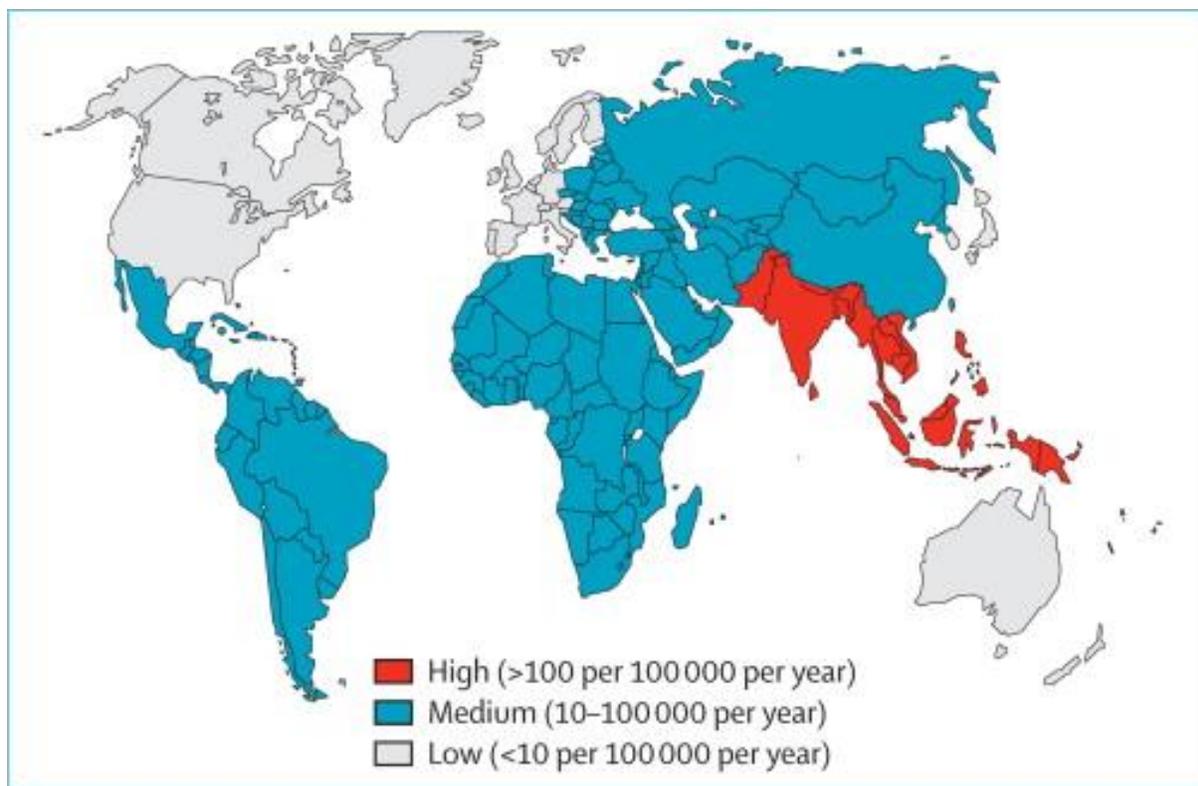


Figure 2: Geographical distribution of typhoid fever globally (Maurice, 2012).

The epidemiology of Sri Lanka shows about 12,800 being confirmed of typhoid fever in the previous 10 years according to reports from 2014. More than half of those cases were from 5 districts including Jaffna, Colombo, Vavuniya, Nuwara-Eliya and Badulla.

Besides being easily transmitted and highly frequent, typhoid fever also carries the risk of multidrug resistance. Since the past two decades, it has been observed that Multidrug-resistant (MDR) strains of *Salmonella* are being resistant to chloramphenicol, ampicillin and trimethoprim, also being accountable for several outbreaks (Farooqui, Khan and Kazmi, 2009). Multiple drug resistant *Salmonella* are harmful to human health. They are considered to contribute to the spreading of drug resistances. Reports say that they were even found in the surface waters of developed countries.

Several efforts and studies have been put up in order to estimate the incidence of typhoid fever. In the year 2000 21.6 million cases were estimated with the highest incidence in children in south and Southeast Asia (Crump, Luby and Mintz, 2004). Later on, in 2010, the incidence rate was estimated to be 13.9–26.9 million cases worldwide (Buckle, Walker and Black). The WHO had suggested of vaccinating the population at a higher risk with polysaccharide vaccination (WHO, 2008).

Developed conventional methods and regulations can be brought up in order to adjust water-related risk so that the incidence rate of typhoid fever can be reduced (Mogasale et al., 2014).

II. MATERIALS AND METHODOLOGY

A. Sample collection

Sealed water bottles from different districts in Sri Lanka were collected. A total of 50 samples from different kinds of brands were collected. These water bottles were taken to the laboratory and stored at room temperature.

Table 1: Sample collection details

Sample code	Brand code	Brand number	Place
S01	WeAs01	Brand 01	Store 01, Wellawatta
S02	WeAs02	Brand 01	Store 02, Wellawatta
S03	WeLa01	Brand 02	Store 03, Wellawatta
S04	WeSu01	Brand 03	Store 04, Wellawatta
S05	MILl01	Brand 04	Store 05, Mount Lavanaia
S06	PeAf01	Brand 05	Store 06, Peradeniya
S07	HaNe01	Brand 06	Store 07, Hatton
S08	HaGa01	Brand 07	Store 07, Hatton
S09	HaNe02	Brand 06	Store 08, Hatton
S10	HaQu01	Brand 08	Store 08, Hatton
S11	NuLa02	Brand 02	Store 09, Nugegoda
S12	DeSw01	Brand 09	Store 10, Dehiwala
S13	MoAq02	Brand 10	Store 11, Moratuwa
S14	BaSp01	Brand 11	Store 12, Bambalapitiya
S15	KoSu02	Brand 03	Store 13, Kotte
S16	KoNi01	Brand 12	Store 14, Kotte
S17	HaSa01	Brand 13	Store 15, Haputhale
S18	HaSm01	Brand 14	Store 16, Haputhale
S19	DeDd01	Brand 15	Store 17, Dehiwala
S20	DeCr01	Brand 16	Store 18, Dehiwala
S21	JaAq03	Brand 10	Store 19, Jaffna
S22	JaNp01	Brand 17	Store 19, Jaffna
S23	JaNp02	Brand 17	Store 20, Jaffna
S24	JaFr01	Brand 18	Store 21, Jaffna
S25	PuPp01	Brand 19	Store 22, Puttalam
S26	PiAs03	Brand 01	Store 23, Puthukudiyiruppu
S27	HoWa01	Brand 20	Store 24, Homagama
S28	AnSh01	Brand 21	Store 25, Anuradhapura
S29	PtWa02	Brand 20	Store 26, Pettah
S30	MuSu03	Brand 03	Store 27, Mullaitivu
S31	WaOr01	Brand 22	Store 28, Wattala
S32	PgAf01	Brand 05	Store 29, Peliyagoda
S33	PgAq04	Brand 10	Store 29, Peliyagoda
S34	NuOt01	Brand 23	Store 30, Nugegoda
S35	WePa01	Brand 24	Store 31, Wellawatta
S36	KaAm01	Brand 25	Store 32, Kalubowila
S37	KaKe01	Brand 26	Store 32, Kalubowila
S38	DeSc01	Brand 27	Store 33, Dehiwala
S39	WaCr02	Brand 16	Store 34, Wattala
S40	VaLl02	Brand 04	Store 35, Vavuniya
S41	VaCs01	Brand 28	Store 36, Vavuniya
S42	VaRa01	Brand 29	Store 37, Vavuniya
S43	VaOr02	Brand 22	Store 38, Vavuniya
S44	KiBf01	Brand 30	Store 39, Kilinochchi
S45	KiOl01	Brand 31	Store 40, Kilinochchi
S46	TrCo01	Brand 32	Store 41, Trincomalee
S47	TrZe01	Brand 33	Store 42, Trincomalee
S48	TrKi01	Brand 34	Store 43, Trincomalee
S49	WaKn01	Brand 35	Store 44, Wattala
S50	WaSc02	Brand 37	Store 44, Wattala

B. Preparation of MacConkey agar plates

Initially lab working area was cleaned with 70% ethanol. MacConkey agar was prepared using 48.05 grams of MacConkey agar powder dissolved in 1000ml of distilled water. It was prepared separately in two different 500 ml conical flasks. A mass 27.52g MacConkey was measured twice using the analytic balance and were added separately into the two test tubes. Using a 500 ml measuring cylinder, 500 ml of distilled water added little by little in order to completely dissolve the agar powder. Then the mouths of

the conical flasks were cover with cotton and aluminium foil. The solutions were autoclaved for about an hour at 121°C. The petri dishes to be used were labelled with the sample code and date and placed in the biosafety cabinet. After autoclaving, the prepared media was quickly carried to the biosafety cabinet and was gradually poured into the petri dishes (approximately 25 ml each). They were left for about an hour to solidify. Then the petri dishes were sealed with parafilm, packed in sterilized bags and stored in the refrigerator.

C. Sample preparation

Test tubes to be used and the 50 water samples, were labelled with the sample code and date. Then approximately 5 ml of each water sample was added into the appropriate test tube. The test tubes were then covered with aluminium foil.

D. Plate streaking

This was carried out next to the Bunsen burner. Before starting, the workplace was cleaned using 70% of ethanol. The prepared MacConkey agar plates were labelled appropriately with the date and sample code. First the inoculating loop was dipped into ethanol and was sterilized by holding it to the Bunsen burner flame, until it became red hot. Once sterilized the loops were allowed to cool for a few seconds. Then the sterilized loops were dipped into the water sample from the test tube. A loop full of water was taken out and was streaked on the agar in a zigzag pattern. The loop was again sterilised using the Bunsen flame and was used to streak at a perpendicular direction to that of the first streaks. This was done all four directions. Similarly, all the samples were streaked accordingly using the same technique. Then the plates were sealed with parafilm and placed in the incubator at 37°C for 24 hours.

E. Gram Staining

First glass slides were labelled with the date and sample code. Then using a sterilized inoculation loop a drop of water was taken a loop full added onto the slide. Then the inoculation loop was sterilised again and a colony of the sample from MacConkey agar plate was taken and placed in the water drop. It was spread in a circular motion creating a thin smear of one centimeter in diameter. It was allowed to air dry for a few minutes and the slide was passed over the flame a few times in order to heat fix the smear onto the slide. Placing the slides on a flat surface, they were flooded with crystal violet for one minute. The excess was rinsed under running water. Then iodine was added and allowed to stain for another minute and the slides were rinsed again. Then a few drops of decolouriser were added on to the slides, were left for 30 seconds and rinsed again. Finally, safranin was added and left for one minute. The excess was rinsed off under running water. The slides were then left to air dry. Then through the oil immersion microscope, the stained smears were observed. After observation the lens was wiped using absorbent paper.

F. Preparation of tryptophan broth for Kovac's Indole Test

Tryptophan broth was prepared based on the sample number that needed to be tested. Usually 16g of tryptophan powder is dissolved in 1L of distilled water. Therefore, the required amount of powder (8.0 g) was measured using the analytical balance, which was then transferred into a 500ml conical flask. Then 500 ml of distilled water was measured in a 1000ml ml measuring cylinder and was transferred into the same conical flask. The mixture was stirred well till the powder was completely dissolved. Next, he prepared solution was sterilized in the autoclave at 121°C for about an hour.

G. Kovac's Indole Test

Kovac's Indole Test was carried out in order to confirm the MacConkey agar media's test results. First test tubes were labelled with the sample code and date. Then 5ml of the sterilized tryptophan broth was transferred into each test tube and covered with aluminium foil. Then using a sterilized inoculation loop, a colony was the respective MacConkey agar plate was taken and inserted into the broth and were covered with the aluminium foil again. Then the inoculated samples were incubated for 18 hours at 37°C. After the incubation, 0.5ml of the Kovac's indole reagent added drop wise to each test tube. Finally, the any colour change on top of the cultured broth was observed.

H. Urease test

Urease agar solution was made depending on the sample numbers that needed to be tested to confirm the results of Kova's indole test. Usually 2.1g of urease agar powder is dissolved in 95ml of distilled water. To that 95ml of solution, 5ml of urea solution is added. The urease agar solution was made using 200ml of water and therefore the required amount of agar powder was 4.42g. So therefore, a mass of 4.42g of urease agar powder was measured using the analytical balance and was transferred into a conical flask. Then 200ml of distilled water was measured using the measuring cylinder and transferred into the same conical flask. The solution was mixed well.

According to the urease agar solution prepared, urea solution was made. A mass of 4.21g of urea powder was dissolved in 10.53ml of distilled water. The solution was mixed well.

Both the urease agar solution and urea solution were autoclaved for one hour at 121°C. After autoclaving both the solutions were mixed together. This mixed solution was transferred into test tube, 5ml each. The test tubes were allowed to cool at a slanted position.

After the cooling process, a colony from the appropriate samples were inoculated into the test tubes using a sterilised inoculation loop. After inoculation, the test tubes were covered with the aluminium foil again and were place in the incubator for 24 hours at 37°C.

I. Motility test

Usually a mass of 20g of motility agar powder is dissolved in 1000ml of distilled water. Based on the sample number that needed to be tested. The required amount of agar powder and distilled water were measured and transferred into a conical flask and the mixture was mixed well. The solution was autoclaved for one hour at 121°C. After autoclaving, the 5ml of the solution was transferred into each labelled test tubes. The test tubes were covered with aluminium foil and allowed to cool.

After the cooling process, a colony from the appropriate samples were inoculated into the test tubes using a sterilised inoculation loop. After inoculation, the test tubes were covered with the aluminium foil again and were place in the incubator for 24 hours at 37°C.

J. Triple sugar agar test

Usually 65g of TSI powder is dissolved in 1000ml of distilled water. Depending on the number of samples that needed to be tested, the appropriate amount of powder and distilled water were measured and mixed together well in a conical flask. The solution was then autoclaved for 1hour at 121°C. After autoclaving, the solution was transferred into labelled test tubes, 5ml each. The test tubes were allowed to cool at a slanted position.

After the cooling process, a colony from the appropriate samples were inoculated into the test tubes using a sterilised inoculation loop. After inoculation, the test tubes were covered with the aluminium foil again and were place in the incubator for 24 hours at 37°C.

III. RESULTS

A. Results of the MacConkey agar plate



Figure 3: Pink and Yellow colonies on MacConkey agar.

Salmonella are non-lactose fermenting bacteria, which produce yellow colonies on the MacConkey agar. Likewise, lactose fermenting bacteria produce pink colonies. Therefore, any yellow colonies formed were identified as NLF bacteria

Table 2: Results of the cultured MacConkey agar plates

Sample code	Presence / Absence of colonies	Colour of colonies
S01	Present	Pink
S02	Present	Pink
S03	Present	Pink
S04	Present	Pink
S05	Present	Pink
S06	Present	Pink
S07	Present	Pink
S08	Present	Pink
S09	Present	Pink
S10	Present	Pink
S11	Present	Pink and yellow
S12	Present	Pink and yellow
S13	Present	Yellow
S14	Present	Pink and yellow
S15	Present	Pink and yellow
S16	Present	Pink and yellow
S17	Present	Pink and yellow
S18	Present	Yellow
S19	Present	Pink and yellow
S20	Present	Pink and yellow
S21	Present	Pink and yellow
S22	Present	Pink and yellow
S23	Present	Pink and yellow
S24	Present	Pink and yellow
S25	Present	Pink and yellow
S26	Present	Pink and yellow
S27	Present	Pink and yellow
S28	Present	Pink and yellow
S29	Present	Pink and yellow

S30	Present	Pink and yellow
S31	Present	Pink and yellow
S32	Present	Pink and yellow
S33	Absent	-
S34	Present	Pink and yellow
S35	Present	Pink and yellow
S36	Absent	-
S37	Present	Pink and yellow
S38	Absent	-
S39	Present	Pink and yellow
S40	Present	Pink and yellow
S41	Present	Pink and yellow
S42	Present	Pink and yellow
S43	Present	Pink and yellow
S44	Present	Pink and yellow
S45	Present	Pink and yellow
S46	Absent	-
S47	Present	Pink and yellow
S48	Absent	-
S49	Present	Pink and yellow
S50	Absent	-

B. Gram Staining Results

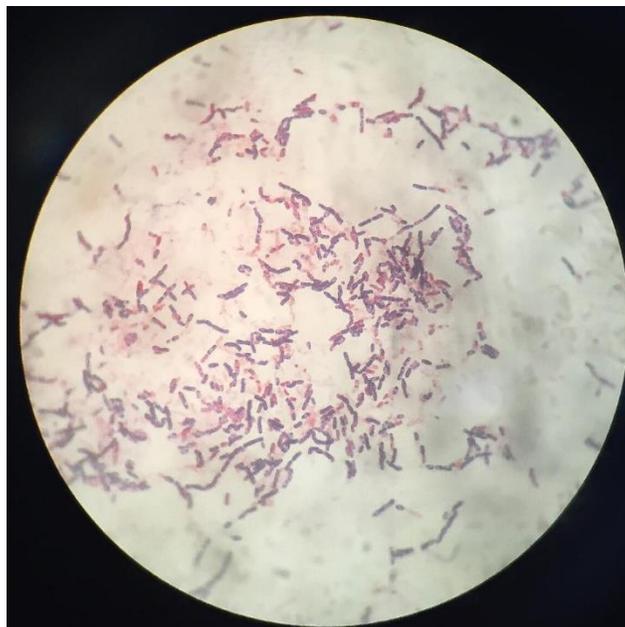


Figure 4: Gram negative bacilli.

Gram staining, which is the basic method of identification after culturing, was done in order to confirm and characterise the type of bacteria from the MacConkey culture medium. The colonies used were the yellow colonies, which were identified as non-lactose fermenting bacteria. *Salmonella* consists of a cell wall made of thick peptidoglycan layer. This feature is what acknowledges *Salmonella* as a gram-negative bacteria. The aim of performing gram staining is to differentiate bacteria based on their cell walls, which is to differentiate gram negative from gram positive bacteria.

The results show that all the samples consisted of gram-negative bacillus. This conclusion was made as the visualise bacteria were pink in colour and rod shaped.

The results of the gram staining process for all the samples are shown in table 5.3

Table 3: Results of the Gram staining

Sample code	Gram staining Results	Sample code	Gram staining Results
S01	Gram Negative bacilli	S26	Gram Negative bacilli
S02	Gram Negative bacilli	S27	Gram Negative bacilli
S03	Gram Negative bacilli	S28	Gram Negative bacilli
S04	Gram Negative bacilli	S29	Gram Negative bacilli
S05	Gram Negative bacilli	S30	Gram Negative bacilli
S06	Gram Negative bacilli	S31	Gram Negative bacilli
S07	Gram Negative bacilli	S32	Gram Negative bacilli
S08	Gram Negative bacilli	S33	-
S09	Gram Negative bacilli	S34	Gram Negative bacilli
S10	Gram Negative bacilli	S35	Gram Negative bacilli
S11	Gram Negative bacilli	S36	-
S12	Gram Negative bacilli	S37	Gram Negative bacilli
S13	Gram Negative bacilli	S38	-
S14	Gram Negative bacilli	S39	Gram Negative bacilli
S15	Gram Negative bacilli	S40	Gram Negative bacilli
S16	Gram Negative bacilli	S41	Gram Negative bacilli
S17	Gram Negative bacilli	S42	Gram Negative bacilli
S18	Gram Negative bacilli	S43	Gram Negative bacilli
S19	Gram Negative bacilli	S44	Gram Negative bacilli
S20	Gram Negative bacilli	S45	Gram Negative bacilli
S21	Gram Negative bacilli	S46	-
S22	Gram Negative bacilli	S47	Gram Negative bacilli
S23	Gram Negative bacilli	S48	-
S24	Gram Negative bacilli	S49	Gram Negative bacilli
S25	Gram Negative bacilli	S50	-

C. Kovac's Indole Test

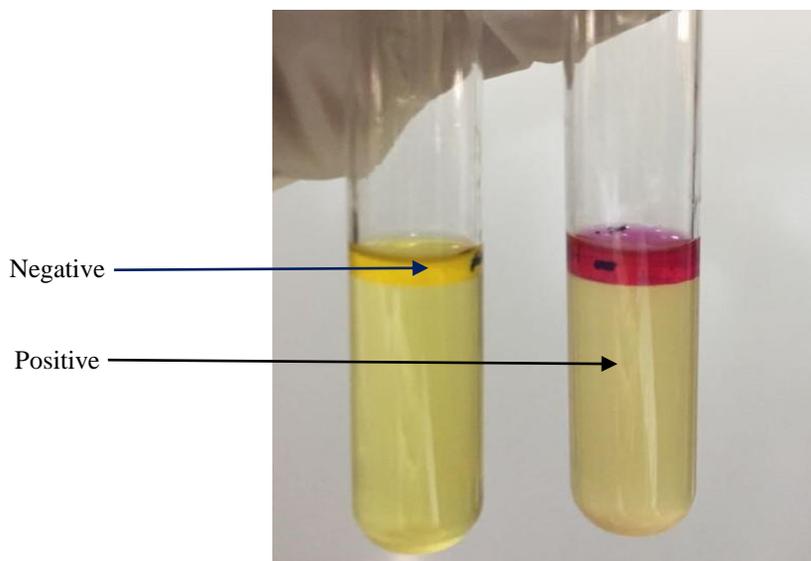


Figure 5: Positive and negative results of the Kovac's Indole Test.

Kovac's Indole test is the first biochemical test performed. This test was designed in order to distinguish among the members of the Enterobacteriaceae family. The purpose of the Indole test is to determine the ability of the microorganism to degrade the amino acid tryptophan and produce Indole (MacWilliams, 2009). The theory behind this test is, the amino acid Tryptophan undergoes deamination and hydrolysis by the bacteria expressing the presence of the tryptophanase enzyme. This enzyme catalyzes the hydrolysis reaction producing three products, which are Indole, pyruvic acid and ammonia (MacWilliams, 2009). The two results

produced are Indole positive, which gives a red band and Indole negative, which produced a colorless band. The positive result relies on the formation of the red colored compound due the chemical reaction between the by-product Indole and the 4-dimethylaminobenzaldehyde present in the Kovac's reagent.

In this study 12 samples were positive for the Indole test and 32 of the samples were negative. The negative samples represent the non-lactose fermenting bacteria and thus suggesting the possibility of the presence of *Salmonella*. The table shows the results of all the samples for the Indole test (Alves *et al.*, 2006).

Table 4: Results of the Kovac's Indole test

Sample code	Results	Sample code	Results
S01	Positive	S26	Negative
S02	Positive	S27	Negative
S03	Positive	S28	Negative
S04	Positive	S29	Negative
S05	Positive	S30	Negative
S06	Positive	S31	Positive
S07	Positive	S32	Negative
S08	Positive	S33	-
S09	Positive	S34	Negative
S10	Positive	S35	Negative
S11	Negative	S36	-
S12	Negative	S37	Negative
S13	Negative	S38	-
S14	Negative	S39	Negative
S15	Negative	S40	Negative
S16	Negative	S41	Negative
S17	Negative	S42	Negative
S18	Negative	S43	Negative
S19	Negative	S44	Negative
S20	Positive	S45	Negative
S21	Negative	S46	-
S22	Negative	S47	Negative
S23	Negative	S48	-
S24	Negative	S49	Negative
S25	Negative	S50	-

D. Urease test results

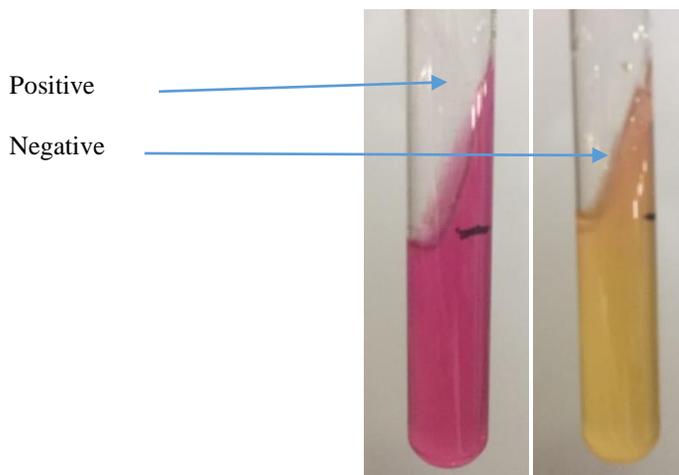


Figure 6: Positive and negative results of the urease test

The urease test is performed in order to identify the organism which have the ability to hydrolyse urea in order to produce ammonia and carbon dioxide (Uotani and Graham, 2013).



The urease media also contains 2% of urea and phenol red as a pH indicator. When ammonia is produced, the pH of the medium also increases. This increase in pH results in a colour change of the medium from yellow to bright pink. This is a positive result of the urease test, and the yellow colour indicates a negative result (Brink, 2010).

In this study 19 of the non-lactose fermenting bacterial samples were negative for the urease test, thus confirming the MacConkey and Indole test results.

The urease test result results of all samples are given in the table 5.4

Table 5: Test results of the urease test

Sample code	Results	Sample code	Results
S11	Positive	S31	Positive
S12	Positive	S32	Negative
S13	Positive	S33	-
S14	Positive	S34	Negative
S15	Positive	S35	Negative
S16	Positive	S36	-
S17	Positive	S37	Positive
S18	Positive	S38	-
S19	Positive	S39	Positive
S20	Positive	S40	Negative
S21	Negative	S41	Positive
S22	Negative	S42	Negative
S23	Negative	S43	Negative
S24	Negative	S44	Negative
S25	Negative	S45	Negative
S26	Negative	S46	-
S27	Negative	S47	Positive
S28	Negative	S48	-
S29	Negative	S49	Negative
S30	Negative	S50	-

E. Mortility Test Results



Figure 7: Positive results of the motility test.

The motility test is done in order to identify gram negative bacteria which are motile. In this procedure, the semi-solid medium in inoculated with the bacteria in a straight-line stab. As a result, positive result of motility, a turbidity due to the bacterial growth will be observed away from the line of stab, thus indicating that the bacteria is able to swim through the medium.

In this study, out of all the samples that were tested for motility, 30 samples were positive. The results of the motility test is shown in the table 5.5

Table 6: Results of the Motility test

Sample code	Results	Sample code	Results
S11	Positive	S31	-
S12	Positive	S32	Positive
S13	Positive	S33	-
S14	Positive	S34	Positive
S15	Positive	S35	Positive
S16	Positive	S36	-
S17	Positive	S37	Positive
S18	Positive	S38	-
S19	Positive	S39	Positive
S20	Positive	S40	Positive
S21	Positive	S41	Negative
S22	Positive	S42	Negative
S23	Positive	S43	Positive
S24	Positive	S44	Positive
S25	Positive	S45	Positive
S26	Positive	S46	-
S27	Positive	S47	Negative
S28	Positive	S48	-
S29	Positive	S49	Positive
S30	Positive	S50	-

F. Triple Sugar Agar test



Figure 7: Positive results of the TSI test

In this study the Triple Sugar Agar test (TSI) is the last biochemical test and is done in order to confirm the presence of *Salmonella*, confirming the results of the previous tests carried out. Here the presence of *Salmonella* is determined with its various enzymatic actions. The triple sugar iron test depends on the basis of gram-negative bacillus being able to utilise glucose and lactose or sucrose by fermentation and thereby produce hydrogen sulphide (H₂S). it comprises of various parts including, 10 parts of lactose, 10 parts of sucrose and 1 part of glucose and peptone. The phenol red in the medium indicates any acidification and the ferrous sulphate indicates the H₂S production. The medium turning yellow is an indication of fermentative bacteria utilising glucose. Likewise, the red colour is an indication of the slants reverting alkaline state as carbon dioxide is produced from the oxidation of the fermented products (Skillern and Overman, 1983). The table 5.6 show the results of the TSI test indicating each part separately.

Table 7: Keys for the TSI results

Key	Colour change	Butt	Slant
A	Yellow	Acid production and glucose fermentation	Acid production and lactose fermentation
G	Yellow and bubbles	Gas production from glucose	
K	Deep red	Alkaline production and no sugar fermentation	Alkaline production and no sugar fermentation
R	No change	No glucose fermentation	No sucrose or lactose fermentation
H ₂ S	Blackened	H ₂ S production	

Table 8: Results of the TSI test

Sample code	H ₂ S production	Butt	Slant	Gas production
S01	Negative	A	K	Negative
S02	Negative	A	K	Negative
S03	Negative	A	K	Negative
S04	Negative	K	K	Negative
S05	Negative	A	K	Negative
S06	Negative	A	K	Negative
S07	Negative	A	K	Negative
S08	Negative	A	K	Negative
S09	Positive	A	K	Negative
S10	-	-	-	-
S11	-	-	-	-
S12	-	-	-	-
S13	-	-	-	-
S14	-	-	-	-
S15	-	-	-	-
S16	-	-	-	-
S17	-	-	-	-
S18	-	-	-	-
S19	-	-	--	-
S20	Positive	A	K	Negative
S21	Positive	A	K	Negative
S22	Negative	A	K	Negative
S23	Negative	A	K	Negative
S24	Positive	A	K	Negative
S25	Positive	A	K	Negative
S26	Positive	A	K	Negative
S27	Negative	A	K	Negative
S28	Negative	A	K	Negative
S29	Positive	A	K	Negative
S30	Negative	A	K	Negative
S31	Positive	A	K	Negative

S32	Positive	A	K	Negative
S33	-	-	-	Negative
S34	Positive	A	K	Negative
S35	Positive	A	K	Negative
S36	-	-	-	Negative
S37	-	-	-	Negative
S38	-	-	-	Negative
S39	Positive	A	K	Negative
S40	Positive	A	K	Negative
S41	Positive	A	K	Negative
S42	Negative	A	K	Negative
S43	Positive	A	K	Negative
S44	Positive	A	K	Positive
S45	Positive	A	K	Negative
S46	-	-	-	-
S47	Negative	K	K	Negative
S48	-	-	-	-
S49	Negative	A	K	Negative
S50	-	-	-	-

Table 9: Results of all the tests

Sample code	MacConkey media		Gram stainig	Indole test	Urease test	Motility test	Triple Sugar Agar test				Presence of <i>Salmonella</i>
	Presence						H2S	Butt	Slant	Gas	
S01	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S02	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S03	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S04	Present	Pink	Gram Negative	Positive	--	--	Negative	K	K	Negative	Other type
S05	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S06	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S07	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S08	Present	Pink	Gram Negative	Positive	-	-	Negative	A	K	Negative	Other type
S09	Present	Pink	Gram Negative	Positive	-	-	Positive	A	K	Negative	Other type
S10	Present	Pink	Gram Negative	Positive	-	-	-	-	-	-	Other type
S11	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S12	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S13	Present	Yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S14	Present	Pink and yellow	Gram- Negative	Negative	Positive	Positive	-	-	-	-	Other type
S15	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S16	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S17	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S18	Present		Gram Negative	Negative	Positive	Positive	-	-	-	-	Other type
S19	Present	Yellow	Gram Negative	Negative	Positive	Positive	-	-	--	-	Other type
S20	Present	Pink and yellow	Gram Negative	Positive	Positive	Positive	Positive	A	K	Negative	Other type
S21	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S22	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S23	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S24	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S25	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>

S26	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S27	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S28	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S29	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S30	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S31	Present	Pink and yellow	Gram Negative	Positive	Positive	-	Positive	A	K	Negative	Other type
S32	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S33	Absent	-	-	-	-	-	-	-	-	Negative	No bacteria
S34	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S35	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	Other type
S36	Absent	-	-	-	-	-	-	-	-	Negative	No bacteria
S37	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	-	-	-	Negative	Other type
S38	Absent	-	-	-	-	-	-	-	-	Negative	No bacteria
S39	Present	Pink and yellow	Gram Negative	Negative	Positive	Positive	Positive	A	K	Negative	Other type
S40	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S41	Present	Pink and yellow	Gram Negative	Negative	Positive	Negative	Positive	A	K	Negative	Other type
S42	Present	Pink and yellow	Gram Negative	Negative	Negative	Negative	Negative	A	K	Negative	Other type
S43	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S44	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Positive	<i>Salmonella</i>
S45	Present	Pink and yellow	Gram Negative	Negative	Negative	Positive	Positive	A	K	Negative	<i>Salmonella</i>
S46	Absent	-	-	-	-	-	-	-	-	-	No bacteria
S47	Present	Pink and yellow	Gram Negative	Negative	Positive	Negative	Negative	K	K	Negative	Other type
S48	Absent	-	-	-	-	-	-	-	-	-	No bacteria
S49	Present	Pink and yellow	Negative bacilli	Negative	Negative	Positive	Negative	A	K	Negative	Other type
S50	Absent	-	-	-	-	-	-	-	-	-	No bacteria

G. Results of total contamination by *Salmonella* from the selected set of bottled water samples.

Finally p

utting all the results of all the tests together, shown by table, it is evident that out of the 50 samples, 11 samples were positive for *Salmonella* (22%), 6 samples had no contamination (12%) and 33 samples were positive for other types of bacteria (66%). This information is represented as a pie chart in figure

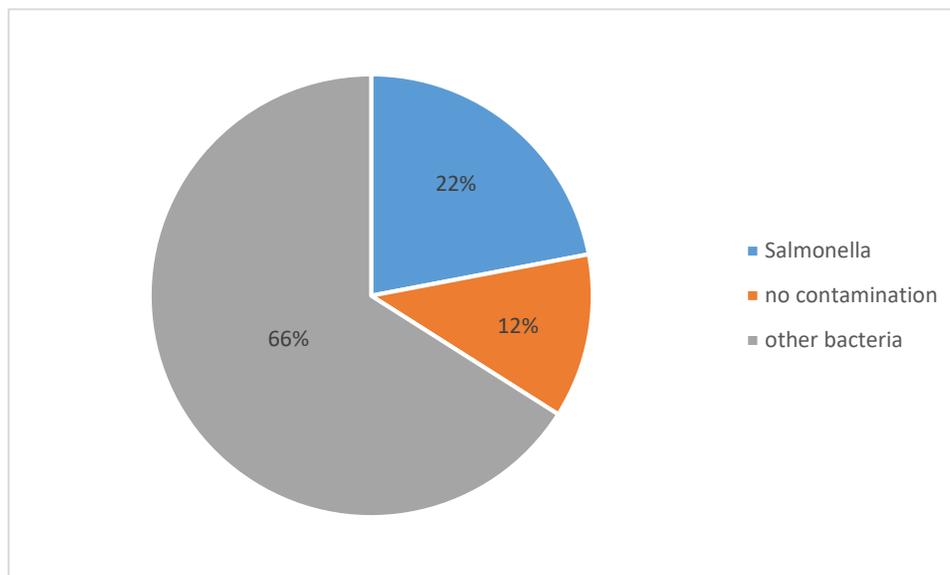


Figure 8: Pie chart representing the percentage of bacteria contaminating the water samples

IV. DISCUSSION

Every human being has the right to be able to drink safe and healthy water. Drinking unsafe and inadequately hygienic water increase the risk of developing various public health issues such as typhoid fever. Therefore, the availability of good quality water sources is getting more and more limited. The impact of water-borne pathogens in human health is also expected to be significant (Suresh & Smith, 2004). In 2012 it was estimated that one third of the world's population live in countries with some level of water stress (Levantesi *et al*, 2012).

In this research, bottled water was tested for the presence of the 'Non-lactose fermenting Bacteria', *Salmonella*. This study is relied on the biochemical tests including Indole test, Urease test, Mortility test, Ornithine Decarboxylase test and Triple Sugar Agar test, which were carried out to confirm the positive results of MaConkey agar media.

Salmonella, the rod shaped, gram negative bacteria, facultative anaerobic bacteria, usually make their habitats in the intestinal tracts of animals and human. Most infections caused by *Salmonella* are due to the consumption of contaminated water and food. Water is considered as the main mode of transmission of typhoidal *Salmonella*, whereas non-typhoidal *Salmonella* are mainly known to be food borne pathogens (Farooqui, Khan and Kazmi, 2009).

Though *Salmonella* was being frequently detected in surface waters including recreational waters and waters used for irrigation or as a drinking water source, yet it was rarely reported in water-borne outbreaks. Continuous contamination during the supply of water to land or crop, has been shown to be a common route of crop contamination in produces related *Salmonella* outbreaks (Levantesi *et al*, 2012).

According to this research study, out of the 50 selected samples, 44 samples (88%) were contaminated with both lactose-fermenting bacteria and non-lactose fermenting bacteria (NLF). Out of this 88% of contaminated water sample, 34 samples (68%) were contaminated with NLF bacteria which was indicated by the presence of yellow colonies in the MacConkey agar media. For further identification, Kovac's indole test was performed where it showed that out of the 34 samples with NLF bacteria, 32 samples (64%) had the chance of containing *Salmonella*. Furthermore, based on the other biochemical testes that were carried out, including the urease test, mortality test and triple sugar agar test, it was finally evident that 11 out of the 50 selected samples, that is 22%, were contaminate with *Salmonella*. Despite this 22% of *Salmonella*, 66% of the water samples were contaminated with other types of NLF bacteria including, *Yersinia pestis*, *Shigella sonnei*, *Serratia marcescens*, *Proteus mirublis*, *Proteus penneri*, *Yersinia pseudotuberculosis* and *Proteus Vulgaris*. The lactose fermenting bacteria, *Escherichia coli* was also present in few on the water samples. The percentage of bacteria present in the water samples are represented in the pie chart below.

Looking into the epidemiology of Sri Lanka, about 12,800 cases have been confirmed in the previous 10 years according to reports from 2014. More than half of those cases were from 5 districts including Jaffna, Colombo, Vavuniya, Nuwara-Eliya and Badulla. Correspondingly, in this study as well, the samples positive for *Salmonella* were collected form the same and nearby geographically area (Jaffna, Puttalam, Puthukudiyiruppu, Pettah, Peliyagoda, Nugegoda, Vavuniya and Kilinochchi). These similarities support the hypothesis that the contamination of drinking water from these areas could be contaminate and leading to typhoidal fever. But yet a conclusion cannot be enclosed as the sample number used in this study is quite small.

Based on literature reviews and surveys, according to a research done by Amber et al., 2009, the outbreak of typhoidal fever showed the presence of *Salmonella* in 100% well water, 65% in household water samples, 2% in food items and 22% in clinical stool sample. In 2008, WHO estimated that 39% of total water involved d diarrheal diseases and sanitation and hygiene related disease problem worldwide. It was estimated that, 13.6% of total deaths in Pakistan, were due to water sanitation and hygiene (Prüss-Üstün et al., 2008). In a study conducted by Oguntoke et al. 2009, it was evident that typhoid fever was the most common water-borne disease with a prevalence rate of 39.3%, followed by bacillary dysentery and cholera, in the area. The ability of *Salmonella* to colonize surfaces and replicate in biofilms of distribution system pipes is the factor that helps it for its growth in water supplies (Jones & Bradshaw, 1996). However, Cicmanec and colleagues suggest that the standard disinfection procedures used in drinking water treatment processes are active against *Salmonella* to a certain extent (Cicmanec, Smith, & Carr, 2004). In the less industrialized parts of the world, especially in the South East Asia and Indian subcontinent, typhoid and paratyphoid fevers remain a major public health problem occur both in epidemic and endemic form (DeRoeck, Jodar, & Clements, 2007). Reports on typhoid and paratyphoid fever epidemics in Asia show that contaminated drinking water which were sourced from well water, piped municipal drinking water and unboiled spring water, was the prime source of outbreaks (Farooqui et al., 2009). Refilling of bottles with these contaminated water from the springs and wells in rural areas could be a cause of the increased incidence rate in Sri Lanka.

Salmonella being frequently found in environmental samples, they are usually present in raw sewage in quite large numbers in the range of between 10^3 – 10^4 CFU/L. It has been found that they can even be still present in wastewater run-off after the advanced secondary treatment which includes coagulation, filtration and disinfection (Wéry et al., 2008).

There are different actions and procedures that could be implemented in order to reduce the spread of *Salmonella* via water and thereby reducing the risk of infection. Some developing countries lack piped water supply. In such cases, self-sustaining decentralized approaches including point of use chemical and solar disinfection, behavioural changes and safe water storage are considered as the most reliable options to target the affected population and also reduce the risk of water-borne diseases through improve quality of drinking water (Mintz et al., 2001). Farooqui et al. (2009) reported the measures which were introduced by the WHO intending to prevent the outbreaks of typhoid fever due to the consumption of contaminated surface or drinking water. These measures include solar disinfection, bleach addition, boiling, and use of low-cost ceramic filters (Farooqui et al., 2009).

V. FURTHER WORK

The test and procedures used in this study are the primary conventional methods used for the detection of *Salmonella*. But in the recent years the techniques for the detection of microorganisms have improved. Improvements can be made to this study in order to increase the accuracy of the results, such as,

- A Larger sample size can be used, with the same number of samples obtained from each district.
- Quantification can also be carried out in order to determine the how much of the microorganisms is present in the contaminated sample.
- In this study, Triple Sugar agar test was the last test used to confirm the presence of *Salmonella*, but it is not a confirmatory test. Therefore, for further confirmation RAPID *Salmonella* Chromogenic media can be used.

Along with these conventional culture tests, molecular tests such as polymerase chain reaction can be applied for greater specificity, sensitivity and it also saves much more time. These PCR techniques can be used not only for quantification but also for genotyping in

order to identify the different strains of *Salmonella*. Such as the Multiplex PCR can be used for detection and amplification of many genetic targets as it can distinguish more than five microorganisms in one run.

Since these conventional culture methods are time consuming, other techniques such as immuno-magnetic separation and biosensor-based methods can also be applied. These methods are much faster and more sensitive (Hsu *et al.*, 2015); Wu, Hulme and An, 2015).

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Adoption of Cloud Computing in Government Institutions in Nigeria

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** A Research Dissertation Submitted To The School Of Computing And Engineering

In Partial Fulfillment Of The Requirements For The Award Of The Masters Of Science In Computing (Information Technology) At
Uganda Technology And Management University (Utamu)
Kampala Uganda

DOI: 10.29322/IJSRP.9.08.2019.p92102

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92102>

DECLARATION

I Yusuf Jibrin Oyoyo declare that this Dissertation is my original work and has not been published or submitted for any other degree award to any other institution.

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APPROVAL

This Dissertation has been submitted for the approval from the following supervisor.

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Prof. Rehema Baguma (PHD)

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Abstract- The study is on how to increase uptake of cloud computing in government institutions in Nigeria. The study sought to answer three research questions for this study:

1. What are the requirements for increasing the uptake of cloud computing in government institutions in developing countries?
2. How can the requirements for increasing the uptake of cloud computing in government institutions in developing countries be realized?
3. How can improvement in the uptake of cloud computing in government institutions in developing countries be tested and validated?

Cloud computing is changing how technology as we know it. It is changing the way that organizations operate. It gives institutions small access to the best technology without having to invest much in it. It solves the problems related with the traditional computing. Cloud computing has opened new ways of using computing resources and capabilities.

The research was aimed at finding out uptake of the cloud computing within government institutions in Nigeria, the expected benefits, challenges faced when implementing the technology and the solutions to these problems. Primary data was collected from institutions that use cloud technology. The data collected was analyzed and collaborated against the secondary literature.

Though cloud computing solves problem of owning your own infrastructure but Internet connection is needed to have access to the intended service. In Nigeria, the communication infrastructure is a major challenge and it hinders the growth of the technology. Lack of stable power, wreckage of infrastructure, insecurity and lack of awareness are among the challenges that were highlighted as the major problems. These problems can be addressed by having qualified personnel to handle security challenges, investing more on communication infrastructure and awareness on what the technology is about among others. The future of cloud computing in Nigeria is bright

Index Terms- Cloud Computing, Cloud Service Providers, Government institutions, Private institutions, Nigeria

Acknowledgements : My special appreciation goes to my supervisor, Professor Rehema Baguma of Uganda Technology and Management University (UTAMU) without her guidance and support; this work would not have been successfully accomplished. She demanded excellence data's at every step of the study and without this the concept would not have grown to become a project.

I am particularly indebted to H.E Dr. Rabi Musa Kwankwaso, Hassan Alwi, and my Father Alh. Ubale Sarki, my Mother Maryam Ahmad Yakasai and my sisters, brothers and my friends for their supports and prayers, these peoples deserve my special recommendation for their contribution in the realization of this research project.

Finally I thank all those- lecturers, classmates, and colleagues at Utamu community- who in one way or another supported my cause; May you all be blessed.

DEDICATION: This project is dedicated to my wonderful friend Hassan Alwi (Resident Director IUEA) and former minister of defense of federal republic of Nigeria and two-time governor of Kano state H.E Dr. Rabi Musa Kwankwaso. There is not a doubt in my mind that without your support- materially, emotionally and spiritually- I would not have managed to complete my MSC COMPUTING.

My amazing Father Alh. Ubale Sarki Hotoro and my amazing mother Maryam Ahmad Yakasai; for the material and emotional support, thanks for all the entire family friends, brothers and sisters and the tough love that kept me focused to the very end.

LIST OF ACRYOMS

BCX	Business Connexion Limited
CEO	Chief Executive Officer
DIT	Diffusion of Innovation theory
Dr	Doctor
EC	Compute Cloud
ICT	Information Communication Technology
IDC	International Data Corporation
IPPIS	Integrated Payroll and Personnel Information System
IT	Information Technology
MSc. Comp IT	Masters In Computer Information Technology
MTN	Mobile Telephone Network
NCC	Nigeria Communication Commission.
NIST	National Institute of Standards and Technology
NITDA	National Information Technology Development Agency
PC	Personal Computer
PHD	A Doctor of Philosophy
Prof	Professor
SMEs	Small and Medium Enterprises
UTAMU	Uganda Technology And Management University
UTAUT	Unified Theory of Acceptance and Use of technology Theory
FIRS	Federal Inland Revenue Services
CSP	Cloud Service Providers
UTAUT	Unified Theory acceptance of use technology
EC2	Elastic Compute Cloud
SaaS	Software as services
Paas	Platform as services
IaaS	Infrastructure as services
AWS	Amazon web services
Maas	Messaging as a service
SpaaS	sharepoints as a services
Laas	Linc as a service
GBB	Galaxy backbone

I. INTRODUCTION

A 1.1 BACKGROUND

Availability of quality IT infrastructure in developing countries is still a problem. Cloud computing as a new computing paradigm can now provide remote access to these resources. According to Greengard (2010), the emergence of cloud computing will change the stakes for entrepreneurs, small and large businesses, and researchers and governments. The 2013 IDC research established that worldwide spending on the growth is related to the countless benefits of the technology such as cost effectiveness. According to Haag and Cumming (Haag and Cumming, 2010), "cloud computing is a technology model in which any and all resources-application software,

processing power, data storage, backup facilities, development tool-, literally everything in the computing context are delivered as a set of services via the Internet". IDC estimated that the cloud market could reach \$150 billion in 2013 (IDC, 2009). However, some companies are skeptical about moving to the cloud but most of them believe that it is just a matter of time before they move to cloud because the benefits that the technology offers are too great (Andrew, 2013).

Gartner (2012) predicts that \$670 billion will be spent on cloud computing from 2013 to 2016, \$310 billion of this will be spent on the cloud technology. Ahmed Adesanya, Managing Director, Petrovice Resources International said, cloud computing is the next major driver of business innovation because it will transform the provision of IT services across all industries (Punch, 2013).

Cloud computing improves productivity as staff are not confined to the four walls of their office but rather they can work from anywhere over the Web, with the help of an Internet enabled computer device. Additionally, it enables access to the organization's services at anytime and anywhere instead of when the infrastructure is in house which limits staff access when the office closes. Furthermore, the cost of cloud computing is lower compared to the traditional environment (The Punch, 2013).

However, there are still concerns associated with use of cloud technology, chief of these is a security of an organization's data since with cloud computing such data is kept by a third party. Therefore, grounding in data security, safety and privacy is key when choosing a provider. Additionally, Laws and regulations that will protect the users on their outsourced data need to be enacted (The Punch, 2013). Cloud Computing is new in Nigeria and Africa as a whole. The Director General of National Information Technology Development Agency (NITDA), Prof. Cleopas Angaye said Nigeria is yet to tap into the benefits of this technology because of the number of challenges facing and confronting the nation's IT industry.

Business Connexion Limited (BCX), provider of Data Centre and Cloud Services in Africa recently launched its cloud computing services in Lagos (Eze, 2013). With a data center based in Ikeja, Lagos, it will offer Infrastructure as a Service (IaaS) Messaging as a Service (MaaS), SharePoint as a Service (SPaaS), Lync as a Service (LaaS) and Private Cloud to Enterprises and Government (Eze, 2013). Having the data center locally is expected to reduce the security concern customers have over the services and will keep the bandwidth costs at a minimum (Eze, 2013).

The CEO of BCX Benjamin Mophatlane, said that traditional Web hosting makes customers pay for fixed storage space and fixed amount of bandwidth when traffic to websites varies and bandwidth and storage needs fluctuate over time. With cloud computing, an organization will only pay for the storage and bandwidth used and not a fixed amount.

According to a recent survey by Symantec (2013), entitled avoiding the Hidden Costs of Cloud, a lot of companies are moving to the cloud to gain various advantages like speed and flexibility. The report also stated that nine out of ten enterprises in South Africa are using cloud computing.

According to Essien (2011), the ever growing IT needs of Digitized Nigerian businesses is the reason why companies are beginning to offer cloud computing services in Nigeria.

Globacom, MTN and Etisalat Telecommunication companies in Nigeria are in final stages of starting to offer cloud computing services. The Nigerian Government through the Galaxy Backbone, a government parastatal is offering cloud services to the government Ministries, Departments and Agencies (MDAs) as well as the private sector. They offer different services ranging from backup as a service, managed services to full cloud solutions (Galaxy Backbone, 2015). They offer different services ranging from backup as a service, managed services to full cloud solutions (Galaxy Backbone).

1.2 PROBLEM DEFINITION

There is need for guidance on how to systematically increase the uptake of cloud computing in developing countries given the enormous benefits of the technology.

Use of cloud computing is growing day by day at the expense of traditional IT service providers (Linthicum, 2013). The major drawback of the traditional IT environment is ease of scalability because IT staffs have to estimate the organization's needs, which may not be accurate (Goodenough, 2013). Therefore, an organization may end up with too much IT resources such as storage or not enough storage. Cloud computing solves this problem since you only pay for what you need and scaling up or down is very easy (Goodenough, 2013). As a result, investment in traditional IT environments is decreasing as cloud computing gets more popular due to the benefits it offers businesses and organizations. However, although cloud computing can greatly benefit government institutions both in developed and developing countries, its adoption in developing countries is still very low. Some of the key reasons given for the low adoption in developing countries include: unreliable power supply, lack of political will to support the growth of the ICT sector, corruption, poor Internet connectivity, limited required expertise, security concerns, lack of relevant policies, etc. (Mujinga and Chipangura, 2011; Mugeni, 2015). Nevertheless, most research today has mainly focused on benefits and challenges of cloud computing adoption in developing countries such as (Mujinga and Chipangura, 2011; Mugeni, 2015; Ahmad and Waheed, 2015; Omwensa, Waema and Omwenga, 2014; Mohammed, Zaharaddeen, Rumana and Taraki, 2015; Ilias, 2013). Not much has been studied about solutions for these challenges and or more importantly how adoption of cloud computing can be adapted in developing countries. The aim of this research is to examine the extent of cloud computing adaptation in government institutions in developing countries with the case study of Nigeria, and how this can be improved for the government and individual institutions to benefit more from the advantages of cloud computing.

1.3 SCOPE OF STUDY

The research is intended to examine the state of cloud computing in developing countries using Nigeria as case study and how its uptake can be increased in such countries in order for them to benefit more from the advantages cloud computing offers.

1.4 AIMS AND OBJECTIVES

The research is aimed at examining how the uptake of cloud computing can be increased in government institutions in developing countries, the specific objectives of the study are:

1. To collect requirements for increasing the uptake of cloud computing in developing countries like Nigeria
2. To design a model that provides guidance on how to increase uptake of cloud computing in developing countries.
3. To validate how use of cloud computing in developing countries like Nigeria can be increased?

1.6

1.7 RESEARCH QUESTIONS

The research questions for this study include:

1. What are the requirements for increasing the uptake of cloud computing in government institutions in developing countries?
 2. How can the requirements for increasing the uptake of cloud computing in government institutions in developing countries be realized
3. How can improvement in the uptake of cloud computing in government institutions in developing countries be validated?

1.6 JUSTIFICATION

This study will provide an understanding of the benefits, status, and need on how the uptake of cloud computing in government institutions in developing countries can be increased. This will benefit both potential consumers and providers of cloud computing services as well as the general IT and research community.

he results will also be useful to the governments in developing countries that may have plans of rolling out Cloud Computing infrastructure and or services. It will also benefit government institutions responsible for formulating policies regarding technology innovations and adoption.

II. LITERATURE REVIEW

This chapter covers a brief history of cloud computing and its paradigm, background of what cloud computing is, its models, characteristics, advantages and disadvantages and all the theoretical aspects with briefly talk about the state of cloud computing in Nigeria. It will also cover cloud computing adoption challenges, proposed solution and the extent the proposed solution can or cannot work for Nigeria.

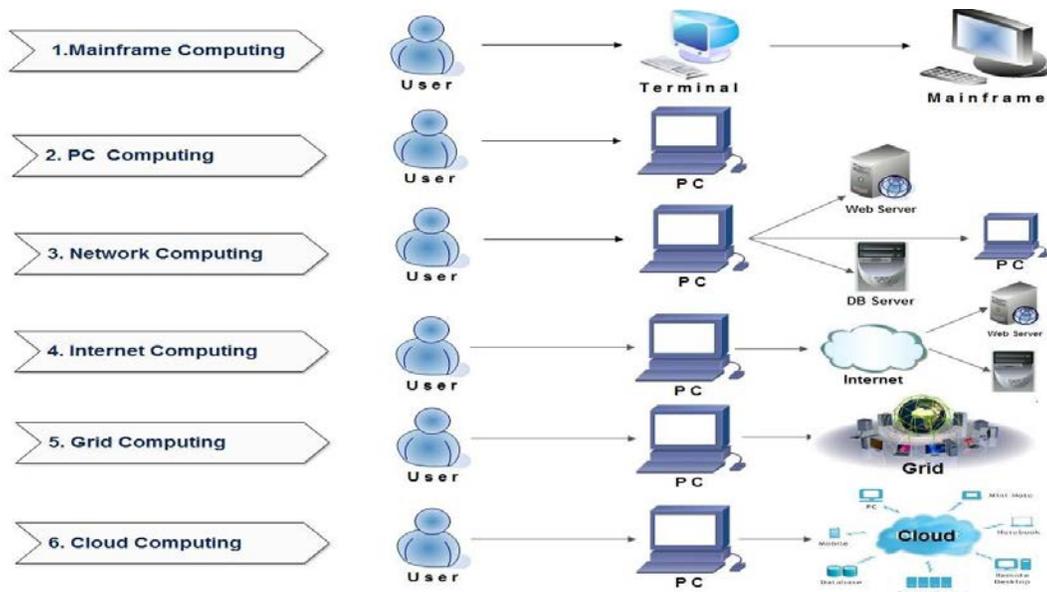


Figure 2.1: Six computing paradigm (Voas and Zhang, 2009).

2.1 EVOLUTION OF CLOUD COMPUTING

Cloud computing is not new to the IT world; it can be discovered back to the 1960s when it was identified or known as “Utility Computing”. The understanding of the technology and different ways of its application is what has changed over the decades. John McCarthy MIT computer scientist introduced the terminology, the concept was that computing will one day be a metered service as you pay for what you use only (Cornerstone Guide to Cloud Computing Best Practices, n.d.).

Amazon also played a key role in development of cloud computing by improving their data center. Amazon Web Service (AWS) was launched in 2002 and in 2006 Amazon’s S3 and Elastic Compute Cloud (EC2) were launched with the later been a web service that

admit and allows SMEs and individuals to use Amazon's computers to run their own applications and the former pricing model been pay-per-use (Shamelle, 2013).

Figure 2:2 shows the evolution of cloud computing over the years. In the 1990s, significant infrastructure is required and there is CAPEX and in 1999 SaaS vendors (Salesforce.com) is emerge as enabling broader adoption of the technology. Later Cloud Connected Data Management evolved we are now presently in a time of pure cloud applications and infrastructure services.

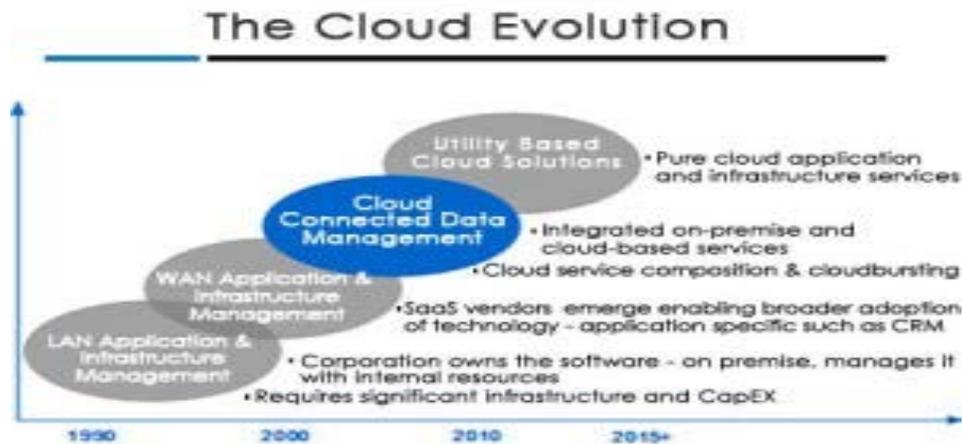


Figure 2:2 Evolution of Cloud Computing (Shamelle, 2011)

2.2 DEFINITION OF CLOUD COMPUTING

Cloud computing has many definitions; different organizations have their own ways of defining the technology. Below are some of these different definitions:

One of the most used definition of cloud computing is the definition of National Institute of Standards and Technology (NIST). They define cloud computing as: "Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell and Grance, 2011).

Gartner defines it as: "Cloud computing is a style of computing in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies" (Gartner.com, 2009).

Forrest Researcher definition of cloud computing is: "A standardized IT capability (service, software, or infrastructure) delivered via Internet technologies in a per-pay-use, self-service way" (J. Staten, 2009).

International Data Corporation (IDC) its definition is; "an emerging IT development, deployment and delivery model, enabling real-time delivery of products, services and solutions over the Internet" (Gens. 2008).

Microsoft research refers to it as variety of services available over the Internet that delivers compute functionality on the service provider's infrastructure (Microsoft Research).

Cloud computing it can also be defined as the use of computer technology that harnesses the processing power of many inter-networked computers while concealing the structure that is behind it (Cornerstone Guide to Cloud Computing Best Practices)

2.3 CHARACTERISTICS OF CLOUD COMPUTING

2.3.1 ON-DEMAND SELF SERVICE: One can easily request a service over the Internet when needed without physical interaction with each other service provider.

2.3.2 UBIQUITOUS NETWORK ACCESS: Services are available and can be accessed through a range of devices (phones, tablets, PC etc.) and from anywhere in the world.

2.3.3 RESOURCE POOLING: Resources are pooled in order to cater to multiple customers using a multi-tenant model with different physical and virtual resources dynamically allocated and reallocated in respect to the customer requirement. The customer generally has no control or knowledge of the precise location of the resource been provided except when identified at a higher level of abstraction (P. Mell and T. Grance, 2011).

2.3.4 RAPID ELASTICITY: Resources can easily be increased or decreased to cater to customer's demand, for a customer the capability appears to be unlimited and it can be appropriated in any quantity and at any given time and place.

2.3.5 MEASURED SERVICE: The service been used is measured, resource usage can be controlled, monitored, and reported providing transparency for both the service provider and customer of the utilized service. A customer is charged for what one uses (Mell and Grance, 2011).

2.4 ARCHITECTURE AND DEPLOYMENT MODELS Architectures and deployment models for cloud computing can be broadly into the following service models:

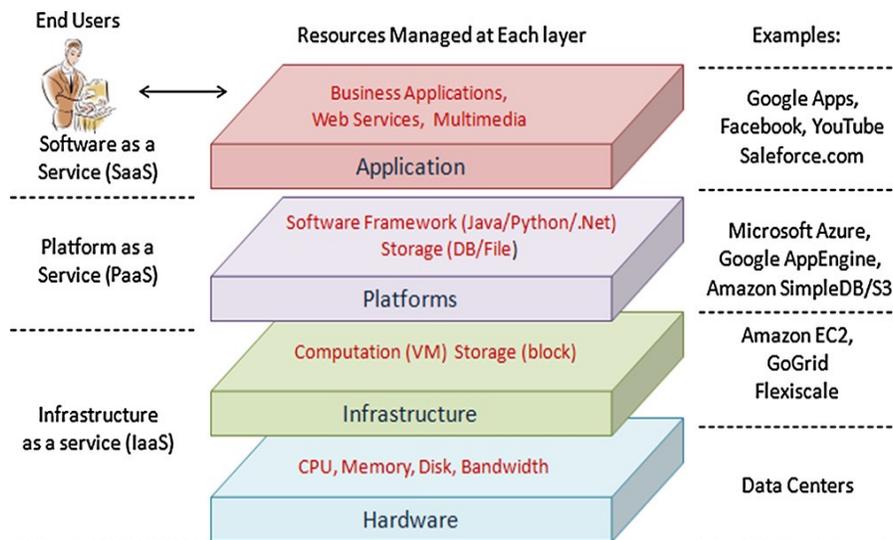


Figure 2:3 Categories of cloud computing services (Hofer & Karagiannis, 2011).

2.4.1 SOFTWARE AS A SERVICE (SaaS): This is a type of service provided where a customer uses an application running on a cloud infrastructure. The software can usually be used either through a web browser or a program interface. The customer does not have a say and is not in charge of the underlying infrastructure with the possible exception of limited user specific on application configuration settings (Mell and Grance, 2011).

2.4.2 PLATFORM AS A SERVICE (PaaS): The service offered to the customer is to deploy onto the cloud infrastructure the application the customer created using libraries, programming languages, tools and services supported by the cloud provider. The customer does not manage or control the underlying cloud infrastructure but the customer has control over the application deployed and possibly limited control of select networking components (e.g., host firewalls)

2.4.3 INFRASTRUCTURE AS A SERVICE (IaaS): The capability offered to the customer is to enable storage, processing, networks and other essential computing resources where the customer is able to deploy and run different software which can include operating system and applications. The customer does not manage or control the underlying infrastructure but has control over operating systems, storage and deployed applications and possibly limited control of networking components (e.g., host firewalls) (Mell and Grance, 2011).

2.5 DEPLOYMENT MODELS

Cloud services can be used in the following deployment models;

1.5.1 **PRIVATE CLOUD:** It is a type of model where the cloud infrastructure is owned by a particular organization, it may be owned, managed and controlled by the organization or a third party and it can be either on or off premises.

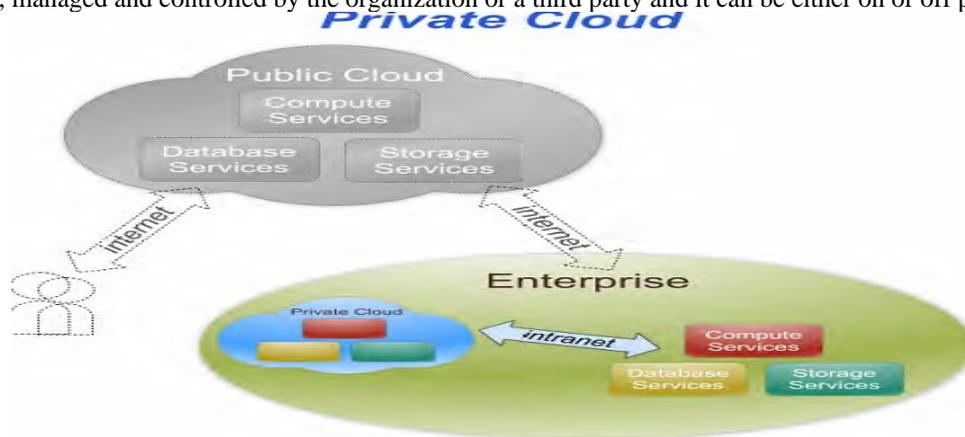


Figure 2:4 Private Cloud (Dustin et al., 2010)

1.5.2 **PUBLIC CLOUD:** it is the opposite of private cloud. In public cloud the infrastructure is open to the public, and is been used by individuals, organizations and government. It is owned, managed and controlled by the service provider and it is located on the premises of the provider (Mell and Grance, 2011).

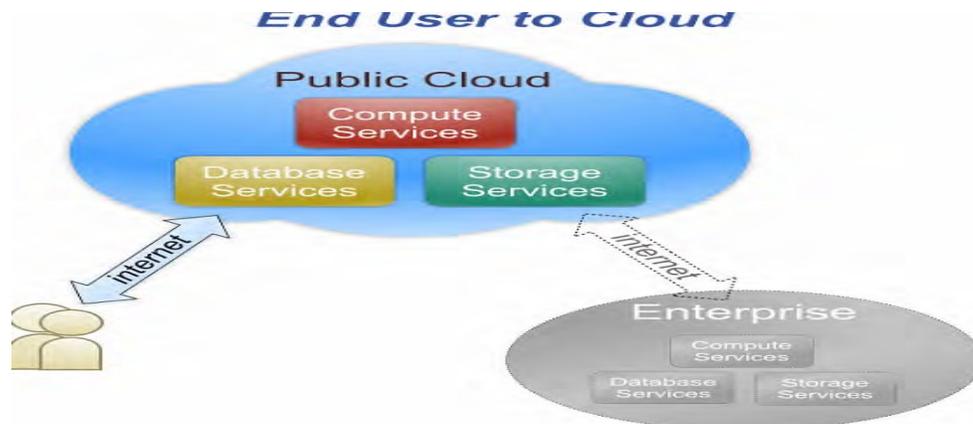


Figure 2:5 Public Cloud (Dustin et al., 2010)

- 1.5.3 **COMMUNITY CLOUD:** The cloud infrastructure is provisioned for a group of organizations that have similar/shared concern (e.g., mission, policy, compliance considerations and security requirements). It may be owned, managed and controlled by one or more of the organizations or a third party and it may exist on or off premises.



Figure 2:6 a community cloud (Prasad et al., 2013).

- 1.5.4 **HYBRID CLOUD:** The cloud infrastructure is a combination of two or more distinct cloud infrastructures (private, public or community) that remain separate entities but are bound together by a standardized or proprietary technology that allows data and application portability (Mell and Grance, 2011).

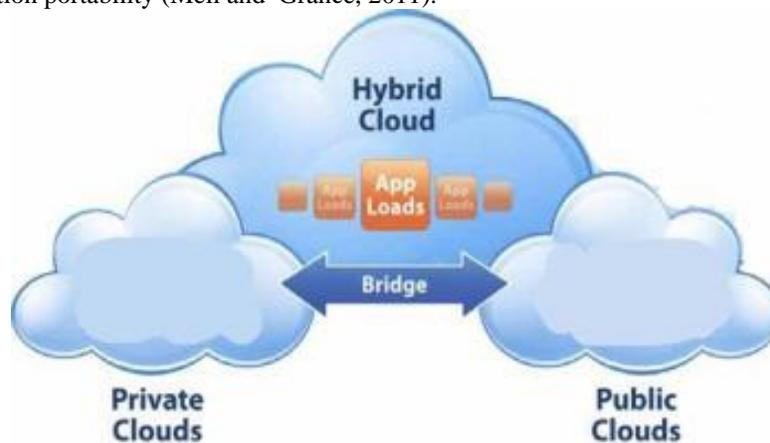


Figure 2:7 Hybrid Cloud (Prasad et al., 2013).

2.5.2 VIRTUALIZATION

Apart from computer and an Internet connection, virtualization is the most important technology, which allows Cloud Computing to reach its full potential (Böhm et al, 2009). Thanks to virtualization a physical server can be divided into several virtual servers, this way an entirely new service emerges (Zhang et al, 2010). These virtual servers are called “virtual instances” (Zhang et al, 2010). Accordingly, the IaaS vendor could sell two different basic options: the rent of the physical servers and the rent of these virtual instances (Mazzuco and Dumas, 2011). Although these two options are able to accomplish the same functions, there are some differences, for example the virtual instances are cheaper since it is not necessarily the physical server but they are also seen as less secure than the physical servers (Barnatt, 2010).

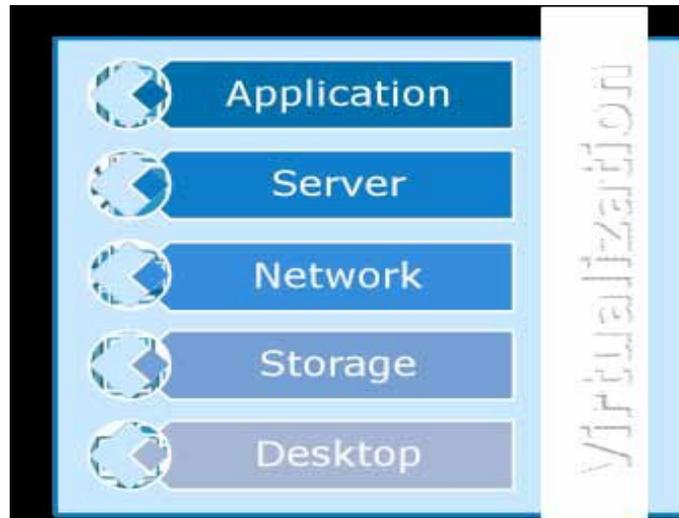


Figure 2:8 Types of Virtualization (Petri, 2010)¹_{SEP}

2.6 BENEFITS OF CLOUD COMPUTING

Cloud computing offers various advantages both to end users and businesses of all sizes. The obvious huge advantage is that you no more have to support the infrastructure or have the knowledge necessary to develop and maintain the infrastructure, the development environment or application, as were things up until recently. The burden has been lifted and someone else is taking care of all that. Businesses are now able to focus on their fundamental business by outsourcing all the hassle of IT infrastructure (Ilias, 2013). Here are some of the advantages that cloud computing has to offer.

2.6.1 COST EFFECTIVENESS: The main and one of the most important advantages of cloud computing is that it eliminates the cost of owning the infrastructure needed to run the organization. Licensing fees, cost of maintenance, software update etc. is saved as well as it is better and cheaper than the traditional approach; it is easily scalable and allows organizations to concentrate on their core business function to add value (Ilias, 2013).

2.6.2 CONVENIENCE AND CONTINUOUS AVAILABILITY: Public clouds offer services that are available wherever the end user might be located. This approach allows easy access to information and accommodates the needs of users in different geographic locations. As a side benefit, collaboration booms since it is now easier than ever to access, view and modify shared the documents and files.

Furthermore, service uptime is in most cases guaranteed, providing in that way continuous availability of resources. The different cloud vendors typically use multiple servers for maximum redundancy. In case of a system failure, alternative instances are automatically spawned on other machines.

2.6.3 BACKUP AND RECOVERY: Is the process of backing up and recovering data that is simplified since those now reside on the cloud and not on a physical device. The various cloud providers offer reliable and flexible backup/recovery solutions. In some cases, the cloud itself is also used solely as a backup repository of the data located in local computers (Ilias, 2013).

2.6.4 RESILIENCY AND REDUNDANCY: A cloud deployment is usually built on a robust architecture, even though it providing resiliency and redundancy to its users. The cloud offers automatic failover between hardware platforms out of the box, while disaster recovery services are also often included.

2.6.5 SCALABILITY: The Scalability is built in feature for cloud deployments. Cloud instances are deployed automatically only when needed and as a result, you pay only for the applications and data storage you need. Hand in hand, it also comes elasticity, since clouds can be scaled to meet your changing IT system demands.

2.6.6 QUICK DEPLOYMENT AND EASE OF INTEGRATION: The cloud system can be up and running in a very short period, making quick deployment a key benefit. On the same aspect, the introduction of a new user in the system happens instantaneously, it eliminates waiting periods.

Furthermore, software integration occurs automatically and organically in cloud installations. A business is allowed to choose the services and applications that is best and suit their preferences, while there is minimum effort in customizing and integrating those applications (Ilias, 2013).

shows the rate of benefits of cloud based on a survey conducted by International Data Corporation in 2009. It shows that the easiness and fast deployment of cloud services is ranked as the biggest benefit of the technology followed by you pay for what you use. While “sharing system/information simpler” and “it’s the way of the future” got the least rating among the benefits of the technology.

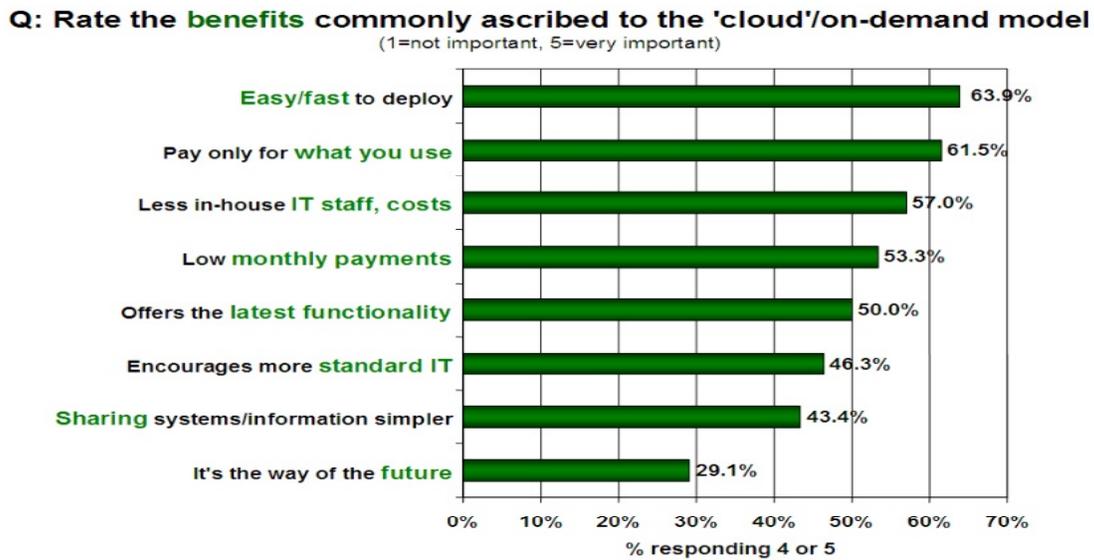


Figure 2:9 Benefits of Cloud/On-Demand Model (IDC, 2009)

2.7 CHALLENGES OF CLOUD COMPUTING

Despite its numerous advantages mentioned above, it also has some disadvantages and some of these challenges are as follows

2.7.1 SECURITY AND PRIVACY: Security is the biggest concern when it comes to cloud computing. By leveraging a remote cloud based infrastructure, a company essentially gives away private data and information and things that might be sensitive and confidential. It is then up to the cloud service provider to manage, protect and retain them, thus the provider's reliability is very critical. A company's existence might be put in risk; so all possible alternatives should be explored before a decision. On the same note, even end users might feel uncomfortable for surrendering their data to a third party.

Similarly, privacy in the cloud is another huge issue. Companies and users have to trust their cloud service vendors that they will protect their data from unauthorized users. The various stories of password leakage and data loss in the media don't help to reassure some of the most concerned users (Ilias, 2013).

2.7.2 DEPENDENCY AND VENDOR LOCK-IN: One of the main disadvantages of cloud computing is the implicit dependency on the provider. This is what is called "vendor lock-in" since it is difficult, and sometimes impossible, to migrate from a provider once you have rolled with him. If a user needs to switch to some other provider, then it can be really painful and cumbersome to transfer huge data from the old service provider to the new one.

2.7.3 TECHNICAL DIFFICULTIES AND DOWNTIME: Certainly the smaller business will enjoy not having to deal with the daily technical issues and will prefer handing those to an established Information Technology companies, however one should keep in mind that all systems might face dysfunctions from time to time. Outage and downtime is possible even to the best cloud service providers, as the past has shown. Furthermore, one should remember that the whole setup is dependent on Internet access, thus any network or connectivity problems will render the setup useless (Ilias, 2013).

2.7.4 LIMITED CONTROL AND FLEXIBILITY: Since the applications and services run on remote, third party virtual environments, companies and users have a limited control over the function and execution of the software and hardware.

2.7.5-INCREASED VULNERABILITY: Related to the security and privacy mentioned before, note that cloud-based solutions are exposed on the public Internet and thus are more vulnerable target for malicious users and hackers. Nothing on the Internet is completely secured and even the biggest companies suffer from a serious attacks and security breaches. Due to the interdependency of the system, if there is a compromise one of the machines that data is stored, there might be a leakage of personal information to the world (Ilias, 2013).

shows the rate of challenges of cloud based on a survey conducted by IDC. It shows that security concern is the issue that the participants are most concerned about it and then followed by availability, which is the second problem that is of concern. While "hard to integrate with in-house IT" and "not enough ability to customize" are of least concern as compared to other challenges.

Q: Rate the challenges/issues of the 'cloud'/on-demand model

(Scale: 1 = Not at all concerned 5 = Very concerned)

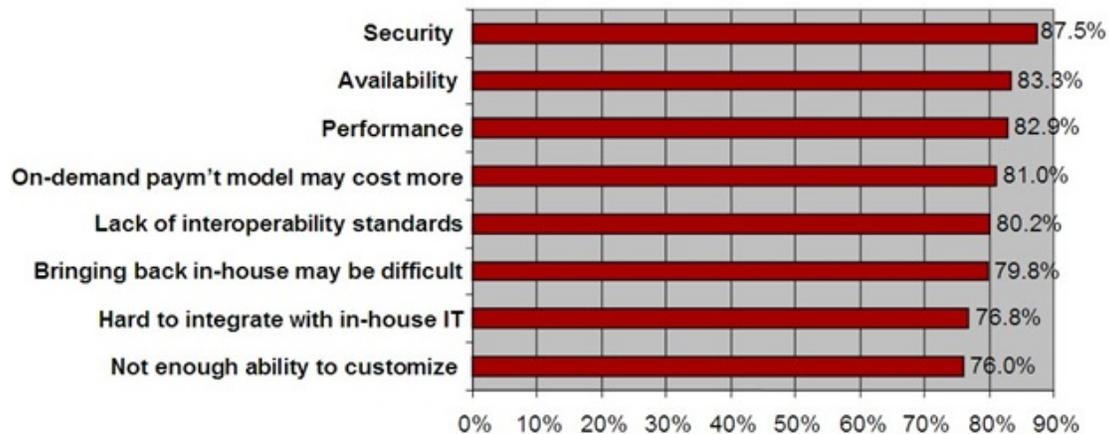


Figure 2:10 Challenges of Cloud/On-Demand Model (IDC, 2009)

2.8 CLOUD COMPUTING IN DEVELOPING NATIONS

Despite all the benefits and growth of cloud computing over the year, the same cannot be said in the developing world. Very few companies and organizations are rushing to use cloud computing despite its several benefits in the developing world. Cloud computing is one of the most fascinating technologies around today but is it also the most alarming. Though the benefits of cloud computing are clear, many individuals and companies have their doubts and concerns about this form of computing. On top of these doubts about cloud computing is about security concern (Ume and Basse et al., 2012).

Users feel that they are not been given any guarantee on safety of cloud computing. Cloud platforms that can meet their requirements need to be even more credible and convincingly safe (Kuyoro and Ibikunle et al., 2011 cited in Ume and Basse et al., 2012).

However, cloud computing is safe and the misconception that it is not is due to ignorance and lack of a general understanding of what cloud computing is. The term by itself does not really explain what it actually is and people do not explain it well as so people misunderstand what it is and develop fear of the unknown. For example Microsoft have multiple data centers across the globe and they all back up one another, so on the possibility of something happening to one of the data centers, the data is replicated across the globe. Microsoft is so certain of their systems that they pledge a 99.9% financially backed uptime for all their customers, so most of concern about cloud computing are due to people's misunderstanding of the technology (Ana, 2011).

2.8.1 CLOUD COMPUTING IN AFRICA

Cloud computing has the ability to solve Africa's problem of lack of IT infrastructure that can cater for the needs of the population. The technology is suited for the continent because you do not have to own, manage and maintain the infrastructure; one can just rent it as a service. This can easily be achieved though only if two problems that hinder the growth of cloud computing across the continent are addressed. The two main concerns are lack of e-communication infrastructures (network coverage) and lack of stable power supply (Cloud Computing in Africa Situation and Perspective, 2012).

The Hedera Technology Consultancy firm report on the state of Internet in Africa identified lack of required investment in communication networks as the root reason why Africa has a poor network quality, because it is hard to follow the clauses that ensure quality levels and access speeds for cloud services. However, ICT usage across the continent is growing and aiding the growth of the economies, therefore the needed investment will be made to ensure the sector provides the benefits it has to offer (Cloud Computing in Africa Situation and Perspective, 2012).

Web traffic in Africa comes mostly from mobile phones compared to fixed lines. Africa has the highest number of web traffic that comes from mobile than fixed line in the world. According to Stat counter (2012), in Nigeria 57.9% of web traffic comes from mobile technology while Zimbabwe 58.1% and Zambia 44% as compared to 10% average across the globe. This is expected to continue and mobile Internet traffic is expected to grow up to 25 fold over the next four years (Sub-Saharan Africa Mobile Observatory, 2012) In South Africa, what is offered is nothing more than a normal remote hosted service and not really cloud computing as advertised in the market says Grant Vine, Technical Director at Cybervine IT Solutions. Cloud computing has lots of benefits and its cost effective but in the South Africa, hosted services offered are stagnant; a customer signs an agreement with a service provider for a certain service over X years with Y capacity. Whether the customer has used the service up to that capacity or not he pays the same amount which is not cloud computing (Itnewsafrika.com, 2013).

There are serious privacy issues when it comes to cloud computing in the developing world. A company has entrusted its information and as well as data to another company, which has continuous access to the information and data. Accidents can happen or

intentional the tampering of the information may occur and the information may be used for things that haven't been authorized by the users. This is making some people take long to take up cloud computing (Ume and Bassey et al., 2012).

Usually users want to have access to their data whenever they need it. Traditionally, people have flash drives and they move around with it to be able to access their data when they want to by just plugging it into a USB port. In developing countries like Nigeria the issue with data availability is that when there is no Internet connection it is the same as having a denial of service. The continuous problem faced by power failure across the country is not helping matters even among the computer literate people. Despite cloud computing being able to serve as a storage medium with data access from anywhere and anytime, if the network is not assured places like Nigeria will always be left behind as long as the status quo prevails (Ume and Bassey et al., 2012).

2.8.1.1 CLOUD COMPUTING IN NIGERIA

Nigeria is a developing country with huge resources and is the most populous nation in Africa. Nigeria has a lot of challenges that the researcher believes cloud computing will help solve some of these problems. An example of a problem that cloud technology can help solve is the lack of sound IT infrastructure facing the nation, cloud computing can solve this because with cloud computing, one does not have to buy the infrastructure but rather rent it as a service over the internet.

The Federal Government estimated to have spent N19.4 billion (\$121. 25 million) on data center in 2011 alone according to Omobola Johnson, Minister of Communication Technology. She stated it is not sustainable and ways must be adopted to reduce and manage it better in the face of growing Information Communication Technology usage. She added that the Federal Government plans to adopt cloud computing services in order to cut cost of ICT infrastructure. The government's is building of a cloud infrastructure for Ministries, Departments and Agencies (MDAs) are aimed at not only saving cost but also driving efficiency and productivity across MDAs (Businessdayonline, 2012).

The use of the technology is starting to yield result in the workings of its Integrated Payroll and Personnel Information System (IPPIS). The application is used to manage civil servants' identification and payroll in a cloud, which are more efficient and effective way on and it has saved the federal government a lot as compared to the manual process, used earlier (Businessdayonline, 2012).

EMC Regional Manager for West Africa, Rasheed Jimoh said the time is right for Nigeria to embrace cloud computing (jimoh, 2012).

Telecommunication companies in Nigeria are investing in data center infrastructure to benefit from what a cloud computing will to offer. Globacom, a telecommunication company is planning on building a 40,000 square feet data centre, this comes after completing a 2,000 square feet data center already. MTN Nigeria another telecommunication company has opened a 500 square meters data center, aimed at offering cloud services to small and medium enterprises (SMEs) across the country. For instance, Airtel launched its 1858 square meter data center in 2012 to cater to its subscriber base (BizWatchNigeria.com, 2013).

However, a recent survey of more than 50 chief executives and IT managers of 10 companies conducted in key state capitals in Nigeria showed most of them are unwilling to outsource even the applications that comprise less sensitive information. They still prefer their in-house infrastructure largely due to the fact that they fear not having control of their data and systems. The few that agreed said they will only consider it after a thoroughly analyzing the risk of dealing with the third party and will also do it in phases with one or two application or process to start with. All agreed that fear and the fact that people don't really know what the technology really is; are the main obstacle to the growth and adoption of the technology (Ume and Bassey et al., 2012). Therefore, there is need for sensitization and awareness of institutions and individuals that can benefit from use of cloud computing about what it is, its benefits, potential drawbacks and solutions and ways it can be used.

2.8.1.2 CHALLENGES FACING ADOPTION OF CLOUD COMPUTING IN NIGERIA.

Status of key infrastructure in Nigeria ^[1]One of the key challenges cloud computing faces in Nigeria is lack of adequate infrastructure on which the cloud services are to run. Major infrastructure that supports cloud services such as electricity; fast, reliable and affordable Internet connectivity; network backbone and so on are very limited in Nigeria. And even when available it is unreliable and present only within major cities leaving many rural areas and smaller cities in the dark. The poor state of electricity in Nigeria is undesirable for data center providers who will rather partner or establish their data centers abroad as this often is cheaper for them than incurring huge cost providing private electricity through generators. And many consumers and third-part vendors in Nigeria are more comfortable buying data center services from data center providers who are either located abroad in countries with more reliable infrastructure or who have their data center backup situated abroad. Ogunraku (2014) reported that even the very few data centers that are located in Nigeria are mainly situated in Lagos which has better network backbone connectivity and closer to the various under sea Internet cables including Main One and GLO 1 cables (Purefoy, & Kermeliotis, 2012). The in-country network backbone connectivity in Nigeria is still very poor implying that most other states in Nigeria lack direct connection to the under sea Internet network.

Backbone networks play major role in the delivery of ICT services including cloud services in all countries. And it contributes a huge portion of the total cost incurred by network providers to their overall cost. And in a country with very vast geographical spread like Nigeria the cost of providing broadband connectivity per subscriber is very high. This cost is much lower per subscriber in cities like Lagos and other densely populated cities compared to rural areas and cities with sparse population (Williams, 2010). As mentioned earlier most of the major broadband infrastructure (WACS, Main-one and Glo 1 fiber optic Cables) are sited in Lagos except for Nigcomsat -1R which is satellite. And these infrastructures are not adequately spread to other cities due to lack of domestic backbone networks. This lack of domestic network infrastructure is the major problem inhibiting the growth of broadband. Some states including the Federal Capital Territory have fiber networks within the state but there are very limited connections between fiber networks from

one state to another. According to the Former Nigeria Minister of Communications Technology, Omobola Johnson, Internet penetration is still very low with broadband penetration even lower (Chidiebere, 2013). And where there is connectivity between states it is only between state capitals. In a nutshell there is the absence of long distance national backbone to carry and distribute the capacities provided by the submarine cables mentioned above to the users in offices, schools, and homes in the hinterland across Nigeria (Olusola & Olojojetan, 2013).

Other challenges facing cloud-computing services in Nigeria^[1] Some of the problems identified as hampering the growth of broadband and by extension cloud computing services in Nigeria is the very high cost of obtaining right of way (inclusive of cost involved in settling government officials, the cost of settling various indigenous owners of the land where the infrastructure will pass through and long delays in procuring the right of way permits). This cost invariably causes the cost of leasing transmission infrastructure to be high. The high cost of investment in last mile broadband infrastructure leads service and infrastructure providers such as the telcos to concentrate only in major cities. Frequent vandalization of broadband infrastructure by hoodlums leaves undesirable financial burden on owners of telecommunication infrastructures. Other challenges include multiple taxation on the part of the federal, state and local governments; weak regulation in some case, incessant disruption due to road works and huge cost of providing alternative electricity to power telecommunication equipment (Olusola & Olojojetan 2013).^[1] Consequently Internet penetration in Nigeria is very poor due to inadequacy of this infrastructure. And where available the cost is quite high. According to the Nigeria Communications Commission there over 85 million Nigerians with access to the Internet as at March 2015. This figure is calculated by adding up all the Internet subscribers per telecommunication operator. This figure may not be very accurate as many Nigerians own more than one phone line, so there may be issues of double counting. The US Census Bureau (2014) suggests that Internet penetration in Nigeria is 33 percent. If this figure by the US Census bureau is correct it means that Internet penetration in Nigeria is low when compared to other African countries especially Morocco, Egypt, Tunisia and South Africa.

The cost of supporting cloud infrastructure and services in Nigeria is still quite high and limited. There are no manufacturing or assembly plants in Nigeria for cloud equipment. This implies that every equipment that is used for cloud deployment is imported from outside the country. It further implies that when a device is faulty it has to be ordered abroad or procured from a vendor who of course buys abroad. Furthermore, there are not many qualified engineers who can install and support cloud infrastructures. For there to be massive deployment and support of cloud services Nigeria will need more trained and qualified engineers that understand how to install, manage and support cloud infrastructures. Presently most of the functional data centers in Nigeria are setup, managed and maintained by expatriates (Dahunsi & Owoseni, 2015).

There is limited investment by both private and public sector investors in ICT infrastructure. Odufuwa (2012) observed a decline in the investment made by some of the telecommunication providers in Nigeria. This is attributable to recent insecurity, which has led to the destruction of many telecommunications infrastructures. Another factor that could have been responsible for this poor level of investment could be recent instability in the political system and furthermore the decline in the price of oil and other economic parameters have not been very encouraging to investors.

Lack of adequate awareness has also been identified by Awosan (2014) as a major issue affecting the adoption of cloud computing in Nigeria. The research carried out by Awosan (2014) revealed that 89.1 percent of the research respondents are of the view that lack of proper awareness of the workings and benefits of cloud computing was responsible for its poor adoption. The people interviewed also corroborated this view. The research also revealed that many small businesses in Nigeria have employees that lack the requisite skills to operate basic ICT tools including cloud applications. And many business owners do not want to invest in upgrading the skills of these personnel for several reasons including cost of training and fear that the employees may end up leaving the organization abruptly (Awosan, 2014). So lack of skills to manage these applications and business owners not seeing real value in automating their processes are huge challenges working against the adoption of cloud based solutions among many Nigeria. Some of these businesses especially the small ones do not have enough sales to justify the use of cloud computing applications as making such a purchase in their view may wipe away their bottom line. And possibly quite a good number of them do not understand how business automation can help make their business more efficient, improve sales, help manage customers and reduce waste. Lack of stability of power supply has been identified as factor that can cause both loss of data and inability to access cloud services. In essence consumers may not be able to access cloud services always and even when they do sudden loss of power supply can cause loss of data (Greengard, 2010). Another major problem limiting the ready adoption of cloud services is the high cost of bandwidth required to transfer data through the Internet especially when working with data intensive applications (Otuka, Preston, & Parmenides, 2014). Furthermore, unreliability of Internet services due to several factors including low bandwidth capacity is also a militating factor (Leavitt, 2009). There is also the lack of confidence on the part of organization on the overall reliability and consistency in the quality of service provided by cloud service providers over a long term (Otuka, Preston, & Parmenides, 2014). Some organizations especially large organizations may not be too comfortable entrusting their IT services to cloud service providers for fear of down time. They may not be sure if the cloud services provider will guarantee optimal performance for their mission's critical business. This view is supported by Carr (2005), who rightly opined that one of the major impediments to the adoption of cloud computing will not be technology but attitude of end-users towards cloud computing. Marston et al., (2011) observed that some applications may not be currently sustainable to be implemented as cloud service but may therefore need to interact with other cloud based applications a process that may pose challenge both in terms of contractual and support issues. Due to the nature of cloud computing services some organizations may be skeptical in adopting the service, as they do not have "control" as such over the information and supporting infrastructure. And some may also be worried about vendor location due to lack of standards or the vendor even completely going out of service.

Awosan (2014), Qamar et al (2010) and Otsuka, Preston, & Parmenides, (2014) pointed out that issues of security, privacy and lack of standards are some of the major concern in cloud computing. From the research carried out by Awosan (2014) Chief Information Officers in selected organizations in Nigeria are of the view that cloud service adoption is considered risky due to insecurity and lack of privacy. Likewise the research by Otuka, Preston, & Parmenides (2014) especially from the focus group part discovered that security and privacy issues were seen as major impediments to cloud computing adoption in Nigeria. Furthermore they found out that lack of standards governing ICT use in general in Nigeria is a key problem to the adoption of cloud services by organizations.

The insecurity facing Nigeria presently affects their organization as well; when their infrastructure or that of their providers or partners has been tampered with it affects their ability to provide connectivity services: We do have downtime to deliver connectivity services due to fiber cuts on our networks or our upstream provider said the organization's staff.

2.8.1.3 SOLUTION TO THE CHALLENGES

1. **High Cost of Internet:** The Nigerian Communications Commission, (NCC) has assured that the availability of new infrastructure companies in the telecoms sector would reduce high cost of internet services.

NCC's Director of Public Affairs, Tony Ojobo stated this in Lagos during the 4th edition of Nigerian entertainment conference.

According to him, new players in the industry would provide an enable environment for competition which drastically will reduce price of internet charge.

He said the reason why internet charges are costly was because of the deficit of infrastructures companies.

Ojobo said this informed the commission's commitment to ensure competitive bid for the auction of the 2.6Hz for broadband infrastructure deployment broadband.

He said, "We envisaged that with the licensing of new infrastructure companies fondly called infracos as well as broad band providers, price reduced."

He stated that what determines price in the market is the numbers of competitors of that same good. "Competition drives down price in the market; it is not by regulating price but by introducing more competitors in the market", he said. Ojobo (2016)

2.8.1.4 REQUIREMENT FOR THE UPTAKE OF CLOUD COMPUTING IN GOVERNMENT INSTITUTIONS IN NIGERIA

The requirement to make cloud computing the next big thing in Nigeria can properly be achieved through the active participation of all involved stakeholders. These include the cloud service providers, the government institutions at all levels, telecommunication infrastructure providers, financial institutions among others. Government on its part should put more effort in developing and propagating the adoption of ICT in Nigeria. It should ensure the development of basic infrastructure such as stable electricity supply. This can be achieved in collaboration with private sector investors in the area of electricity generation, transmission and distribution. With such infrastructure in place other investors in the ICT sector will be encouraged to make more tangible investment in cloud computing facilities and indeed other ICT infrastructures that will one way or the other support cloud computing. With stable and efficient power supply, organizations that are into the provision of cloud computing services will invest in the establishment of data centers in Nigeria. This will decrease the cost of accessing cloud services and also improve the speed of access, as the consumers will be able to access the services in country instead of accessing it from a distance country. Furthermore, promoting the establishment of more inclusive and robust network infrastructure will bring about increase in the use of broadband services. The current state of network backbone infrastructure in Nigeria is still very limited not covering most sections of the country thereby making the reach of broadband very poor and where available not adequate. Government either working alone or in partnership with private sector investors by proving the necessary enabling environment should aggressively pursue the extension of current ICT network backbone across the country (Dahunsi & Owoseni, 2015).

The establishment of manufacturing plants for ICT equipment especially the equipment that are used in cloud computing will help reduce the price of these items and invariably the adoption of cloud computing (Dahunsi & Owoseni, 2015). Investment in such manufacturing plants should be embarked upon by private sectors. On government's part it can provide the enabling environment including tax relieves to private sector investors to encourage them to setup such manufacturing plants. The private sector investors should be bold enough to make necessary investments in setting up manufacturing plants. They should take special consideration to the over 100 million prospective consumers and the over 17 million micro businesses that can potentially become small and even medium size enterprises.

There should be increased advocacy on the use and benefits of cloud computing to organisations. Many organisations are not entirely aware of the real effect automation can bring to their bottom line. Letting them know how automation can help improve sales, manage customers; track inventory and so on will surely help encourage the adoption of cloud computing services. Government and cloud computing service providers can also go further to give incentives to organisations that adopt the use of basic cloud computing services in their activities. For instance organisations can be given free tutorial on how to migrate to cloud services and service providers should also consider giving free trial for a given period of time to try out cloud services. Increased availability of more cloud computing service providers will also aid adoption. This will help address the issue of inaccessibility and in the long-term reduce cost and bring about improvement in cloud services due to competition among cloud service providers. Development of innovative cloud solutions that are suitable for government institutions in Nigeria, such as CliniPak (West, 2015) a mobile healthcare solution currently in use in Nigeria will ultimately help improve cloud services adoption. Similar solutions should be developed for the various sectors in Nigeria in simple to use and affordable manner.

More focused research should be geared towards improving cloud computing infrastructure and services. Private sector organizations can sponsor research institutions either through grants, scholarships etcetera to carryout research work that will help

improve cloud-computing services in Nigeria. Such research can include looking at ways of improving present services, manufacturing new hardware equipment and software applications. Dahunsi & Owoseni (2015) suggest that universities can be encouraged to establish cloud network laboratory in their institutions to teach regular students and organizations that may wish to send their employees to learn specific skills on the provision, management, support and deployment of cloud computing services.

Regulation including enforcement of data protection laws and all other intellectual property rights protection regime should be adequately enforced. Nigeria is a member of WIPO and is signatory to all the major IPRs treaties but the problem has always been the enforcement of the relevant laws. Fully enforcing such laws will give users the confidence to adopt cloud computing services including allowing their vital data to be warehoused in a data center knowing that their data will be adequately protected. And where there is a breach they can easily get the relevant government authorities to take necessary action including getting redress from the legal system. Having a sound regulatory system that ensures that service providers keep to their side of the bargain and deliver proper services with minimal downtime will be a huge source of encouragement to organizations to adopt cloud-computing services.

There's a need to increase security in Nigeria which will help the organization as well as their infrastructure or that of their cloud service providers or partners that has been tampered with it affects their ability to provide connectivity services: We do have downtime to deliver connectivity services due to fiber cuts on our networks or our upstream provider said the organization's staff.

III. METHODOLOGY

3.1 INTRODUCTION

This chapter describes the methodology that will be followed to achieve the objectives of this research.

1. To collect requirements for increasing the uptake of cloud computing in developing countries like Nigeria
2. To design a model that provides guidance on how to increase uptake of cloud computing in developing countries.
3. To validate how use of cloud computing in developing countries like Nigeria can be increased?

The requirements for increasing the uptake of cloud computing in developing countries like Nigeria will be collected through the review of existing research in journals, book chapters and conference proceedings about adoption and adaptation of cloud computing in developing countries, Africa and Nigeria in particular. The aim of the literature review will be to identify what other researchers have established about requirements for increasing uptake of cloud computing in developing countries, Africa and Nigeria in particular. Results from literature review will be supplemented by an administered survey in Nigeria covering government institutions (Ministries, departments and Agencies) and key ICT service providers such as Telecommunication companies to verify the requirements obtained from literature and obtain additional ones.

Objective two i.e. to examine how use of cloud computing by government institutions in developing countries like Nigeria can be increased will be achieved through the design of a model that can guide efforts for increasing the uptake of cloud computing in developing countries like Nigeria. To design the model, we will use principles and constructs of already existing technology adoption and adaptation models such as but not limited to as Diffusion of Innovation theory (DIT) (Rogers, 1995), Unified Theory of Acceptance and Use of technology Theory (UTAUT) by Venkatesh et al. (2003), various cloud computing adoption models such as Cloud Computing Adoption Model for Governments and Large Enterprises by Trivedi (1999), adoption of cloud computing in education by Sabi, Uzoka, Langmia and Njeh (2015), etc.

The third objective i.e. to validate how use of cloud computing in developing countries like Nigeria can be increased will be achieved

To validate whether the developed model improves adoption of cloud computing in a developing country (third objective), the theoretical model will be validated with cloud computing for e-government experts, ICT providers as well as representatives of MDAs specifically those currently involved/responsible for cloud implementation of cloud computing services and relevant members of the private sector.

This chapter describes the methodological approach that will be used and the reason for choosing it is justified. How the data will be collected and how it will be analyzed is also presented.

3.2 RESEARCH METHODS AND JUSTIFICATION OF METHOD APPLIED.

The kind of research one is doing will determine the research methodology you use to support your work and methods you use in order to collect data. When measuring variables and verifying theories or hypotheses or questioning them then one will go for quantitative way of collecting data. Data is often used to generate new hypotheses based on the results of data collected about different variables. Some people are often much happier about the ability to verify quantitative data as many people feel safe only with numbers and statistics. And quantitative data, it must be remembered, are also collected in accordance with certain research vehicles and underlying research questions. Even the production of numbers is guided by the kinds of questions asked of the subjects, so is essentially subjective, although it appears less so than qualitative research data (Prince. C 2013). However, often collections of statistics and number crunching are not the answer to understanding meanings, beliefs and experience, which are better understood through qualitative data and which is more suited for this research.

The major activities of the research design are indicated in the following figure

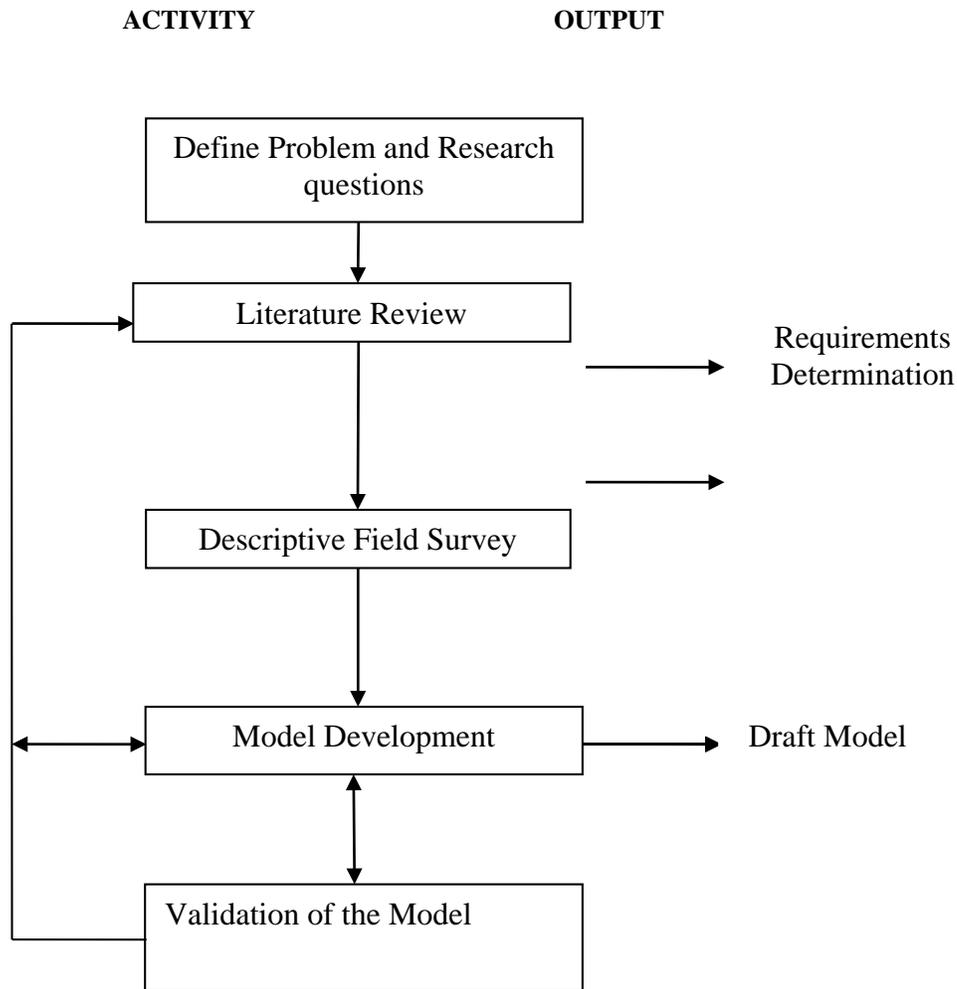


Figure 3. 1: Overview of the Major Activities in the Research Design

3.2.1 QUALITATIVE RESEARCH SELECTED.

Qualitative research is aimed at gaining a deep understanding of a specific organization or event, rather than a surface description of a large sample of a population. It aims to provide an explicit rendering of the structure, order, and broad patterns found among a group of participants (Csulb.edu, 2013). Qualitative research allows the participants to state and explain what is been asked in respect to how they use and see it rather than the researcher limiting the participants. It was chosen because it is flexible and can adjust to settings. Changes can be made in respect to concept, data collection methods and tools as the research progresses.

The author will use qualitative research methodology to collect the data needed through conducting interviews. The author conducted a background study on the organizations that are will be interviewed in order to accomplish the research’s objectives and the people directly connected to the topic will be contacted so as to collect the primary data.

3.3 COLLECTION TECHNIQUES, TARGET SAMPLING AND JUSTIFICATION

3.3.1 COLLECTION TECHNIQUES: INTERVIEW QUESTIONNAIRE

Because qualitative method of research was chosen as the primary technique to be used in this research, Questionnaire was choosing in order to have a better understanding and get the necessary data needed on the subject matter. The author prepared the questions in advanced and contacted the people connected to the topic within the government and private organizations. In this particular research the questionnaires was send by using Google form to staff of the government organizations and cloud service providers. The participants are from different government institutions, cloud service providers ranging from the national level, provincial level and local level with different profession the questions prepared in advance will be asked during the fill the questionnaire form but depending on the interviewees response new questions can be asked as well.

3.3.2 COLLECTION TECHNIQUES: SECONDARY DATA COLLECTION

It is important to note that before primary data was collected, an in-depth secondary data was studied (Chapter 2) where materials were reviewed from authentic sources. Importance was given to current data, as the topic is new in the African continent; it is still in its infancy stages.

3.3.3 TARGET SAMPLING

The research is aimed at finding the uptake of cloud computing in government institutions in Nigeria, so it is important to target both government organizations and private institutions (cloud service providers). The IT personnel of this various institutions are the ones been targeted as they are the ones with the responsibility of making sure the objectives of the research service been used and achieved.

3.4 METHOD OF ANALYSIS

The data collected will be analyzed in order to make sense of the data collected and make the interpretation of the data simple. Names of both the organization and the interviewees will be withheld because of privacy and confidentiality. The author will use aliases in referring to the organizations.

IV. DATA PRESENTATION, INTERPRETATION AND ANALYSIS FINDINGS

The purpose of the field study was to examine how the uptake of cloud computing can be increased in government institutions in Nigeria. This chapter presents the results from questionnaires that were administered to government institutions and cloud service providers in Nigeria. Thirty five (35) questionnaires were administered to cloud service providers in Nigeria. And it covered Out of the thirty-five questionnaires given out, twenty one (21) were responded to. In from 13 cloud service providers organisations that is It solutions, Cloud Host Nigeria, Go4 Hosting Nigeria, Host Ville Nigeria, Utiware.net Nigeria, Globacom Nigeria, SimbaNET (U) limited, DESCASIO CLOUD Solutions, NCC, GBB, NigComSat Lyd, Galaxy Backbone and Etisalat / 9Mobile Nigeria and on 16 positions that is Administrator, Data Officer, Software Engineer, IT Manager, Network engineer, Senior officer, Database administrator, Technical manager, IT officer, E-Government Solutions Manager, Engineering, Operation Manager, Technician, Network Admin, Programmer and System Analyst.

Also Thirty five (35) questionnaires were administered to government institutions in Nigeria. And it covered Out of the thirty-five questionnaires given out, twenty one (21) were responded to. Sections 4.1 and 4.2 below, present the findings obtained from each group. In from 13 cloud service providers organizations that is National information technology agency, Kano State Government, Nigerian Communications Commission, Ministry of education Kaduna, Abubakar Tafawa Balewa University Bauchi, Kano Geographical Information system, NMC, Energy Commission of Nigeria, Board of Internal Revenue Kano State, Nigerian Airspace Management Agency, National Pension Commission, Petroleum Technology Development Fund, Central Bank of Nigeria, Ministry Of Science And Technology Kano and Kano electricity distribution company and on 17 positions that is IT Officer, IT, Director ICT, Director scholarship department, Commissioner Inspectorate, Executive officer, Tax Administrator, Help Desk Analyst, System Admin, GIS officer, Lecturer, Deputy Manager, Senior Officer, Chief information officer, Network Engineer, Senior Special Assistant On ICT, Senior assistant

4.1 FINDINGS FROM CLOUD SERVICE PROVIDERS.

In total 17 cloud service providers participated in the study namely: IT solutions, Cloud Host Nigeria, Go4 Hosting Nigeria, Host Ville Nigeria, Utiware.net Nigeria, Globacom Nigeria, SimbaNET (U) limited, DESCASIO CLOUD Solutions, GBB, NigComSat Lyd, Galaxy Backbone and Etisalat / 9Mobile Nigeria

The participating cloud service providers were mainly represented by 16 positions that is Administrator, Data Officer, Software Engineer, IT Manager, Network engineer, Senior officer, Database administrator, Technical manager, IT officer, E-Government Solutions Manager, Engineering, Operation Manager, Technician, Network Admin, Programmer and System Analyst from ICT department.

4.2 Organizations that Participated in the study

In total 17-cloud service providers based in Nigeria participated in the study. All the 17 had 1 participant except for GBB that had 2 participants and Galaxy backbone that had 3 participants. The list of all cloud service providers that participated in the study is given in the appendix as appendix 1.

4.3 Position of the Respondents

The respondents were distributed among different specializations of IT namely; Administrator, Data Officer, Software Engineer, IT Manager, Network engineer, Senior officer, Database administrator, Technical manager, IT officer, E-Government Solutions Manager, Engineering, Operation Manager, Technician, Network Administrator, Programmer and System Analyst.

4.1 Gender

Majority of the participants were male at 63.2% compared to the females who were 36.8%

4.2 Age of the Respondents

Majority of the respondents were between 25-34 years of age followed by the 35-44 years age bracket as summarized in table 4.3 below.

Table 4.3 Age of the Respondent

Age	Frequency	Percentage
Below 25 Years	0	0%
25-34 Years	8	57.9%
35-44 Years	4	20%
45-54 Years	2	10.3%
55-64Years	1	6.5%
65+ Years	0	0%

Figure 4.3 Ages

4.3 Level of Education for the participants

Majority of the participants were holders of bachelors and Masters degrees as shown in table 4.4 below.

Table 4.4 Level of Education for the Participants

Qualification	Frequency	Percentage
Masters and above	9	42%
First degree	10	47.4%
Diploma	2	10.5%
Certificate	0	0%
Other	0	0%

Figure 4.4 Educations

4.5 Types of cloud services provided

Majority of the cloud service providers provide platform as a service followed by software as a service followed by infrastructure as a service and advisory services for cloud computing as shown in table 4.5 below.

Cloud Service	Frequency	Percentage
Software as a service	5	21.1%
Infrastructure as a service	4	15.8%
Advisory services for cloud computing	4	15.8%
Platform as a service	6	26.3%
Business process as a service	0	0%
All	13	63

Table 4.5 cloud services

4.6 Other companies that provide cloud services in the country

Other companies that provide cloud services in the country some are based in Nigeria while others are not based in Nigeria include; MTN, Globacom, Amazon Web services and Google.

4.7 Whether government institutions are among the customers of cloud services provided in Nigeria

Participants were asked whether government institutions were among the customers of cloud services provided in Nigeria to which 68.8% said YES while 36.8% said NO.

4.8. Government Institutions that Currently Use Cloud Services

Participants were further asked to name the Government Institutions that were currently using their cloud services and the kind of cloud services they were using. Table... below gives a summary of the Nigerian Government institutions that are currently using cloud services and the kind of cloud services currently used.

Table 4.9 government institutions using cloud services and the kind of services used

Name of Government Institution	Kind of Cloud Service used from your company	4.9 Challenges Faced by Cloud Service Providers
Federal Inland Revenue Services, National Insurance commission, Federal Inland revenue services, National information Technology development agency. Federal inland revenue services,	Platform as a services Platform as a services Platform as a services Platform as services, infrastructure as services. Platform as a services, infrastructure as a services, Software as a service All	Participants were asked about the challenges they currently face in their business of providing cloud services to which majority low demand for the services (68.4%) indicated recruitment of qualified staff with 15.8%, high operational cost with 0% and low demand for the services with 10.5 as summarized in table 4.9 below.
Nigerian Social Insurance Trust, Bank of Agriculture,	Platform as services. Platform as a service and business process as a services Software as a service, Platform as a service, Advisory services for cloud.	
Oyo State Government		
Plateau State University, Bokkos	Software as a service, Platform as a service, Advisory services for cloud computing All Platform as a service and business process as a service Platform as a service, infrastructure as services	
ALL FEDERAL AGENCIES Nigeria Institute Management		
NIGCOMSAT		
Federal Ministry Of Science And Technology, FIRS, Platform as services, Software as services. Pension Commission	Platform as a service, infrastructure as services, platform as a services, infrastructure as a services, Software as eservices Platform as a service, infrastructure as services, Software as a service, Platform as a service.	
Nigerian Airspace Management Agency.	Infrastructure as a services, platform as a services	<i>Table 4.9 challenges and comments on cloud services</i>
Central Bank of Nigeria	Messaging as a service, SharePoint-as-a-service, platform as a services, Infrastructure-as-a-service, Software-as-a-service A-service (SaaS) as well as Infrastructure-as-a-service (IaaS)	
Transcorp Hotel,		
AMCOM Nigeria,	A-service (SaaS) as well as Infrastructure-as-a-service (IaaS)	
Coscharis Group and it offered	IaaS, Messaging as a service, SharePoint-as-a-service, platform as a services	
Federal Ministry of Education,	IaaS, Messaging as a service, platform-as-a-service.	

Challenges	Frequency	Percentage
High operational costs	0	0%
Recruitment of qualified employees	3	15.8%
Low demand for the services	14	68.4%
Others specify	0	0%

4.10 Suggestions about how the uptake of cloud services among government institutions in in Nigeria can be increased

Participants were asked to make suggestions of ways uptake of cloud computing services among government institutions can be increased in Nigeria and below is a summary of the suggestions given.

Awareness and training about cloud computing: Some of the individual responses for this category are:

- Awareness about cloud services to institutions
- Providing awareness of cloud services to organization
- Cloud Computing awareness on their benefit
- Organise sensitisation and awareness workshop for government institutions' decision makers
- Increased Awareness
- Awareness about cloud computing
- Increased advocacy on the use and benefits of cloud computing to organisations

Availability of IT experts in cloud computing, data center and power supply about cloud computing. Some of the individual responses for this category are:

- By availability of IT cloud experts, Data center etc.
- Stability of power supply
- Availability of Internet network and stability of electricity supply etc.
- Electricity supply, internet network, ICT infrastructures
- Adequate electricity supply
- The unreliability of power supply in the country needs to be taken seriously and resolved as soon as possible. This is because electricity is very essential especially in the running of data centers; there should be intensified awareness creation by cloud service providers geared at sensitizing the public on the benefits and risks of cloud adoption by organizations in Nigeria
- Power supply is needed because cloud can not run without internet and internet needs electricity, public institutions needs awareness about cloud computing so that they can use it in there organisations
- Availability of power supply, which can protect lost of date and inability to access cloud services
- It need data center, ICT Infrastructures

Availability of ICT infrastructures and more cloud service providers for cloud computing. Some of the individual responses for this category are:

- Provide adequate ICT infrastructures
- Availability of ICT cloud infrastructure
- Provide broadband to backbone infrastructure, data centers
- Increased advocacy on the use and benefits of cloud computing to organisations, The establishment of manufacturing plants for ICT equipment, participation of cloud service providers, the government institutions at all levels
- Need for backbone infrastructure sharing/general communication problems, it need data center, ICT Infrastructures
- More cloud service providers are needed in the country to encourage competition, which will result to the driving down of the cost of its services. This would make the technology more appealing to organizations, promotion of pervasive broadband deployment, increasing its adoption and usage, and ensuring availability of broadband services at affordable rates.

Adequate financing for cloud computing: Some of the individual responses for this category are:

- Adequate financing for GBB services

7. 4.11 Other relevant comments made by the Participants

Table 4.12 other relevant comments

Why should adopt

Adopting cloud computing is the best for public and private institution in Uganda.

Uptake of cloud computing in Nigeria will make cloud computing the next big thing in Nigeria.

Government institution should be aware to know that cloud computing is one the best technology for easy access to improve services in their institutions.

Cloud computing is safe and easy to access at anytime and anywhere.

Adoption of cloud computing in government institutions is the best technology in the new generation.
 Cloud computing will also help organisation achieve reasonable saving on energy cost
 It's good for government institutions to adopt cloud computing in there organisations.
 Cloud computing services are more secured, reliable and affordable.
 Cloud computing is a new technology in our institutions.
 The future of cloud computing in Nigeria is bright if government and all stakeholders would put all hands on deck to ensure that these identified challenges/impediments to its feasibility are addressed squarely.
 Cloud technology is good for our institutions.
 Cloud computing globally has come to stay, and Nigeria cannot afford to leave behind.
 Cloud computing offerings globally are taking center stage in strategizing businesses for more profitability and cost management.
 Adoption of cloud in institutions will enable cloud computing to work viably in Nigeria.
 To make cloud computing the next big thing in Nigeria can properly be achieved through the active participation of all involved stakeholders.

Why not to adopt

Unstable power provision in the country is a big challenge for cloud service providers

4.2 FINDINGS FROM GOVERNMENT INSTITUTIONS

National information technology agency, Kano State Government, Nigerian Communications Commission, Ministry of education Kaduna, Feedback was also sought from 14 government institutions above
 The in total 14 government institutions participated in the study were mainly represented by Directors and senior staff in the ICT department namely:

1. Name of the Institutions

Table 4.13 Name of the government institution.

Government Institution	frequency	Position of the staff that participated
National information technology agency	3	IT officer, IT, Executive officer Senior special assistant on ICT
Kano State Government	1	Deputy Manager, System admin, Network engineer
Nigerian Communications Commission	3	Director scholarship department, commissioner
Ministry of education Kaduna	2	inspectorate Lecturer
Abubakar Tafawa Balewa University Bauchi	1	GIS officer
Kano Geographical Information system	1	System admin
National M Commission	1	Desk analyst,
Energy Commission of Nigeria	1	Tax administrator
Board of Internal Revenue Kano State	1	Network Engineer
Nigerian Airspace Management Agency	1	IT Officer
National Pension Commission	1	Network Engineer
Petroleum Technology Development Fund	1	Executive officer
Central Bank of Nigeria	1	Director ICT
Ministry Of Science And Technology Kano	1	Chief information officer
Kano electricity distribution company	1	

Table 4.13 shows the names of organization that participated in the study, number of staff that participated and positions of the staff that participated.

2. Gender

Majority of the participants were Male (15) while Females were (6). This could be due to the fact that globally most ICT professional are men.

3. Age

Majority of the participants were between 25-34 years at 52.4%

Table 4.14 Age

Age	Frequency	Percentage
Below 25 Years	1	4.8%
25-34 Years	11	52.4%
45-54 Years	8	38.1%
55-64 Years	1	4.8%
65+ Years	0	0%
	0	0%

4. Education

Table 4.15 level of Education for participants

Majority of the participants had Masters degrees and above at 62%. All others had Bachelors degrees.

Current Position	Frequency	Percentage
Less than 1 year	1	4.8%
Between 1 to 4 years	7	33.3%
Between 4 to 7 years	5	23.8%
Between 7 to 10 years	3	14.3%
More than 10 years	5	23.8%

Qualification	Frequency	Percentage
Masters and above	13	61.9%
Bachelor degree	8	38.1%
Diploma	0	0%
Certificate	0	0%
Other	0	0%

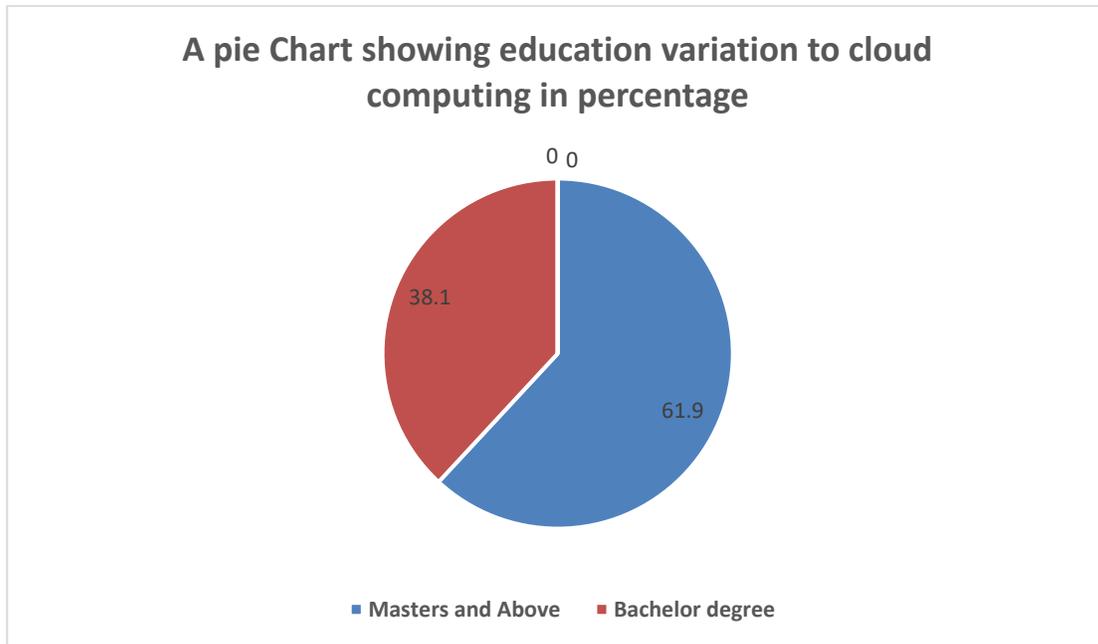


Figure 4.1 Education

5. Duration in current position

Majority of the position duration are between 1 to 4 years with 33.3% then between 4 to 7 years and more than 10 years with 23.3% then followed between 7 to 10 years with 14.3% and the lowest position duration are less than 1 year with 4.8%

6. Level of operation for the government institutions that participated in the study?

Most institutions that participated in the study were operating at the national level (76.2%) while the rest were operating at the provincial level, none operated at the local level.

7. Level of Understanding of Cloud Services?

Majority of the participants had a moderate (43%) and low (33%) understanding of cloud services

Table 4.20 cloud service level

Level of understanding	Frequency	Percentage
High	5	23.8%
Low	7	33.3%
Moderate	9	42.9%
Others	0	0%

5. Reasons for the level of understanding of cloud services

High level of understanding: Some of the individual responses for this category are: Because its modern technology that boost the tomorrow's technology to high intensity.

Cloud it usually been used in institutions at national level

Cloud has different Services that gives options to cloud users e.g. platform, software and infrastructure as a services.

Is a model in which application software is delivered via the internet.it is a model where, the service providers supply service to the users, such as development environment, and server platforms through which the users can develop custom applications.

Cloud services are platform as service, infrastructure as services.

Cloud computing is a process whereby data's and storage in a cloud and it can easily be access at anytime and anywhere at far as there's Internet Connection.

Cloud computing is the delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage; similar to how you are billed for water or electricity at home.

The practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

With the adoption of Cloud Computing, Data will be more secured and easier to access everywhere and where necessary.

As specialist in the field of Computing and Currently undergoing some research on Virtual Machine Placement in Cloud Computing.

It is a kind service provided to users on demand through the use of Internet from cloud computing provider's server instead of providing by on-premise server own by the company.

Moderate: Some of the individual responses for this category are:

Not much knowledge about it because is a new to our organization.

Not much Knowledge about the cloud computing.

Basic knowledge.

I know how cloud system operates seamlessly across various devices

Low: Some of the individual responses for this category are:

Low.

We use Cloud services and I lecture Cloud computing.

I have not used it much.

6. Institution using clouds services

Majority (76.2%) the institutions were using clouds services.

7. Cloud services used

Majority of the participants were using software as a services, infrastructure as services and platform as a services.

Table 4.22 cloud services used

Services used	Frequency	Percentage
Software as a service between	11	52.4%
Infrastructure as a service	11	52.4%
Advisory services for cloud computing	1	4.8%
Platform as a service	8	38.1%
Business process as a service	2	9.5%
Others specify	1	4.8%
None of the above	2	9.5%
Not using	1	4.8%

8. Other government institutions using cloud services in the country

A total of 15 other government institutions were given by participants as also using cloud

Corporate affairs commission Nigeria

Nigerian communication commission

Petroleum Trust Development Funds

Central Bank of Nigeria,

Security & Exchange Commission,

National Information Technology Development Agency,

Pension Commission

Federal University of Nsukka

Federal Inland Revenue Service,

Nigeria ComSat,

Nigeria Communication Commission

National Identification Management Commission

Nigeria Insurance Commission

Federal Airport Authority of Nigeria

Ahmadu Bello University ZARIA

9. Whether all government institutions should adopt use of cloud services

Participant were asked whether they think it is a good idea for all government institutions to adopt use of cloud services to which 75% said Yes and 25% No

10. Reason why government institutions should use of cloud computing.

Why should adopt: Some of the individual responses for this category are.

Because it saves cost

There are many benefits of cloud computing most important is cost reduction and instant access.

It will help government institutions in storing data and easy accessibility

With the adoption of Cloud Computing, Data will be more secured and easier to access everywhere and where necessary. The issues of losing Data will be minimized.

It makes data storage easier and more secured in terms of data loss.

It help reduce Cost of running the Organisations, reduce IT Resource wastage, and enhance speed in executing complicated tasks

Scalability: Cloud infrastructure scales on demand to support fluctuating workloads. Storage options: Users can choose public, private, or hybrid storage offerings depending on security needs and other considerations. Control choices: Organizations can determine their level of control with as-a-service options. These include software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). Tool selection: Users can select from a menu of prebuilt tools and features to build a solution that fits their specific needs. Security features: Virtual private cloud, encryption, and API keys help keep data secure.

The Cloud computing makes your business dependent on the reliability of your Internet connection. When it's offline, you're offline. If your Internet service suffers from frequent outages or slow speeds, cloud computing may not be suitable for your business.

It can store are huge data's, it will reduce cost to the government, it can keep records for a long time

It kept huge data, it protect data from missing

It can helps for recording data easily

This will save cost

Cloud computing Will assist in conducting all government business in simple way.

Because all the data's store can easily be accesses and you can keep huge information on a cloud.

Use cloud-based servers.

Why should not adopt: Some of the individual responses for this category are.

Because of sensitive of information, security agencies and other departments should not use it now.

Its not 100% secured

The data's are not so secured

Because it is not secured to keep some confidential information on cloud

Because its the needs of modern technology

The reasons for and against cloud service adoption given by participant's shows that they understand fairly well the pros and cons of cloud services in general and for government institutions in particular.

11. Suggestions on ways the adoption of cloud computing services among government institutions in the country can be increased?

Awareness and Training: Some of the individual responses for this category are.

Advertising benefits, promoting cloud computing in schools.

Adequate awareness about cloud services, providing adequate infrastructures in which clouds will be run e.g. electricity, internet connectivity etc.

Enlighten the stakeholders and convincing them about the importance of it.

Sensitization and training of IT Staff

Traditional programmers should be trained on the new cloud technologies; government should allocate relevant training funds to his IT organization, Available power supply and Data Center

Enlightenment about the benefit of cloud to government institutions, Cloud Computing Experts with are knowledge on how to managed all clouds service in an educational institution and aviation sectors

Awareness or Enlightenment about cloud computing benefit, Availability of fund to carry out the project, Experts that can manage and show how cloud services can be used

It needs Enlightenment for the institutions before adopt it, it need Available electricity for connecting with Internet so that you can access data stored etc.

Improve the quality of Internet and infrastructure: Some of the individual responses for this category are.

Government should provide accessible, available and affordable Internet access service

By providing reliable Internet services and uninterrupted power grids

Data Center, Power supply, Internet Connection, IT infrastructures

ICT infrastructures, Power supply, Experts that can manage and control cloud services

Develop a government policy on cloud service adoption: Some of the individual responses for this category are.

Government should use Nigerian Information Technology Development Agency (NITDA) as tool to sensitize other agencies on the importance cloud computing.

By employing skilled IT staffs.

Introducing New Policy that makes organisations to operate in real time.

Ensure the use IT Technology in all government institution.

Experts that know well about the clouds

Cloud services knowledge about it benefit which can convince institutions at state level to adopt Software as a service

Security and privacy

Security is the biggest concern when it comes to cloud computing.

Ensure all data and information on cloud are secured.

Provide reliable security on the data stored.

The cloud users should have privacy on their data

Protect their data from unauthorized users

12. Other relevant comments provided by participants

To adopt cloud services: Some of the individual responses for this category are.

Cloud is important.

Cloud computing is the next big technology.

Adopting cloud computing in Nigerian institutions is the best idea.

Cloud computing is new and should be adopted with absolute care in its adopt action.

Nigerian government Institution should adapt the use of Cloud Service as it reduces Cost of running the organisation. And for Researchers, there is a need for further research on Cloud Computing & Fog Computing in order to help save Energy.

I personal think more private institutions should adopt the use of cloud computing services in Nigeria.

Nigerian ICT institutions

Cloud will be the best technology in the near future for storing information by government institutions.

Adopting cloud computing will bring fast gaining when implemented.

Is good for government to adopt cloud services in their ministries and other agency.

To adopt cloud in government institutions it has side effect and benefits to the organisations.

It will be much more better for government institutions to uptake this new technology

Uptake of cloud at state ministries can benefits government alots.

Government should adopt the use cloud computing in their e-governance activities.

We will be high glad to have this fantabulous project within our institutions because they needed to be on a new world.

Adopting cloud computing in government institutions will be are good ideas for.

I see little evidence of anyone losing their job as a result of cloud computing. I do, however, see job responsibilities shifting in IT department.

Enlightenment is Very important as many people at stakes doesn't know about the Cloud computing

Cloud computing has many impacts from the social, organizational, and environmental point of views so is good government to adopt in it some Institutions.

Not to adopt cloud services: Some of the individual responses for this category are.

A major disadvantage of cloud computing is Downtime. No cloud provider, even the very best, would claim immunity to service outages.

Cloud computing systems are Internet based, which means your access is fully dependent on your Internet connection.

The adoption of cloud computing in the enterprises particularly organizations and government agencies in developing countries is a major challenge. Cloud computing is a recent innovation in computing technology and still under development. Though it received considerable attention of research in industrialized countries, and envisioned to be the next generation architecture of IT enterprise, its understanding and recognition is quite low even among IT practitioners in developing countries, this eventually leads to organizations and government agencies not exploring its full benefits.

Quantitative and qualitative approaches were employed in the research process to explore the factors responsible for slow adoption of cloud computing, data were collected and analysed and the findings led to the conclusion that though cloud adoption is foreseeable in near future, efforts are required from both government and IT service providers to overcome the obstacles to its adoption

4.3 Requirements for increasing adoption of cloud services among Government Institutions in Nigeria

4.3.1 Awareness and Training: Sixty eight percent (68%) of the cloud service providers that participated in the study indicated that one of the key challenges faced by the sector is low awareness about cloud computing services and their importance. The representatives of government institutions that participated in the study agreed with cloud service providers and suggested that Government through the Nigerian Information Technology Development Agency (NITDA) should sensitize other agencies on the importance of cloud computing. Representatives of government institutions that participated in the study advised that to increase adoption of cloud computing in government institutions, traditional programmers should be trained about the relatively new cloud

computing technologies and government should allocate funds for such training. They also advised that all public servants should be enlightened about the benefits cloud computing such as cost saving, more reliable services, etc. The research carried out by Awosan (2014) revealed that 89.1 percent of the research respondents were of the view that lack of proper awareness of the workings and benefits of cloud computing was responsible for its poor adoption. The people interviewed also corroborated this view. The research also revealed that many small businesses in Nigeria have employees that lack the requisite skills to operate basic ICT tools including cloud applications. And many business owners do not want to invest in upgrading the skills of these personnel for several reasons including cost of training and fear that the employees may end up leaving the organization abruptly (Awosan, 2014). So lack of skills to manage these applications and business owners not seeing real value in automating their processes are huge challenges working against the adoption of cloud based solutions among many Nigerians.

4.3.2 Improve the quality of the Internet Infrastructure:

Cloud service providers that participated in the study noted that there is a need to provide broadband connection to the backbone infrastructure and data centres to make it easier for individuals and institutions to access cloud services. The representatives of the government institutions noted that to increase adoption of cloud services in the country, government should provide more reliable and affordable Internet services. Ogunraku (2014) reported that the very few data centers located in Nigeria are mainly situated in Lagos which has better network backbone connectivity due to its close proximity to the various under sea Internet cables including Main One and GLO 1 cables. The in-country network backbone connectivity in Nigeria is still very poor because most other states in Nigeria lack direct connection to the undersea Internet network (Purefoy & Kermeliotis, 2012). Backbone networks play major role in the delivery of ICT services including cloud services in all countries. And it contributes a huge portion of the total cost incurred by network providers to their overall cost. And in a country with very vast geographical spread like Nigeria the cost of providing broadband connectivity per subscriber is very high. This cost is much lower per subscriber in cities like Lagos and other densely populated cities compared to rural areas and cities with sparse population (Williams, 2010). Internet penetration is still very low with broadband penetration even lower (Chidiebere, 2013). There isn't long distance national backbone to carry and distribute the capacities provided by the submarine cables mentioned above to the users in offices, schools, and homes in the hinterland across Nigeria (Olusola & Olajoyetan, 2013). Some of the problems identified as hampering the growth of broadband and by extension cloud computing services in Nigeria is the very high cost of obtaining right of way (inclusive of cost involved in settling government officials, the cost of settling various indigenous owners of the land where the infrastructure will pass through and long delays in procuring the right of way permits). This cost invariably causes the cost of leasing transmission infrastructure to be high. The high cost of investment in last mile broadband infrastructure leads service and infrastructure providers such as the telcos to concentrate only in major cities. Frequent vandalization of broadband infrastructure by hoodlums leaves undesirable financial burden on owners of telecommunication infrastructures. Other challenges include multiple taxation on the part of the federal, state and local governments; weak regulation in some case, incessant disruption due to road works and huge cost of providing alternative electricity to power telecommunication equipment (Olusola & Olajoyetan 2013). Consequently Internet penetration in Nigeria is very poor due to inadequacy of this infrastructure. And where available the cost is quite high. According to the Nigeria Communications Commission there over 85 million Nigerians with access to the Internet as at March 2015. This figure is calculated by adding up all the Internet subscribers per telecommunication operator. This figure may not be very accurate as many Nigerians own more than one phone line, so there may be issues of double counting. The US Census Bureau (2014) suggests that Internet penetration in Nigeria is 33 percent. If this figure by the US Census bureau is correct it means that Internet penetration in Nigeria is low when compared to other African countries especially Morocco, Egypt, Tunisia and South Africa.

4.3.3 Develop a government policy on cloud service adoption: The Government of Nigeria should introduce a new policy that mandates and guides all government institutions in the country to use cloud services for some aspects of their work in order to exploit some of its advantages

4.3.4 Provide more reliable power supply: Lack of or unstable power supply especially outside the big towns was given as another big challenge to the adoption of cloud computing in Nigeria. Greengard (2010) identified lack of stable power supply as one of the factors that can cause both loss of data and inability to access cloud services. He noted that, in essence consumers may not be able to access cloud services always and even when they do sudden loss of power supply can cause loss of data (Greengard, 2010).

4.3.5 High Cost of Internet: Another major problem limiting the ready adoption of cloud services is the high cost of bandwidth required to transfer data through the Internet especially when working with data intensive applications (Otuka, Preston, & Pimenidis, 2014). Furthermore, unreliability of Internet services due to high cost of Internet and several factors including low bandwidth capacity is also a limiting factor (Leavitt, 2009).

Mobile operators are nevertheless now the primary means of Internet access as they are for voice services. The Research ICT Africa household and individual ICT survey (2012) found that in 11 of the 12 participating sub-Saharan African countries (the exception being South Africa), less than 16 per cent of the population has ever used the Internet. Moreover, internet users are concentrated in urban areas, while rural and marginalised areas are almost untouched by the Internet; and of those using the Internet, the majority gains access to it through mobile devices but with high cost of bandwidth (Research ICT Africa, 2012).

4.3.6 Provide reliable and consistent the cloud services: There is also the lack of confidence on the part of organisation on the overall reliability and consistency in the quality of service provided by cloud service providers over a long term (Otuka, Preston, & Pimenidis, 2014). Some organizations especially large organizations may not be too comfortable entrusting their IT services to cloud service providers for fear of down time. They may not be sure if the cloud services provider will guarantee optimal performance for their missions critical business. This view is supported by Carr (2005), who rightly opined that one of the major impediments to the

adoption of cloud computing will not be technology but attitude of end-users towards cloud computing. Marston et al., (2011) observed that some applications may not be currently sustainable to be implemented as cloud service but may therefore need to interact with other cloud based applications a process that may pose challenge both in terms of contractual and support issues. Due to the nature of cloud computing services some organizations may be skeptical in adopting the service, as they do not have “control” as such over the information and supporting infrastructure. And some may also be worried about vendor location due to lack of standards or the vendor even completely going out of service.

4.3.7 Data Security, privacy and lack of standards: Security and privacy are the major challenges facing cloud computing not only in Nigeria but also across the world. These concerns are some of the issues hindering people and organizations to adopt cloud computing. T. Ilias (2013) noted that by adopting cloud computing, an organization is handing over its data and information to a third party to manage and protect them hence reliability is very important. If the data is to be compromised, it will be a disaster to big organizations financially and it will taint their reputation. The news people hear on cyber wars among countries and security breach even faced by the top IT companies in the world doesn't help assure people that cloud computing is secure.

T. Ilias (2013) pointed out that privacy are some of the concerns in cloud computing. From the research carry out, various stories of data loss and password leakage in the media does not help to reassure some of the most concerned users.

Security is the biggest concern when it comes to cloud computing. By leveraging a remote cloud based infrastructure, a company essentially gives away private data and information, things that might be sensitive and confidential. It is then up to the cloud service provider to manage, protect and retain them, thus the provider's reliability is very critical, Similarly, privacy in the cloud is another huge issue. Companies and users have to trust their cloud service vendors that they will protect their data from unauthorized users.

Awosan (2014), Qamar et al (2010) and Otuka, Preston, & Pimenidis, (2014) pointed out that issues of security, privacy and lack of standards are some of the major concern in cloud computing. From the research carried out by Awosan (2014) Chief Information Officers in selected organizations in Nigeria are of the view that cloud service adoption is considered risky due to insecurity and lack of privacy. Likewise the research by Otuka, Preston, & Pimenidis (2014) especially from the focus group part discovered that security and privacy issues were seen as major impediments to cloud computing adoption in Nigeria. Furthermore they found out that lack of standards governing ICT use in general in Nigeria is a key problem to the adoption of cloud services by organisations

National Insecurity: Insecurity faced in some parts of the country is a challenge because it disrupts the connectivity to the cloud infrastructure. Telecommunication Company's base stations are sometimes destroyed across the country, According to International Bank for Reconstruction and Development / The World Bank (2016). 150 base stations were lost due to bombing and flooding in 2012 alone and twice as many dependent base stations were also affected. Fibre links laid across the country have many times been vandalized leading to disruption of service and it hinders the ability of service providers to have their service available 24/7 and more importantly, such occurrence discourage potential customers from taking up use of cloud services

4.4 ADDITIONAL REQUIREMENT FOR THE UPTAKE OF CLOUD COMPUTING IN DEVELOPING COUNTRIES.

The requirement to make cloud computing the next big thing in Nigeria can properly be achieved through the active participation of all involved stakeholders. These include the cloud service providers, the government institutions at all levels, telecommunication infrastructure providers, financial institutions among others. Government on its part should put more effort in developing and propagating the adoption of ICT in Nigeria. It should ensure the development of basic infrastructure such as stable electricity supply. This can be achieved in collaboration with private sector investors in the area of electricity generation, transmission and distribution. With such infrastructure in place other investors in the ICT sector will be encouraged to make more tangible investment in cloud computing facilities and indeed other ICT infrastructures that will one way or the other support cloud computing. With stable and efficient power supply, organizations that are into the provision of cloud computing services will invest in the establishment of data centers in Nigeria. This will decrease the cost of accessing cloud services and also improve the speed of access, as the consumers will be able to access the services in country instead of accessing it from a distance country. Furthermore, promoting the establishment of more inclusive and robust network infrastructure will bring about increase in the use of broadband services. The current state of network backbone infrastructure in Nigeria is still very limited not covering most sections of the country thereby making the reach of broadband very poor and where available not adequate. Government either working alone or in partnership with private sector investors by proving the necessary enabling environment should aggressively pursue the extension of current ICT network backbone across the country (Dahunsi & Owoseni, 2015).

The establishment of manufacturing plants for ICT equipment especially the equipment that are used in cloud computing will help reduce the price of these items and invariably the adoption of cloud computing (Dahunsi & Owoseni, 2015). Investment in such manufacturing plants should be embarked upon by private sectors. On government's part it can provide the enabling environment including tax relieves to private sector investors to encourage them to setup such manufacturing plants. The private sector investors should be bold enough to make necessary investments in setting up manufacturing plants. They should take special consideration to the over 100 million prospective consumers and the over 17 million micro businesses that can potentially become small and even medium size enterprises.

There should be increased advocacy on the use and benefits of cloud computing to organisations. Many organisations are not entirely aware of the real effect automation can bring to their bottom line. Letting them know how automation can help improve sales, manage customers; track inventory and so on will surely help encourage the adoption of cloud computing services. Government and cloud computing service providers can also go further to give incentives to organisations that adopt the use of basic cloud computing services in their activities. For instance organisations can be given free tutorial on how to migrate to cloud services and service providers

should also consider giving free trial for a given period of time to try out cloud services. Increased availability of more cloud computing service providers will also aid adoption. This will help address the issue of inaccessibility and in the long-term reduce cost and bring about improvement in cloud services due to competition among cloud service providers. Development of innovative cloud solutions that are suitable for government institutions in Nigeria, such as CliniPak (West, 2015) a mobile healthcare solution currently in use in Nigeria will ultimately help improve cloud services adoption. Similar solutions should be developed for the various sectors in Nigeria in simple to use and affordable manner.

More focused research should be geared towards improving cloud computing infrastructure and services. Private sector organizations can sponsor research institutions either through grants, scholarships etcetera to carry out research work that will help improve cloud-computing services in Nigeria. Such research can include looking at ways of improving present services, manufacturing new hardware equipment and software applications. Dahunsi & Owoseni (2015) suggest that public universities can be encouraged to establish cloud network laboratory in their institutions to teach regular students and organizations that may wish to send their employees to learn specific skills on the provision, management, support and deployment of cloud computing services.

Regulation including enforcement of data protection laws and all other intellectual property rights protection regime should be adequately enforced. Nigeria is a member of WIPO and is signatory to all the major IPRs treaties but the problem has always been the enforcement of the relevant laws. Fully enforcing such laws will give users the confidence to adopt cloud computing services including allowing their vital data to be warehoused in a data center knowing that their data will be adequately protected. And where there is a breach they can easily get the relevant government authorities to take necessary action including getting redress from the legal system. Having a sound regulatory system that ensures that service providers keep to their side of the bargain and deliver proper services with minimal downtime will be a huge source of encouragement to organisations to adopt cloud-computing services.

V. DEVELOPMENT OF A MODEL FOR ADOPTION OF CLOUD COMPUTING IN GOVERNMENT INSTITUTIONS IN NIGERIA.

5.1 Introduction

This chapter presents the model for the adoption of cloud computing in government institutions in Nigeria. It covers discussion of the requirements for the model, development of the model and finally validation of the developed model.

5.2 Requirements for adoption of cloud services among Government Institutions in Nigeria

The requirements for adoption of cloud computing services among government institutions in Nigeria were obtained from a survey on cloud service providers and Government institutions in Nigeria as well as a review of related literature. The requirements obtained include: awareness and training, improving the quality of the internet infrastructure, developing a government policy on cloud service adoption, providing more reliable power supply, reduction of Internet costs, providing reliable and consistent cloud services, data security, privacy and development of standards and a national security policy.

5.2.1 Awareness and Training: Sixty eight percent (68%) of the cloud service providers that participated in the study indicated that one of the key challenges faced by the sector is low awareness about cloud computing services and their importance. The representatives of government institutions that participated in the study agreed with cloud service providers and suggested that Government through the Nigerian Information Technology Development Agency (NITDA) should sensitize other agencies on the importance of cloud computing. Representatives of government institutions further advised that to increase adoption of cloud computing in government institutions, traditional programmers should be trained about the relatively new cloud computing technologies and government should allocate funds for such training. They also advised that all public servants should be enlightened about the benefits of cloud computing such as cost saving, more reliable services, etc. The research carried out by Awosan (2014) revealed that 89.1 percent of the research respondents were of the view that lack of adequate awareness of the workings and benefits of cloud computing was responsible for its poor adoption. The people interviewed in this research also corroborated this view. Furthermore Awosan (2014) established that many small businesses in Nigeria have employees that lack the requisite skills to operate basic ICT tools including cloud applications yet many business owners are reluctant to invest in upgrading the skills of these personnel for several reasons including cost of training and fear that the employees may end up leaving the organization abruptly. So, lack of skills to manage these applications and business owners not seeing the real value of taking some/all their computing services to the cloud are huge challenges working against the adoption of cloud based solutions among many Nigerian institutions including government agencies.

5.2.2 provide more reliable Internet Service:

Cloud service providers that participated in the study noted that there is a need to provide broadband connection to the backbone infrastructure and data centres to make it easier for individuals and institutions to access cloud services. The representatives of the government institutions noted that to increase adoption of cloud services in the country, government should provide more reliable and affordable Internet services. Ogunraku (2014) reported that the very few data centers available in Nigeria are mainly situated in Lagos which has better network backbone connectivity due to its close proximity to the various under sea Internet cables including Main One and GLO 1 cables. The in-country network backbone connectivity in Nigeria is still very poor because most of the out of town states in Nigeria lack direct connection to the undersea Internet network (Purefoy & Kermeliotis, 2012). Backbone networks play major role in the delivery of ICT services including cloud services in all countries and contributes a huge portion of the total cost incurred by network providers to their overall cost. In a country with a very vast geographical spread like Nigeria, the cost of providing broadband connectivity per subscriber is very high. This cost is much lower per subscriber in cities like Lagos and other densely populated cities compared to rural areas and cities with sparse population (Williams, 2010). Internet penetration is still very low with broadband

penetration even lower (Chidiebere, 2013). Additionally, there is not long distance national backbone to carry and distribute the capacities provided by the submarine cables to the users in offices, schools, and homes in the hinterland across Nigeria (Olusola & Olaojoyetan, 2013). Some of the problems identified as hampering the growth of broadband and by extension cloud computing services in Nigeria is due to the very high cost of obtaining right of way (inclusive of cost involved in settling government officials, indigenous owners of the land where the infrastructure will pass and long delays in procuring the right of way permits). This cost invariably causes the cost of leasing transmission infrastructure to be high. The high cost of investment in last mile broadband infrastructure leads service and infrastructure providers such as the telecos to concentrate only in major cities. Frequent vandalization of broadband infrastructure by hoodlums leaves undesirable financial burden on owners of telecommunication infrastructure. Other challenges on the reliability and cost of the Internet service include: multiple taxation on the part of the federal, state and local governments; weak regulation in some cases, incessant disruption due to road works and huge cost of providing alternative electricity to power telecommunication equipment (Olusola & Olaojoyetan 2013). Consequently Internet penetration in Nigeria is very poor due to the inadequacy of the infrastructure and where available, the cost is quite high. According to the Nigeria Communications Commission, there were over 85 million Nigerians with access to the Internet as of March 2015. This figure is calculated by adding up all the Internet subscribers per telecommunication operator. However, this figure may not be very accurate as many Nigerians own more than one phone line, so there may be issues of double counting. The US Census Bureau (2014) reported an Internet penetration in Nigeria of 33 percent in 2014. This shows that Internet penetration in Nigeria is still very low compared to other African countries especially Morocco, Egypt, Tunisia and South Africa.

5.2.3 Develop a government policy on cloud service adoption: Given the low awareness about the potential of cloud computing and skills to acquire and manage such services among government institutions in Nigeria, the Government of Nigeria should introduce a new policy that mandates and guides all government institutions in the country to use cloud services for some aspects of their work in order to exploit some of its advantages

5.2.4 Provide more reliable power supply: Lack of or unstable power supply especially outside the big towns was given by the survey participants as another big challenge to the adoption of cloud computing in Nigeria. Additionally, Greengard (2010) identified lack of stable power supply as one of the factors that can cause both loss of data and inability to access cloud services. He noted that, in essence, consumers may not be able to access cloud services always and even when they do sudden loss of power supply can cause loss of data (Greengard, 2010). Therefore, for more institutions in Nigeria to adopt cloud services, the reliability of power in areas that already have it should be improved and for those that have not yet got it, it should be extended there.

5.2.5 Reduction of internet Costs: Another major problem identified by both cloud service providers and government institutions as limiting the ready adoption of cloud services is the high cost of bandwidth required to transfer data through the Internet especially when working with data intensive applications (Otuka, Preston, & Pimenidis, 2014). This challenge is a continental challenge. The Research ICT Africa household and individual ICT survey (2012) found that in 11 of the 12 participating sub-Saharan African countries (the exception being South Africa), less than 16 per cent of the population has ever used the Internet. Moreover, most of those that have ever used the Internet are concentrated in urban areas, while rural and marginalised areas have poor or no Internet at all ; and of those using the Internet, the majority gain access to it through mobile devices but at a very high cost of bandwidth (Research ICT Africa, 2012).

5.2.6 Availability of reliable and consistent cloud services: The study participants also expressed limited confidence in the overall reliability and consistency in the quality of service provided by cloud service providers over a long term. This was also pointed out by Otuka, Preston & Pimenidis (2014). In the survey, representatives of some government agencies expressed their discomfort about entrusting their IT services to cloud service providers for fear of down time. They noted that they may not be sure if the cloud services provider will guarantee optimal performance for their mission critical business. This view is supported by Carr (2005), who rightly opined that one of the major impediments to the adoption of cloud computing will not be technology but attitude of end-users towards cloud computing. Marston et al., (2011) observed that some applications may not be currently sustainable to be implemented as cloud service but may therefore need to interact with other cloud based applications, a process that may pose challenges both in terms of contractual and support issues. Due to the nature of cloud computing services some organizations may be skeptical in adopting the service, as they do not have “control” as such over the information and supporting infrastructure. Furthermore some may also be worried about vendor location due to lack of standards or the vendor even completely going out of service.

5.2.7 Data Security, privacy and standards: just like elsewhere in the world, government institutions in Nigeria raised the issue of Security and privacy as one of the major issues hindering them from adopting cloud computing services. Ilias (2013) noted that by adopting cloud computing, an organization is handing over its data and information to a third party to manage and protect hence reliability is very important. Data compromise will cause a disaster to big organizations financially and taint their reputation. Furthermore the survey participants noted that the stories they hear on cyber wars among countries and security breaches faced by the top IT companies in the world confirms their fears about the security challenges of cloud computing services. As noted by Ilias (2013), leveraging a remote cloud based infrastructure means that a company essentially gives away private data and information, including what might be sensitive and confidential. It is then up to the cloud service provider to manage, protect and retain them, thus the provider’s reliability is very critical, Similarly, privacy in the cloud is another huge issue. Companies and users have to trust their cloud service vendors that they will protect their data from unauthorized users. In a research carried out by Awosan (2014) Chief Information Officers in selected organizations in Nigeria concurred that cloud service adoption is risky due to insecurity and lack of privacy. Likewise the research by Otuka, Preston, & Pimenidis (2014) reported that the IT community in Nigeria considered security and privacy issues as well as lack of standards governing ICT use in general in Nigeria, major impediments to cloud computing adoption in Nigeria.

5.2.8 National security: Insecurity faced in some parts of the country is a challenge because it can disrupt the connectivity to the cloud infrastructure. Telecommunication Companies base stations are sometimes destroyed across the country, According to International Bank for Reconstruction and Development / The World Bank (2016), 150 base stations were lost due to bombing and flooding in 2012 alone and twice as many dependent base stations were also affected. Fiber links laid across the country have many times been vandalized leading to disruption of service hence hindering the ability of service providers to have their service available 24/7 and more importantly, such occurrences discourage potential customers from taking up use of cloud services. Therefore, improvement of national security will increase the reliability of the internet infrastructure and cloud services which will in turn attract more people to take up use of cloud services.

5.3 The development of a model for adoption of Cloud Computing in developing nations.

This section discusses a model for adoption of cloud computing in Nigeria, based on the requirements discussed in section 5.2. The model builds on the integrated model that has been widely utilized in efforts to increase adoption of cloud computing in developing nations. Other models for cloud computing adoption were evaluated as presented in chapter two section 2.9, but the integrated model was the closest to the requirements established for increasing adoption of cloud computing in Nigeria.

5.3.1 Deriving the Model

There are various models for adoption of cloud computing as presented in section ...but the integrated model was the closest to the requirements for adoption of cloud computing in Nigeria.

The integrated model was developed to examine the most important factors for adoption of cloud services in an organization. It covers technological, organizational and environmental factors (Tornatzky and Fleischer, 1990).

The components of technological factor meets the requirement for available and reliable power supply, the components of security privacy meets the requirement for level of security procedure in place to protect information or the system from unauthorized access or any other security events. The components of organizational factors meets the requirements for top management support and technology readiness, According to requirement collected the management will helps with developing of a government policy on cloud services adoption, management should introduce a new policy that mandates and guides all government institutions in the country to use cloud services for some aspects of their work in order to exploit some of its advantages while for technology readiness IT infrastructure and human resources in terms of cloud computing is by improving the quality of internet infrastructure. Cloud service providers that participated in the study noted that there is a need to provide broadband connection to the backbone infrastructure and data centres to make it easier for individuals and institutions to access cloud services, the components of environmental factors meet the requirement for The environmental factor that determines the environmental elements that might affect an organisation's intent to use cloud technology like compliance with regulation, trading partner pressure and competitive pressure.

5.3.2.1 A Model for Increasing Adoption of Cloud Computing Services In Nigeria

An integrated model has been developed to examine what are the most important factors for adopt the cloud in an organisation. This model incorporates aspects of the Technology Organization Environment Framework TOE (Tornatzky and Fleischer, 1990), The research model consists of three fundamental factors: technological, organisational, and environmental factors.

5.3.3.1 Components of The Model Developed

5.2.3.2 Technological Factor

The technological factor describes the characteristics of the cloud technology and identifies the factors that affect an organisation's decision to adopt this technology.

5.2.3.2.1 Availability: Availability is an influential factor in relation to an organisation's decision to adopt cloud computing. Cloud computing offers resources online, meaning that the consumer can access the cloud from anywhere and at any time. This means the system needs to function properly and must be available to use whenever it is requested.

5.2.3.2.2 Reliability: The reliability of the cloud is another major factor in the decision. It refers to the ability of a system to fulfill its intended function in a proper manner as expected. Reliability involves ensuring a high quality of service to end users, with a high transmission rate, minimum rate of errors, and fast recovery.

5.2.3.2.3 Security: Refers to the level of security procedures in place to protect information or the system from Unauthorised access or any other security events. Lack of security is one of the biggest doubts for many organisations that intend to adopt the cloud (Benlian and Hess, 2011)

5.2.3.2.4 Privacy: Defined as confidentiality of data, where only authorised users can access it. It is the main concern for organisations thinking about cloud computing because when using a cloud service an organisation cannot fully control the information stored on cloud-based servers.

5.2.3.2.5 Trust: Trust refers to the reliance on another entity and the belief that this entity will function as expected. Trust in the cloud environment heavily depends on trusting the service itself and the provider to provide a trusted level of authenticity, integrity and confidentiality in regard to the service and the stored data.

5.2.3.2.6 Relative advantage: Relative advantage is an element of the DOI model (Rogers, 1995). This factor refers to the level of benefit to an organisation if they decide to move into cloud computing.

5.2.3.2.7 Compatibility: Refers to the ability of the existing application to be compatible with the cloud. The compatibility of a firm's applications with the cloud environment is a real problem that an organisation needs to consider carefully when considering use of the cloud. This factor was identified in the Rogers model (Rogers, 1995).

5.2.3.2.8 Complexity: An organisation normally considers the degree of difficulty involved in using new technology as an important element in their decision before adopting this technology. This factor is also an element of the DOI model (Rogers, 1995).

5.2.3.3 Organisational Factor

The organisational factor describes the characteristics of an organisation that might have a significant impact on their decision.

5.2.3.3.1 Top management support: Top management plays an important role and has a significant impact on the adoption rate of IT innovations at the organisational level. Support from top management is essential because they have the ability to make the change and execute acceptance of the cloud. This change in the organisation needs a supportive decision from top management.

□ **5.2.3.3.2 Organisation size:** The size of the organisation is another influential factor. The number of employees, the amount of investments, the target market and annual revenue defines the organisation size.

5.2.3.3.3 Technology readiness: The technological readiness of organisations, meaning the degree of readiness of the IT infrastructure and the human resources in terms of cloud computing.

5.2.3.4 Environmental Factor

The environmental factor determines the environmental elements that might affect an organisation's intent to use cloud technology.

5.2.3.3 Compliance with regulations: This is an influential factor that can make an organisations reluctant to move into cloud computing. This concern comes from the fact that there are no governmental regulations or rules that can support the firm in the event of a data breach. The lack of IT standards is a real problem that might obstruct adoption decisions (Marston et al, 2011).

5.2.3.4 Competitive pressure: Defined as the degree of pressure that an organisation faces from competitors. In a highly competitive industry, an organisation encounters pressure from competitors to adopt new technologies. This pressure forces some organisations to adopt cloud computing technology and gain a great benefit, more business facilities and better operational efficiency.

5.2.3.5 Trading partner pressure: This is another pressure affecting the organisations adoption decision. This pressure comes from vendors or other partners who might adopt cloud computing. Consequently, this might encourage an organisation to adopt this technology.

5.2.3.6 Physical location: The physical location is a critical factor that affects an organisation's decision to adopt cloud computing for several reasons. First there are no international policies or regulations for data protection in cloud. Second the fact that some of the cloud providers store the data in another country without disclosing this to the end users (Jaeger et al, 2009).

5.4 Cloud computing adoption Model

TRADITIONAL FACTORS

Availability
Reliability
Security
Privacy
Trust

DIFFUSION OF INNOVATION THEORY

Relative Advantage
Compatibility
Complexity



Intention To Adopt Cloud



ORGANISATIONAL FACTORS

Top Management Supports

Organisational Size

Technology Readiness

Figure 1 an integrated model for cloud computing adoption

**ENVIRONMENT
FACTORS**
**Compliance With
Regulation
Competitive Pressure
Trading Partner Pressure
Physical Location**

VI. VALIDATION OF THE MODEL FOR INCREASING ADOPTION OF CLOUD COMPUTING IN GOVERNMENT INSTITUTIONS IN NIGERIA.

VII. CONCLUSION AND RECOMMENDATION

The objective of the research is to examining how the uptake of cloud computing can be increased in government institutions in developing countries, the specific objectives of the study are: To collect requirements for increasing the uptake of cloud computing in developing countries like Nigeria, To design a model that provides guidance on how to increase uptake of cloud computing in developing countries and To test and validate how use of cloud computing in developing countries like Nigeria can be increased?

The learning from the literature review and the Questionnaire results has provided the uptake of cloud computing in government institutions in Nigeria that have been summarized into the following three research questions.

5.1 CONCLUSION

If the present challenges militating against the adoption of cloud computing in Nigeria are resolved it has the potential to deliver immense benefits to government institutions businesses. Organizations can take advantage of cloud computing to quickly enter into a market a move that would have previously been more difficult due to cost of acquiring ICT infrastructure. This is particularly of advantage in emerging markets like Nigeria where there is gross inadequate infrastructure, which poses a strong disadvantage to organizations that are trying to compete with others in the countries. But with the advent of cloud computing these businesses can leverage readily available, efficient and affordable cloud services. So cloud computing will allow organizations in Nigeria to have access to information technology services on demand without having to incur the full cost of setting up full blown technology infrastructure of their own. This will allow the organization to utilize the money it should have invested in acquiring technology infrastructure into other areas. And the fact that the organization under cloud computing environment will have to pay only for what it needs and uses, it further saves the organization from making investment in infrastructure that it could cease to use in future. So in essence the problem of underutilization of technology infrastructure will be taken care of.

Organizations in Nigeria will have faster time to market their products/services as not only the cost of setting the necessary ICT infrastructure is reduced but also the time it would take to setup such facilities is also avoided. Marston, et al., (2011) further notes that cloud

Computing significantly lowers the barrier to innovation, making it more feasible for businesses to scale their services (either upwards or downwards depending on demand and other considerations). And furthermore, cloud computing makes it possible for businesses to access new classes of applications and services that were hitherto impossible to access. Cloud computing will also help organizations achieve reasonable savings on energy cost. This is particularly true since the organization will have limited IT infrastructure that require energy in its premises.

5.2 RECOMMENDATIONS

The future of cloud computing in Nigeria is bright if government and all stakeholders would put all hands on deck to ensure that these identified challenges/impediments to its feasibility are addressed squarely. On this note, the researcher proffers the following recommendations which if implemented would enhance the effective adoption of cloud computing in Nigeria.

The unreliability of power supply in the country needs to be taken seriously and resolved as soon as possible. This is because electricity is very essential especially in the running of data centers.

There should be intensified awareness creation by cloud service providers geared at sensitizing the public on the benefits and risks of cloud adoption by organizations in Nigeria.

More cloud service providers are needed in the country to encourage competition, which will result to the driving down of the cost of its services. This would make the technology more appealing to organizations.

Cloud providers in Nigeria should be able to provide free trials of their services to their targeted organizations at a stipulated period of time to encourage them to adopt the technology.

More data centers should be established in the country to improve the access to cloud computing resources, reduce costs of access, increase monitoring for security purposes, and protect local content.

There should be a strong legal framework on data protection, which should be in line with international best practices. When this is properly put in place, clarification of

Relations between data center managers and clients, as well as service level agreements would be enhanced.

The implementation of the submission of a committee set up by the federal government to develop a national broadband strategy and roadmap for Nigeria would go a long way in helping the growth of cloud computing in Nigeria. The implementation period is between 2013 and 2018 (a five-year period) geared towards increasing Internet and broadband penetration across the country tremendously. The intention is to ensure that all state capitals and urban cities will have metro-fibre infrastructure installed within the period. The key objectives of the plan as highlighted include the promotion of pervasive broadband deployment, increasing its adoption and usage, and ensuring availability of broadband services at affordable rates.

Question 1. What are the requirements for increasing the uptake of cloud computing in government institutions in developing countries?

Question 2. How can the requirements for increasing the uptake of cloud computing in government institutions in developing countries be realized?

Question 3. How can improvement in the uptake of cloud computing in government institutions in developing countries be tested and validated?

5.3 FUTURE RESEARCH

There are areas in which further research can be done to provide more insight into uptake of cloud computing within government institutions in developing nations particularly Nigeria.

The governance of cloud computing in government institutions in Nigeria for a new paradigm of computing. So the possible research question is: "What is the new cloud computing governance in government institutions in Nigeria?"

The number of cloud computing projects will start to increase in future therefore research into uptake of cloud computing will be important. A possible research question is: "What are the critical considerations for successful uptake of cloud computing in the government institutions in Nigeria?"

One of the main concerns about cloud computing is poor security. This needs to be researched and a possible research question is: "How to secure cloud computing by developing an enterprise security architecture for the government institutions?"

With the huge upfront investment of cloud computing, a possible research question is: "How to make cloud computing an enabler to government objectives?"

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Hydrogen Mapping, Laws and Table

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DOI: 10.29322/IJSRP.9.08.2019.p92103

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92103>

Abstract- Hydrogen mapping is important to better understand and implement more effective ways of energy generation processes. The hydrogen pockets in the map suggest the process in which hydrogen enhance its energy and this process can be used in technical engineering processes, whether chemically or mechanically. The biggest challenge is that our environment does not have ready access to the zero level where hydrogen exists as an atom to continuously charge the mapping process. However, there are other methods that can be employed to achieve highly competitive results following the methods of hydrogen mapping. The process of hydrogen mapping starts from level zero to level ten. The results at level ten are an enhanced hydrogen pack that is able to exist alongside the zero levels of hydrogen without destabilizing. During the mapping of hydrogen it becomes clear that the first balanced and free hydrogen pack exist at the solar level, the second one is at the galactic level and the third one is at the universal level. The theoretical presentation in this paper only covers the map up to the solar level. It then becomes clear that everything that exist is beyond zero, if it wasn't, hydrogen atoms would form part of the environment we know and sparks of energy would be created from the atmosphere everywhere. Hydrogen creates its energy by totally focusing on enhancing its core and this results into a magnetic energy that pulls strongly towards its core. Hence everything in existence is pulled towards this core with a spherical shape in the center.

I. INTRODUCTION

Hydrogen as an element has a map that is expressed throughout the entire universal system that we live in. Herein is the map of hydrogen from level zero to level five, a level of the solar system in existence. Hydrogen continuously enhance itself through work so that it can balance and free itself from its most unstable state. The enhanced form of hydrogen that is mapped herein becomes the zero points for existence itself. Everything in existence is created around the enhanced form of hydrogen that is highly magnetic and become the central force of attraction in existence because everything is drawn towards this central point.

The entire map of hydrogen follows a set of rules that guides the continuous enhancement of hydrogen in existence. The first law is a law of potential and this is where the hydrogen atom is found at level zero. At level zero, there is no work done yet and therefore there is no energy, the level produces no sound and has no light. All these things are a potential at this point carried by hydrogen as an atom. The instability of the hydrogen atom result from its continuous effort to express its potential. Resulting to a breakthrough that happens when hydrogen finally breaks itself up to release its potential. The breakthrough immediately leads to level one of the hydrogen element, where hydrogen starts to focus on itself. This focus is considered to be work, work that enhances hydrogen's potential to higher levels of energy, sound and light

intensity. When hydrogen focuses on its core, it enhances magnetic energy that pulls everything in that level of existence towards that enhanced core of hydrogen. From the breakthrough, hydrogen expresses itself as the outcome of the work done at level one. The level of work employs the law of work and the level of discovery uses the law of discovery. Everything discovered must be studied and hydrogen found itself to lack balance at this level. Further continuing to the level of support where hydrogen gains support from its base hydrogen at level zero. This support allows hydrogen to work on its mirror image without losing its previous enhancement.

The law of support at level three makes it possible for hydrogen to proceed to its balanced state at level four. The balanced form of hydrogen is highly energetic, illumined with varying decibel levels. This is the self-sufficient form of hydrogen, however, it must first break free from the bond it has with its base hydrogen to become free. At level five balanced hydrogen breaks free from its base hydrogen and becomes free hydrogen.

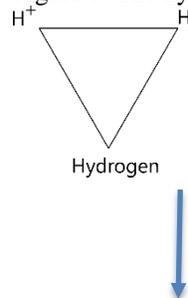
The entire outcome of enhanced hydrogen is also depicted in the hydrogen table and this whole work herein only goes to the level of the solar system. Hydrogen can be mapped through into galactic levels and thereafter into the universal level where hydrogen mapping will be fulfilled and then hydrogen multiplication begins.

hydrogen laws

II. HYDROGEN POTENTIAL

Hydrogen is based on potential that continuously need to be expressed and this potential is capable of communicating and working. Nothing can be added or taken away from hydrogen as it has dedicated principles to fulfill its potential through enhancement and multiplication. The potential of hydrogen continuously need to discover and express itself. It carries the potential of sound, work, light and energy, the work splits hydrogen into a neutron and a proton which result into sound and light.

Figure 1. The hydrogen potential



Hydrogen potential = 4

1. Work
2. Sound
3. Energy
4. Light

At this level Hydrogen equals four ($H = 4$), the potential of Hydrogen is work that produces sound, energy and light (H^+ and H^-). Therefore at level zero ($H = 1$), -meaning zero carries the potential to create charged energy levels. It is therefore the only level that seem tricky to understand because it remains the potential for every other energy level to be expressed.

The 1st law of hydrogen: *Every Hydrogen atom carries the potential to work, release sound, light and enhance itself into energy.*

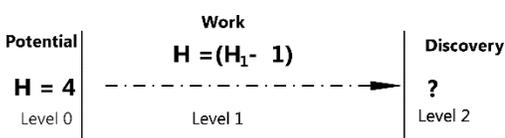
$H = 4$ shows that Hydrogen atoms unstable nature is caused by its potential to express itself, However this potential of hydrogen only exist at level zero. Level zero is the only point where there is no work, no sound and no energy, clarifying the fact that the hydrogen atom cannot be found at any other level but zero.

III. HYDROGEN BREAKTHROUGH

Hydrogen works first to enhance itself and during work, sound, light and energy is released. The working of hydrogen is the first step towards unleashing the full potential of hydrogen. So, $H = H_1 - 1$, the minus one means one is deducted from the base of the hydrogen atom's potential at level zero to enhance the expression of hydrogen at the first energy level. H_1 is a representation of hydrogen beyond the potential level. A Hydrogen atom breaks itself into half (H^+ and H^-) so that it can focus on expressing itself (H_1).

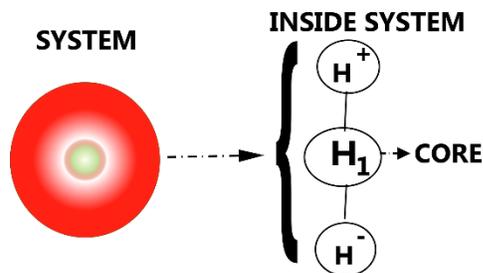
For example: where $H = H_1 - 1$, H_1 is being enhanced by the breakdown of hydrogen which is considered a breakthrough in hydrogen mapping. The breakdown of H into H^+ and H^- result into H^0 which is = 1. So this 1 focuses on the hydrogen (H_1) and enhances its energy going forward. This is how hydrogen works and express itself in the first energy level. So this energy level is based on work towards discovering a much more stable and balanced form of hydrogen.

Figure 2: Working of hydrogen



Where work equals one, $H = H_1 - 1$, because the very expression of work comes from the potential of hydrogen. Hydrogen works as it breaks itself down and focus more on itself. The work of hydrogen creates a system.

Figure 3: Hydrogen system at level 1



The split of hydrogen forms a system where it is able to focus on its core, a single hydrogen atom enhance it to a complete balanced state. This focus creates a magnetic force that pulls the system towards its core, thereby resulting on a strong magnetic field safe guarding the system.

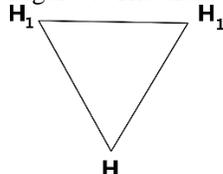
The 2nd law of hydrogen: *Hydrogen is the force doing work every time it potentially breakthrough.*

The first law proves the creative ability of hydrogen is based on energy that is sourced from the enhancement of hydrogen itself during work. The energy field protecting the hydrogen system is a source of magnetic energy resulting from hydrogen work.

IV. HYDROGEN DISCOVERY

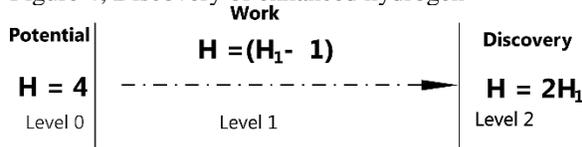
Work leads to a discovery, a discovery that seeks to fulfill the need that was buried as potential to work because for the first time hydrogen has found itself in existence. For the first time at this level, existence has something to give back to the hydrogen atom for the whole work well done.

Figure 4: The discovery



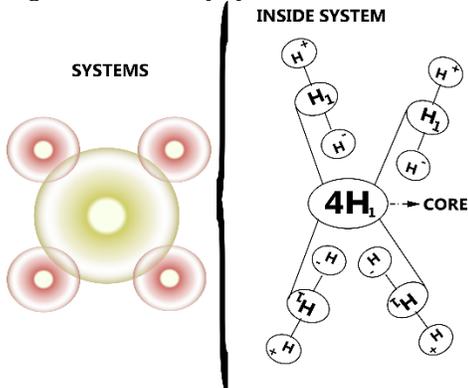
It's time for this enhanced discovered hydrogen to give back to the Hydrogen at level zero and it can only give back in the way it received, $H = H_1 + 1$. Thus at this point Hydrogen is, $H = (H_1 - 1) + (H_1 + 1)$ resulting onto $H = 2H_1$, so this is how creation found itself to be in existence. $H = (H_1 - 1)$, this was the breakthrough and $H = (H_1 + 1)$ is the contribution back to the core.

Figure 4; Discovery of enhanced hydrogen



Hydrogen has now successfully enhanced itself from H to $2H_1$. The work and the discovery point of enhanced hydrogen start to show a workable map that can be followed to understand the creativity of hydrogen. Enhanced hydrogen grows its magnetic field and strengthens its energy field. However, this level of enhanced hydrogen is not balanced and more work must be done to reach a balanced state.

Figure 5: Discovery systems



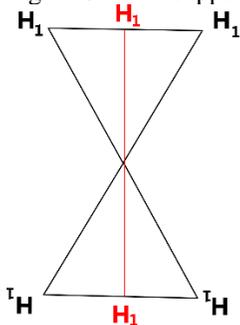
The 3rd law of Hydrogen: For every work done, hydrogen is enhanced. The enhanced core equals the product of the work done.

$H = H_1 - 1$ is always the input from the base hydrogen and $H = H_1 + 1$ is contribution towards the base hydrogen. Hydrogen is proving to be self-sufficient and this allows it to continue enhancing itself to levels where it becomes free hydrogen.

V. HYDROGEN SUPPORT

Upon discovering itself, hydrogen continues to be unfulfilled as it need to balance and gain its mirror image view. The work required for hydrogen to balance itself equals the work already done to discover it. However, hydrogen must support its discovery so that it can continue work and discover itself exactly the way it did before. So during the discovery of its mirror image, level zero provides total support for the already existing part of hydrogen discovered through enhancement work. Therefore, the discovery plus the potential come together temporarily. This enables hydrogen to work on itself again and advance to its fully independent state.

Figure 6: Total support (support in red)

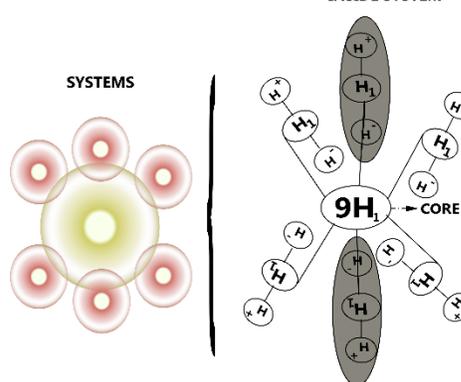


Hydrogen support itself in this way so that it can continue working and enhancing itself. So the coming together of $H = 4$ and $H = 2H_1$ gives $H = 2H_1 - 4$, clearly representing the discovery with total support from level zero. The existing discovery receives total support because it worked and fulfilled the potential by giving back completely what it received. Now the discovery is totally capable of finding itself and balancing itself as it fuses its work resulting on $H = H_1^2$. So this zero point of total support is not the

one creating but the discovery continues in a quest to fulfill the potential already known from zero.

The work of hydrogen is always one and it produces energy that is H_1 , this energy is always focused on enhancing its core. So, Hydrogen equals work multiply by two energy system focusing on a specific core. Thus $H = 1(H_1 \times H_1)$ resulting on $H = H_1^2$. The same applies during support enhancing the discovered hydrogen to a new level of expression.

Figure 7: Support systems (support in grey)



The 4th law of hydrogen: for every enhanced discovery of hydrogen, equal and total support is provided by the base hydrogen.

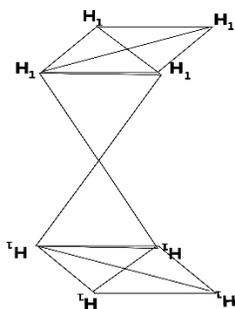
This is how progress is gained through enhancement as hydrogen only concerns itself with progress, vital progress does not consume its own work. Support therefore exists for all enhanced discoveries to continue working and contributing to the hydrogen map.

VI. HYDROGEN BALANCE

At this point hydrogen has discovered its enhanced version twice, suggesting that it has achieved its mirror image and therefore aware of itself. The potential is now expressed twice and enhanced hydrogen has given back to the base hydrogen twice. It is a point of balance as every action has been totally reacted upon with equal force.

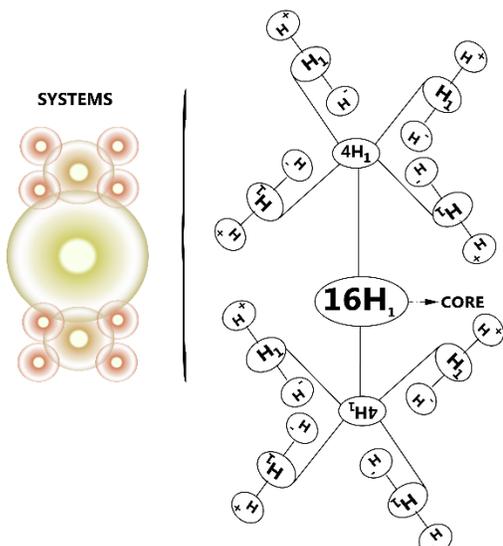
The total work done by hydrogen: Before support, the discovery of enhanced hydrogen was found to be $H = 2H_1$ and during support, the discovery of enhanced hydrogen is again achieved through work and it is $H = 2H_1$, so now the union of the two enhanced discoveries is $H = 4H_1$. This comes from, $H = (H_1 - 1) + (H_1 + 1)$ before support and $H = (H_1 - 1) + (H_1 + 1)$ during support resulting on $H = (H_1 - 1) + (H_1 + 1) + (H_1 - 1) + (H_1 + 1)$ which gives $H = 4H_1$.

Figure 8: Balanced hydrogen



A system of balanced hydrogen shows the exact map of enhanced hydrogen packets.

Figure 9: Balanced system
 INSIDE SYSTEM



The 5th law of hydrogen: Balance can only be achieved through work and work done with the total support of the hydrogen base.

For the very first time enhanced hydrogen has created a totally balanced system for H₁ to thrive.

VII. FREE HYDROGEN

The entire work began because hydrogen needed to balance and liberate itself. It achieves balance through focused enhancement work.

Therefore $H = 4H_1 + 4$ (where $4 = H$), Then $H = 4H_1 + H$ meaning $4H_1 = H - H$ and thus $4H_1 = 0$. This means enhanced hydrogen can now exist side by side with the hydrogen base at level zero as free hydrogen. It is therefore clear that hydrogen seeks to balance itself so that it can be free.

The 6th law of hydrogen: Hydrogen can only be free through work and support and free hydrogen is total energy.

HYDROGEN TABLE

The table of hydrogen herein shows hydrogen from level zero where only the hydrogen atom exist up to level five, a point

where free and enhanced hydrogen exist. At level zero, only the hydrogen atom exist and it breaks through at level one to start focusing on itself. Level two shows the growth and enhancement of hydrogen from level 1 and the flow of hydrogen breakthrough continues work to enhance itself. Level three supports level two so that an enhanced balanced level of hydrogen can be achieved. Level four expresses the balance form of enhanced hydrogen and this form of hydrogen continues to level five where it becomes free. Free hydrogen is able to thrive side by side with level zero of hydrogen atoms without reacting or consuming itself. Further growth is triggered when free hydrogen ventures further, a need will arise again for hydrogen to further its work and enhance itself towards a more enhanced and stable hydrogen to withstand its surrounding environment.

Table 1: Hydrogen table

Laws Levels	HYDROGEN TABLE					REALISATION
	Potential	Work	Discovery	Support	Balance	
0	1					5
1		+1	+1 (2)	+1 (3)	+1 (4)	+1 (4)
		1	1 (2)	9	1 (4)	1 (4)
		-1	-1 (2)	-1 (3)	-1 (4)	-1 (4)
			4		4	4
			-1 (2)		16	16
			1 (2)		4	4
			+1 (2)		-1 (4)	-1 (4)
					1 (4)	1 (4)
					+1 (4)	+1 (4)

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Conflicts and Conflict Management in Modern Organisations-A Pre –Conflict Resolution Environment Approach

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DOI: 10.29322/IJSRP.9.08.2019.p92104

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92104>

Abstract- In the animal kingdom, the rule is, eat or be eaten: in the human kingdom, define or be defined. “These are words of Stephen Thomas an American psychologist, which a Cleary depicts a picture of the nature of Conflicts: that they are inevitable and occur everywhere: whether at individual level, family, group .societal organizational, regional and globally. There is a common believe that among several scholars on the definition of conflicts. They all view it as a disagreement, contradiction, incompatibility or differences that may arise in any situation/individuals/groups /organizations in which there are incompatible Goals, Ideas, Cognitions, or Emotions within or between individuals or groups that lead to opposition or antagonistic interaction. The definition recognizes three basic types of conflict: Goal conflict, Cognitive Conflict and Affective. The Hard and Soft model of Human Resource Management contend that conflicts are avoidable if organizations create a high committed workforce and focus on the needs of their employees contrary to the hard model. The soft model takes a unitaristic approach while the hard model takes a pluralistic approach. Unitarism view conflicts as dysfunctional whereas pluralism anticipates and views conflicts as normal in any organisation. The divergence of these approaches is a clear indication that conflicts are not necessarily undesirable. The resolution of conflict can often result to a constructive solution. This paper examines conflict from a variety of viewpoints. It considers the positive and negative aspects of conflict, discusses the levels of conflict that can occur within organizations which include: intrapersonal level, interpersonal, intragroup, intergroup, and intra-organisational level and finally, it identifies the approaches to conflict resolutions and strategies, of managing conflicts. The paper adopts Thomas and Killman strategies of conflict management modes which includes: Avoidance, Accommodation Collaboration, Competition and Compromise thus incorporating a more conducive pre-conflict resolution environment elements ICLWC which stands for: **Identify** the nature of conflict; **Communicate** effectively; **Listen** to one another, show the **willingness** to resolve the conflict and demonstrate **Congruence** of the mind. Therefore the article proposes setting a pre-conflict resolution environment (ICLWC) before identifying the appropriate conflict management strategies. It is also evident that organisations that take conflict audit and manage them amicably are likely to have a more satisfied work force and achieve their objectives.

Index Terms- Conflict, conflict management, Conflict resolution, Conflict modes, Conflict theories and models, conflict strategies, pre-conflict, Congruence, listening and communication

I. INTRODUCTION

Individuals, groups and organizations experience conflict at some time or another as they execute business or interact with one another. This may be due to magnitudes of ambiguity in the rules governing their relations or over dissimilarities of interests or because one or more parties consciously break the agreed procedures. Cole (1995) defines Conflict as a state that arises whenever the perceived benefits of an individual or a group clash with those of another individual or group in such a way that strong emotions are provoked and compromise is not considered to be an option. Managers are not only apprehensive with managing conflicts to limit the negative features of conflict while increasing the positive effects of conflicts, but also involved in resolving conflict to reduce, eliminate or terminate all forms and types of conflict. However, the way in which managers handle conflict determines whether it is beneficial or disparaging to an organization or to employees (Deutsch & Coleman, 2000). Conflict is inevitable and even desirable: “To work in an organization is to be in conflict. To take advantage of joint work requires conflict management” (Tjosvold 2008: 19). Organizational conflicts are unavoidable and studies indicate that about 20 percent of workers period is spent on managing conflicts (Rahim, 2000).

Divergent Views on Conflict

There differing views on whether conflicts are good /healthy or dangerous /counterproductive. While some scholars believe that conflicts are good, others believe that they are unnecessary and can be avoided. Conservatively, managers considered subduing conflict and maintaining peace at all costs as the best way to manage conflict. However, modern view, conflict as a cautionary signal for a more severe problematic issue that requires to be settled (Darling and Walker, 2001). Although not all hitches and differences can be resolved, managing conflicts can ‘reduce its negative consequences arising and improve its positive functions thereby promoting efficacy in organisations’ (Rahim, 2002: 208. Handy (1993) considers differences between people and groups as natural, inevitable and necessary “paradoxically, differences are

essential to change. If there were no urge to compete and no need for disagreement, the organisation would either be in a state of apathy or complacency. As Handy puts it, the absence of conflict is not harmony but apathy. Managers who perceive conflicts as essential for change inspire conflicts between groups and individuals. However the major challenge managers encounter is to retain constructive conflict over issues from sinking into dysfunctional interpersonal conflict and to encourage managers to disagree without retracting their ability to work as a team. Conflict can be internal (within the individual) or external (between two or more individuals or between groups.) Sometimes conflicts may thrive unconsciously or unconsciously or triggered by situational factors such as individual goals, anxiety, power, sense of objectivity, inadequacy or differences in upbringing and orientations among staffs in organizations. (Bourgeois, Eisenhardt, & Kahwajy, 1997).

Labor Relations View on Conflicts

The collective features of organizational conflict have extensively been studied by industrial relations scholars. They reflected that management and workers have divergent interests and, therefore, conflict is unavoidable and ought to be resolved through mechanisms such as collective bargaining or labour courts (Teague and Roche, 2012). However, there few studies on personal conflict at work place from a management perspective (Hunter and Renwick, 2009).

Human resource management (HRM) has been labelled as a discipline with two distinctive facets (soft and hard) which are absolutely conflicting in theory. Although, from a theoretical background, the principal conflicts and pressures confined within the models have not been adequately explored, the terms have gained some prominence within organizational styles of managing conflicts. Storey (1989) made a distinction between the 'hard' and 'soft' versions of HRM. The hard version stresses that employees are important resources through which organizations accomplish competitive advantage. It focuses on the quantifiable, measurable and business-strategic features of managing employees in a 'rational' way, i.e. treating them as tools like any other factor of production to realize organizational needs. The pluralist view supports the hard version of HRM. Pluralistic view believes that the interests of employees will not automatically coincide with those of their employers. Conflicts of interest and disagreement between managers and workers over distribution of firm's profits are perceived as normal. They advocate for existence of conflict resolution mechanism and trade unions to deal with conflicts as they are experienced. The pluralist scholars perceive the unitary view as unpractical and against the interest of employees. Many researchers support the pluralistic view on the argument that in any natural situation and with human interaction, conflicts are inevitable (Armstrong 2000).

While pluralism anticipates and views conflicts as normal in any organisation the unitary perspective views conflict as dysfunctional. Armstrong and Baron (2002) found employees to have a wealth of collective skills, abilities and experience, which they are able to organize productively and utilize in the interests of their employers, in order to contribute substantially to organizational goals and to achieve a competitive advantage (Armstrong 2000).

Storey (1992) in his Soft model of Human Resource Management contend that conflicts are avoidable if organizations create a high committed workforce and focus on the needs of their employees contrary to the hard model. (Guest (1987) and Storey (1992) noted the key difference between the hard and soft as being whether emphasis is made on the human (soft model) or the resource (hard model). In soft model, employees are perceived to be driven by McGregor's Theory Y perspective with individuals governed by the concept of a 'high commitment work system' (Walton, 1985b), which is aimed at stimulating employee commitment; creating self-regulated behaviour and relations characterized by high levels of trust' (Wood, 1996, p. 41). Communication plays a vital role in management where employees' views are listened to and interest of management and employees indeed coincide. Soft model takes a unitaristic approach while the hard model takes a pluralistic approach. In the words of Gennard and Judge (1997), organizations and employees are assumed to be integrated, all sharing organizational goals and working as members of one team. In theory, one would argue that minimal or no conflict exists between employees and managers in organization that apply the soft model. Truss (1999) detected that with organizations needs dominating those of the employees, the notion of Soft HRM is more rhetoric than the reality (Armstrong 2002)

Theories of Genesis of Conflict

There several theories that explain conflict and conflict management in Organizations. This paper touches on the; Structural/sociological theory, Marxism theory, Biological Theory and Frustration-anger-aggression theory which advance the genesis of conflicts in modern organizations.

The structural theory describes conflict from a creation of pressure that ascends when groups fight for limited resources. The theory recognizes social segregation, denial, class injustices, unfairness, marginalization, gender differences, racial apartheid, and economic corruption among others as sources of conflicts. Such factors characterize modern organizations and if managers are not keen in observing these triggers of conflicts, they may generate in destructive conflicts (Oakland, 2005)

Marxist Theory of conflict attributes the sources of conflict to division of Society into two unequal classes: the bourgeoisie, who controls the means of production as well as the government, and the proletariats (workers); who are deprived, socially deflated, and financially starved. There is a persistent struggle between the two classes over resources. (Lenin, 1917) believed that the state itself is a product of conflict of class struggle. However Marxism theory viewed conflict from economic view point ignoring other sources of conflict. One would be concerned on whether Marxism theory applies in defining organization conflict or not. Indeed collective bargaining agreement are based on struggle for financial resources between employers and employees. (Oakland, 2005)

Biological Theory of conflict explains that human nature is inherently shifted from cohort to cohort. The wicked nature of man can therefore be genetically transferred just the way a parent may transfer positive qualities to a child. It is argued that man may be that instinctively violent beings since their descendants were, and such aggressive or destructive impulses are in the genes. Some characteristics are inherent hence spontaneous and could be uncontrollable. This argument underscores the statement that the

greatness of certain people, clan or family; conceit and hostility of a particular nation or group is genetically determined (Oakland, 2005)

Frustration-anger-aggression theory Advanced by Dollard and Doob, et al (1939), and further advanced by Miller (1948) and Berkowitz (1969 suggests that it is normal for man to respond to hostile conditions. Aggression is viewed as a product of obstructing, or frustrating, a person's energies to accomplish an objective. Frustration is considered as the sensation that develops when a person do not attain what they want (Tucker-lad, 2013). For example an employee may feel frustrated for not getting a promotion. When the anticipation fails to meet accomplishment, people tend to provoke others they think they are accountable for the frustration thus causing interpersonal conflicts (Oakland, 2005).

Types and Sources of Conflict in Organizations

Scholars of organizational behavior refer to any form of conflict within organizations as 'organizational conflict' (OC).such conflicts may shape themselves in diverse forms: intrapersonal, interpersonal intergroup and inter-organizational conflicts. The word 'inter' means "between," while 'intra' means "within" (Elmagri, & Eaton, 2011). Lamb (2008) considers Intra-personal conflicts as "man against self" conflict, "in which one endures to cope or fight with their cognizance and behaviors such as addiction, that one wants to end but may find it difficult to do so." The intrapersonal conflicts therefore occurs when an individual has to make a personal decision (do I take option A or option B?).It may be a conflict of values, of priorities or making a decision on a goal (Lamb 2008).

Interpersonal conflicts are found between individuals. Lamb (2008) Such conflict has been described as "man against man." According to Wood et al., (2003) interpersonal conflict is conflict that ensues between two or more persons working together in clusters or bands while Nistorescu (2006), views it as the process through which somebody or a section prevents another from winning the desired outcome. He noted if such conflicts are not prevented at early stages, they can get into ugly scenarios thus affecting employees' productivity. A number of studies point interpersonal conflict as the most common type of workplace conflict (Dana, 2001).Such conflict is caused by individual dissimilarities including; behaviors, personality, culture, approaches, values, opinions, and the other differences (Elsayed-Elkhouly, 1996). Personality conflict occurs when much hidden differences in drives are observed in individuals or where there is malice or 'cold attitude' to each other, or inherent hostility thus leading to a disagreement. Power struggle may be found where two people in an association and have a great desire for supremacy and both want to control the affiliation. The Unresolved power conflict usually heightens to the point of relationship failure and sometimes dissolution (Fisher, 2000).

Morell (2009) describes another type of conflict called "Man against society; or man against nature "conflict which arises when an individual stands against institution, practices, or social evils such as, human trafficking, mistreatments, oppression, fraud, corruption, bad governance, et cetera. Morell (2009) distinguishes the two forms of conflict and argues that "man against man" conflict generates into "man against society". "Man against nature" is a type of conflict that portrays a state of

controversy between man and his environs. This includes conflict emerging from forces of environment: such as global warming, climate change, desertification, emerging resistant diseases such as malaria,, which produce a condition in which man scuffles with environment to overcome it.Modern organizations today struggle to reduce this type of conflict. (Lamb, 2008)

Another type of conflict include Inter-Group conflict brought about by difference or dispute between two or more groups, teams, ethnic groups, communities, or interest groups .Singh and Pandey (2004) define group conflict as the difference that rise from the choice made by team affiliates. The conflict may be inter- group or intra- group. This conflict may result from the group need to mutually agree; scarcity hence scramble for resources; variances in group goals, tasks interdependence differences in group opinions, Poor communication channels among group membership; struggle for recognition; overlapping responsibilities However, the way in which managers handle conflict determines whether it is beneficial or disparaging to an organization or individuals.(Deutsch & Coleman, 2000).

According to Katz (1965), there three main sources of conflict: Economic, value, and power Economic conflict includes opposing drives to achieve limited resources. Each individual focuses their behavior and emotions towards their gains. Such conflicts characterize Union and management negotiations. Value conflict encompasses a mismatch in cultural aspects; ideologies – the preferences, philosophies and practices that individuals believe in. Power conflict arises when each person/group/organization/nation wants to maximize the extent of control that they exercise in the affiliation and the societal situation. It is not possible for one party to be powerful without the other becoming feeble. As Thomas Stephen puts it, "In the animal kingdom, the rule is, eat or be eaten: in the human kingdom, define or be defined." Thus, any power tussle would generally result in a conquest and overthrow and submission or in a "stand-off" with untiring state of pressure.

Most conflicts involve a combination of Economic, value, and power sources. For instance, union-management conflict not only involves struggle for economic resources, as well as power struggle but also encompasses different philosophies or political ideals. The more sources that are involved, the stronger and obstinate the conflict generally becomes. (Fischer 2000).

Fischer (2000) also attributes conflict to lack of clearness in communication. Poor communication is viewed as one of the major factors contributing to organizational conflict among other factors such as poor management style, change in governance, and thirst for power. Lack of clarity leads to confusion, hurt and anger thus aggravating the conflict process. Miscommunication and misinterpretation is often caused by Perceptual biases, Self-centeredness, selective perception, emotional bias, prejudices, etc., Fischer (2000)

Hotepo, et al., (2010) outlined six major sources of conflict which were categorized into both personal and organization factors: individual stress causing interpersonal differences; conflicting roles; struggle for control against one another/group to accomplish their own self-seeking behavior; misunderstandings and disagreements arising from different was employees are oriented; interdependence needs among employees to collaborate with one another , which, if not well handled may cause communication problems thus causing conflicts; and finally the external forces disrupting internal systems. For example change

in technology, political and social revolution are likely to cause conflict organizational conflict. Conflict is bound to ensue under environmental pressure with inadequate resources, unfavorable strategies such as downsizing, competitive stresses, or by high degrees of insecurity (Elmagri, & Eaton, 2011).

Sources of conflict can also be classified based on the understanding of its nature and consequences; 1. Affective Conflict, which results from provoked individual feelings and emotions on an issue as one tries to deal with the matter. 2. Substantive Conflict arises from employees differences about job task or content. 3. Conflict of Interest may be caused by discrepancy between two parties in their prejudices for allocation of limited resource. 4. Conflict of values occur due to differences in values or philosophies 5. Goal Conflict occurs when individuals or groups pursue conflicting goals. 6. Realistic versus Nonrealistic Conflict- Realistic conflict refers to irreconcilabilities that have rational content (i.e., tasks, goals, values, and means and ends) while Nonrealistic conflict occurs as a product of a party's desire for let go pressure and voicing anger, ignorance, or fault. 7. Institutionalized versus Non-institutionalized Conflict- The earlier is described by circumstances in which players apply explicit rules, and exhibit expected conduct, e.g. line staff conflict or labor management negotiations. 8. Retributive Conflict- This conflict is characterized by a condition where the conflicting parties feel the need for a protracted conflict to discipline the rival. 9. Misattributed Conflict- This relates to the inappropriate job of grounds (behaviors, parties, or issues) to battle. 10. Displaced Conflict- This type of conflict happens when the differing parties either direct their aggressions to social bodies who are not inscribed in conflict or claim over minor, issues (Rahim, 2011).

Managing Conflict

Recognizing the sources of conflict in any organization is the main step in the development of conflict resolution mechanism (Robbins and Judge, 2008; Rahim, 2002, Elmagri, M.I. and Eaton, D., 2011). The greatest method of managing conflict in organizations is pursuing a positive action rather than a negative force that would intimidate a person or a group. (Robinson et al (1974). Rahim (1986) says that organizational conflict should be managed rather than resolved to develop individual, group, and system success. There is need to identify all levels of organizational conflict and then mediate, may it be at intrapersonal, interpersonal, intragroup, and intergroup levels. To manage interpersonal conflict, employees must be exposed to strategies of managing interpersonal conflict to deal with different situations effectively and set up suitable instruments for unsettled concerns to be dispensed with correctly (Rahim, 2001). There is need for employees to change their attitudes, behavior to allow members to relate effectively. Managers should cultivate diverse but suitable approaches to resolve and manage conflicts; there is need to organize workshops on organizational conflict management from time to time for the employees. (Pawlak 1998)

Conflict Management Strategies

Recent studies indicate that line managers handle workplace conflicts in many organisations. There are discrepancies about the key factors influencing line manager's conflict management styles. There many ways in which conflict is

resolved which entirely depends on several factors such as the interdependence and dominance of parties involved. (Blake, Shepard & Mouton, 1964) identified three common approaches for dealing with conflicts where parties involved are interdependent: 1. win-lose, 2. Lose-lose, and 3. win-win.

Individuals learn the manners of negative conflict early in their lifetime hence win-lose strategies such as competition, dominance, aggression and defence dominate in many social relations. It is assumed that one man's gain is the other person's loss. Therefore each party strives to compete or dominate. In a democratic system the winner is determined through an acceptable system such as popular vote, the ability of the leader, or the determination of justice. In an anarchy situation it may be survival for the fittest; secret strategies, threat, insinuation – whatever works may be applied i.e., the ends justify the means. The main aim is to have a winner who is superior and a loser who is inferior (Thomas (1977) pointed with the win-lose competitive strategy, the parties battle the conflict out in an attempt to win though with the risk that one may lose.

The lose-lose strategy is epitomised by levelling over conflict or by attaining the simplest of compromises. Thomas (1977) advises seeking a middle ground where both parties bargain, giving up certain desired outcomes to achieve fulfilment of others. Conflict is seen as unavoidable. And using win-lose strategy allows each party to get some of what it wants.

The win-win approach is a cognisant and organised effort to maximize the outcomes of both parties through collaborative problem solving. The conflict is seen as a problem to be solved rather than a war to be won. Collaboration seeks to satisfy the desired outcomes of both parties often by changing the situation itself. This technique emphasizes on the needs and constraints of both parties rather than stressing approaches intended to defeat. Individuals involved work toward collective and superordinate goals (Thomas 1977).

Win-win approach emphasis on the superiority of the long term relationships between the parties, rather than short term accommodations. There is open and direct Communication. The outcomes of win-win approach is integrative and parties plan arrangements within the possible available resources prevailing in the relationship with a mutual understanding and trust, and acceptance rather than an acceleration of distrust and resentment. Win-win approach needs extraordinary amount of tolerance and expertise in human relations and problem solving (Blake, Shepard & Mouton, 1964).

Conflict Managing Modes

Follett (1926/1940) was one of the early scholars who took a lot of interest on conflict and conflict managing modes. She acknowledged three main modes of managing interpersonal conflicts: Domination, Compromise and Integration. She also suggested that organizations could deal with conflicts through: Avoidance and Suppression styles. Other earlier studies in conflict managing modes are from the work of Follett's mode. Blake and Mouton (1964) found that interpersonal conflicts could be resolved using five modes: Forcing, Withdrawing, Smoothing, Compromising, and Problem solving. They categorised the modes based on the level of concern for individuals and production. Unlike Follett's modes, Blake and Mouton introduces Forcing problem solving and smoothing as conflict mode and all believe

on compromise mode in conflict management. Rahim (1983) suggested that interpersonal conflict could be managed using his five modes; integrating, obliging, dominating, avoiding and compromising all based on the level of concern for a person and others the person relates with. Rahim modes were an extension of Follet though the former included obliging, a style Follet had not considered. Unlike Follet and Rahim, Blake and Mouton added forcing and smoothing styles of handling conflict,

Thomas (1976) advanced a two-dimensional framework of conflict-handling modes based on the level of cooperativeness and assertiveness of the parties involved in the conflict. He recognized five conflict-handling modes: collaborating, accommodating, competing, avoiding and compromising. People who are assertive attempt to gratify their own concerns, while individuals who are cooperative try to fulfil the concerns of others. Comparing Thomas and Rahim's modes there is a large amount of similarity between the two approaches. Blake and Mutton's (1964) empirical study is viewed as the genesis of all other studies on conflict handling styles. Thomas (1976) and Rahim (1983) conflict management modes have been widely applied most widely by managers and individuals even in the current times. (Holt and DeVore, 2005; Daly et al., 2010). Although Blake and

Mutton (1964) designate that the collaborating mode (high concern for both people and production) is most effective for dealing with conflict, recent authors believed that different modes of handling relational conflicts are appropriate for various situations (Rahim, 2002) Each situation or problem is unique hence may require a unique strategy or different mode to solve the problem.

Context under Each Managing Mode is Applicable

It is argued the type of conflict mode managers apply depends on several factors; situational features of the conflict such as the intricacy and significance of the matter, how relevant each situation is to each party, the time and resources involved in resolving the conflict. Thomas (1977) five modes as shown in fig. 1. of conflicts are widely applied by managers today to solve organisational including interpersonal conflicts, Many scholars agree on circumstances and situations under which each mode is best applicable.(Rahim 2002)

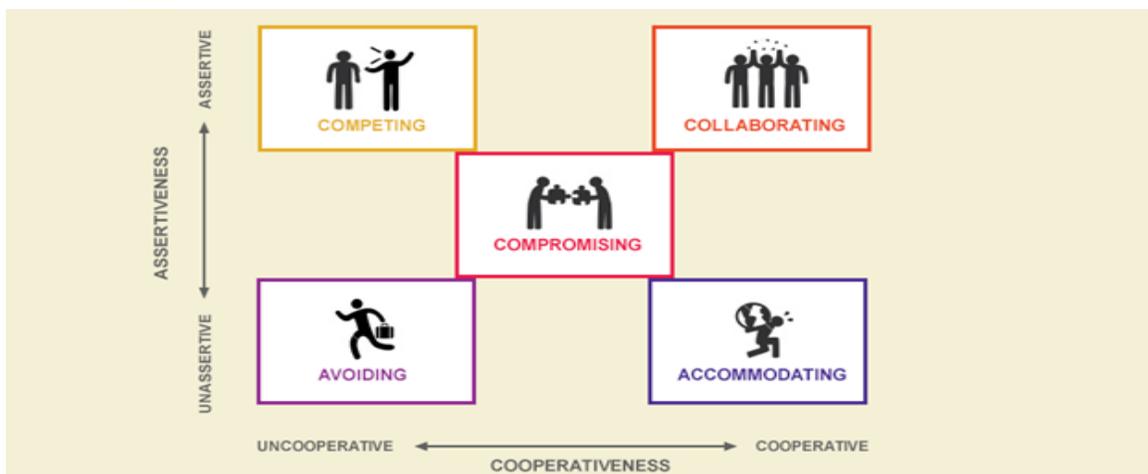


Fig.1. Source: Thomas –Killman (1977) Conflict Modes

According to the above model, collaborating mode is best when parties wish to cooperate to achieve a win-win outcome and ensure each party is contented. It seeks to obtain a lasting solution taking into account the interest of both parties involved in the conflict like the integrative and problem-solving modes. (Holt and DeVore, 2005). Collaboration is considered beneficial when the issue is intricate, when commitment is desirable from the other party for fruitful operation and time is available for problem-solving. On the other hand, the mode may be unsuitable in a simple matter, when urgent solution is needed, and where individuals involved lack problem-solving skills. Chung-Yan and Moeller (2010) suggest that collaboration is the best mode of handling strategic conflict or a long term problem. (Rahim, 2002). Accommodation mode disregards one's own needs and down plays the dissimilarities (Rahim 2000). It is suitable if a party considers their view point not right and need to be reasonable, where the matter is insignificant or is more important to the other person, where there is need to gain credit, when there is desire to minimize loss in a defeat, and for purposes of maintaining

harmony and stability in the relationship (Rahim, 2002). According to Chung-Yan and Moeller,(2010), accommodating is inappropriate for handling task conflict but best when dealing with interpersonal relations conflict due to its long-term orientation.

Competing mode has been associated with a win-lose outcome and the need to defend your position. Rahim, (2002: 219.) found competition to be appropriate mode where there's no qualified person to make a decision and where there is need to overcome assertive juniors. However he felt the mode was inappropriate where the matter is complex, if both parties are equally controlling or the parties are highly competent on the problem. The mode is also appropriate when one is right on an important issue, when quick decisive action is desirable, when unpopular decisions have to be taken on unimportant matter. Canary (2003) established that competition was usually not effective in handling divergences.

Avoiding mode is used as a preventive measure, by assuming the problem or delaying the situation (Rahim, 2002).

Rahim advocates the use of avoidance only when the matter is inconsequential and the possible dysfunctional consequence of provoking the other party overshadows the paybacks of resolution.). [Canary \(2003\)](#) found that avoidance is generally ineffective at resolving disagreements. Thomas (1977) believed avoidance would be best when the matter is unimportant and there are other more significant issues to deal with, when time is required to calm angers or to gather information, where others can deal with the issue more effectively, and where other issues are involved.

Compromising mode advocates for a give-and-take situation which aims to fulfil each party's concern ([Thomas et al., 2008](#)). It is suitable when parties are of equal supremacies and are committed to mutually exclusive actions, when the matter is important and collaboration and competition are not the best modes of dealing with the conflict. (Thomas 1977). However Rahim (2002) contend that compromise is inappropriate where the state of affairs is complex and requires a long-term solution based on a problem-solving style hence not best for managing social conflicts. Therefore more cooperative modes (accommodating, compromising and collaboration) are considered to be more practical in providing lasting solutions to conflicts, while less cooperative modes (avoidance and competition) are most appropriate in dealing with short term tactical issues. ([Rahim, 2002](#)). However Thomas dual model based on the degree of cooperation and assertiveness involved, is faulted for its assumption that conflict is handled only by the parties involved while in the actual sense a mediator or a conciliator may be involved in helping the parties in resolving conflict. This is common in dispute resolution in organisations where the trade union representatives represent the interests of their members. Some managers may not lack the sovereignty and the means to apply the conflict-handling mode for a specific conflict condition. De Church and Marks (2001) model collapses into two dimensions all other modes mentioned by other scholars; 1. Activeness. "The extent to which conflict behaviours make a responsive and direct rather than passive and indirect impression" High activeness is characterized by openly discussing differences of opinion while parties fully pursuing their own interests. 2. Agreeableness - "the extent to which conflict behaviours make a pleasant and relaxed rather than unpleasant impression". High agreeableness is characterized by attempting to satisfy all parties involved.

Factors Influencing Conflict Management Style

Rahim (2002) emphasised both organisational and personal characteristics as determinants of conflict-handling mode while Thomas, (1976). Viewed it from a psychological viewpoint, either contextual (i.e. a behaviour reaction to a condition) (Thomas, 1992; Rahim, 2002) or personality-based (Daly et al., 2010). The Personal aspects of the parties involved in a conflict have a significant impact on the stability of the style of managing conflict. ([Daly et al., 2010](#)). [Tyler \(1986\)](#) hypothesised that task-oriented managers are more likely to be concerned with productivity, whereas relationship-oriented managers are more likely to be concerned with Personal interpersonal relations. The organisational aspects, include policies and regulations for conflict management, and training accorded to line managers on conflict management. ([Daly et al., 2010](#)).

The sex of line executives may also influence their conflict management mode. Holt and DeVore (2005) in their study found

that men are more expected to apply competing mode than women, and that females are more expected to recommend the use of compromising mode than men. Though some empirical studies disclose that females tend to be more assertive in handling conflict than male. (Nguyen and Jang, 2012). Thomas et al.'s (2008) study also observed similar findings based on the argument that men are equally assertive hence were more likely to use competitive mode. Their findings revealed that there were no substantial differences regarding the use of collaborating mode. Munduate et al.'s (1999) study however found no correlation between conflict mode and gender. This complicates the conclusion on whether gender differences had any impact on the choice of conflict management style. The national culture of bosses may also affect their conflict-handling mode.

The results of Holt and DeVore's (2005) study reveals that managers' individual values and beliefs lead them to competing mode, while collectivistic cultures favour the modes of avoidance, compromising and collaborating. Doucet et al. (2009) study agrees with Holt and DeVore's findings which found outstanding variances between American managers and Chinese managers. While Western executives view avoidance of conflict as counter-productive, some studies found out that conflict avoidance is effective in socialist societies, where harmony and redeeming image are extremely treasured (Morris et al., 1998; Doucet et al., 2009). However no studies show whether the national culture of executives surpasses the organisational culture when managers are selecting the conflict mode.

Psychologists argue that executive's personality has an impact on the choice of their conflict-handling mode. (Jensen-Campbell and Graziano, 2005). Antonioni (1998) study showed a positive relations between bosses' personality trait and conflict-handling mode. He found that agreeable bosses more inclined to collaborative mode. Other empirical studies revealed similar results. Conscientiousness is negatively correlated with avoiding mode. Given that personality influenced only a small fraction (25 percent) of disparity in the use of certain conflict-handling modes. It implies that other factors other than personality were significant in influencing the choice of conflict managing mode executives. (Antonioni 1998).

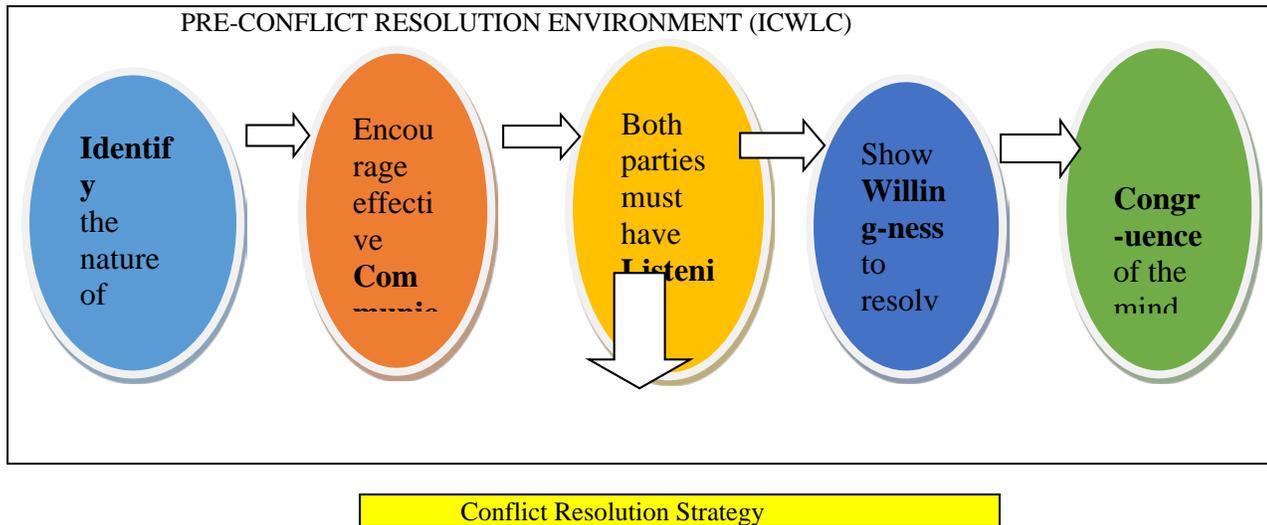
Conflict management skills are considered very essential in the success of conflict resolution. There is need to evaluate managers often on how they deal with organisational conflict. Studies show that line managers generally do not receive feedback about their conflict management capabilities in Irish organisations. Other authors also advocated for the need to reward executives for managing their employees effectively. (Merchant and Wilson, 1994), this would be a lesson to others that organisations care and value consistency in conflict management.

Creating a Pre-Conflict Resolution Environment

Management scholars generally agree that there is no one best style on how to manage conflict. Conflict can be managed successfully only if pre-conflict environment is conducive for conflict management. The authors of this paper agree with other scholars that Thomas-Killman's modes of conflict management model is very critical in conflict management but they propose the need to incorporate pre-conflict environment resolution elements (ICWLC) as shown in fig 2 at the plenary stage of conflict management. They advocate that there is need to lay a good

ground for conflict management before one identifies an appropriate strategy of handling conflict. (Rahim (2002)

Fig. 2.Pre-conflict Resolution Environment Model



Source: Murerwa-Guantai (2019)

Every manager must Identify (**I**) the nature of the conflict; its significance, time required to resolve it, and either or not it's mandatory to win the competition at the end, among other factors mentioned in this paper. Managers also need to identify a conducive pre-conflict resolution environment. This may require manager's prior training in conflict management to enable them handle conflict whenever it occurs. There is also need to identify the way managers are oriented towards perceiving conflict. Khun and Poole (2000) identified two types of approaches of conflict that influence managers perception; Distributive approach which uses a competitive tactic where each party aims at winning at the expense of the other party (win-lose outcome) expected and Integrative orientation where both parties build concessions and view conflict as an occasion to ensure a win-win outcome for both parties. Identification of all the elements discussed is likely to ensure a smooth process of conflict resolution. Jonathan (2016)

Effective Communication (**C**) plays a key role in managing interpersonal conflict. Brickman and Kirschner (2004) identify twenty four ways of bringing the best in everyone. In their book, they argue that one must accept differences as obstacles and aim at reducing differences. "Conflict occurs when the emphasis is on differences. Such differences can be reduced through effective communication. Reducing differences can turn conflicts into cooperation" Brickman and Kirschner (2004).

Resolving conflicts requires effective Listening (**L**). Managers must listen to understand their employees. "When two or more people want to be heard and no one is willing to listen, an argument is inevitable. Listen and understand first, and you will unlock the doors to people's minds" Brickman and Kirschner (2004). However the challenge in listening is that people do not listen empathetically to one another. As Stephen puts it, "most people do not listen with the intent to understand. Most people listen with the intent to reply"

Managers must show the willingness (**W**) to resolve conflict. The hard and soft view of human resource management

prepares managers for either having the willingness to create a conducive environment where employees and managers have a mutual understanding and operate on a levelling ground under the soft model (unitaristic approach) or preparedness in mechanisms of handling issues since conflict between management and employees are bound to arise under the hard (pluralist) approach. Lastly managers and employees must demonstrate Congruence (**C**) of the mind or have a common understanding. They must reason in the same manner and get things right. "Brickman and Kirschner (2004) argue that when getting it right is your highest priority, one is likely to slow things down enough to see the details. One may even decline to act because of a particular doubt about the consequence.

II. CONCLUSION

It is obvious that in any environment conflict is inevitable. Though the existence of conflict is mainly perceived to have a negative effect, sometimes it can be beneficial to an individual, group or an organisation. Most conflict management scholars agree that what is relevant in conflict is how it is handled. Conflict can trigger the need for searching for new facts and solutions, improve group cohesiveness, teach one how to make the most of each situation and use it to identify learning opportunity or a leadership opportunity. Managers can also use it as an opportunity to transform the situation into something better. However if conflicts are poorly handled, they can reduce employee productivity, lead to delays and increase costs in decision-making process, increase interpersonal or intergroup hostility e.g. arguments/aggression, lead to poor cooperation, raise stress levels, lower morale/ commitment and involvement and lead to withholding information and resources. (Fisher 2000).

Though Thomas and Killman's (1977) mode of conflict is widely used in conflict management, their model did not take into account of the pre-conflict resolution environment elements

(ICLWC) which are very critical in preparing managers for conflict and conflict resolution. Thus the authors of this paper believe that the ICLWC environment is necessary to lay a good foundation for conflict management before you identify the modes of managing conflict. A manager does not need to wait for conflict to arise and then resolve, but can create a conducive pro-conflict environment.

Managers must focus on boosting employee satisfaction as well as increasing their productivity through managing interpersonal conflicts thus boosting interpersonal relationships. However Conflict can be managed successfully only if the environment is conducive for conflict resolution. It is evident that organizations that conduct conflict audit and manage them amicably, are more likely to have a satisfied work force and achieve their objectives.

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Peace Initiatives and Opportunities for Sustainable Peace in Nyakach and Sigowet Sub-Counties of Western Kenya

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DOI: 10.29322/IJSRP.9.08.2019.p92105
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92105>

ABSTRACT

The recurrence of interethnic conflicts in Kenya has been a common phenomenon which has led to loss many lives and left a lot of destructions in the wake. Even with these recurrent conflicts there are opportunities within the communities where these conflicts occur to make things right and ensure durable peace at all times. In Kenya, there have been several cases of recurrent conflicts as well as efforts to bring these conflicts to a stop. One of the most affected places by inter-ethnic conflicts is Nyakach and Sigowet Sub-counties. There are opportunities that exist in the area to help in curbing cases of ethnic conflicts; however, these opportunities have not been properly utilized to help in curbing the repeated episodes of violent inter-ethnic conflicts between communities living in the border of the two Sub-counties. The study was conducted in four wards in the two sub-counties and gained information from 384 respondents including 296 household heads, 36 government officials, 12 non state actors and 4 FGDs of 10 participants each. The study utilized questionnaires, interviews and FGDs. The study indicated that there were different agencies involved in promotion of peace in the area which included National Cohesion and Integration commission (NCIC), National Council of Churches of Kenya, Catholic Justice and Peace Commission (CJPC), National Land Commission (NLC), National Police Service (Police). The study also indicated that the effective ways of promoting sustainable peace in the area included Public *barazas*/Dialogue forums; use of police and courts; religious leaders; community elders; use of Government commission; and use of Local administrators. The results also indicated that devolution provided an opportunity for sustainable peace as well. The study recommended more coordination and pro-activity of government agencies and county governments in efforts of peace building in the study area.

Keywords: Peace Initiatives, Sustainable peace, Recurrent conflicts; State and Non-State actors.

1.0 INTRODUCTION

Conflicts have remained a major concern in the post-cold war world, there have also been several attempts by various players including the United Nations to bring lasting peace in various parts of the world more so in Africa. The UN for instance, has commissioned up to 24 peace-keeping missions of varying robustness in Africa, which have contributed decisively to the stabilization of some conflict affected areas such as Namibia, Mozambique, and Liberia (Tull, 2008); The UN has however failed in ending fighting in certain areas such as Eastern Congo, Sierra Leone, Somalia (Mair, 2009; Tull, 2008). This follows the UN's approach of preventing recurrence of conflicts through advocating for durable peace in conflict prone areas.

Many African countries that have undergone some serious episodes of violent conflicts in the history of Africa have always found ways to deal with conflicts through both state and indigenous initiatives at the grass roots level to ensure that communities are able to live together in harmony. In Rwanda, the *Gacaca* courts helped in reconciling communities that had fought and killed each other mercilessly (Mensah, 2008). The South African Truth and Reconciliation Commission led by Bishop Desmond Tutu brought the black and white communities in South Africa together (Moe, 2010). Through this, South Africa became one united nation just like Rwanda.

Kenya has had its own fair share of internal conflicts. Before independence, the Mau Mau engaged the colonial government in serious fighting in effort to gain independence. Between 1963 and 1967 the Kenyan Somalis engaged the government in fighting with the aim of reuniting with the Greater Somalia. This conflict became known as the Shifta and was the ethnic conflict pitting ethnic Somalis against the Kenyan government (Oyugi, 2000).

The advent of political pluralism in the 1990s saw a new rise in ethnic conflicts in Kenya (Musau, 2008; Oucho, 2008). The Multiparty politics revamped the idea of ethnicity in various communities. This coupled with other factors including competition for resources mainly land, political manipulations on the basis of ethnicity, colonial legacy, electoral fraud, weak institutions and heavy handedness of security personnel, greatly contributed to the many conflicts that have been recurring in Kenya since the 1990s. Most of these conflicts have been common during election periods, although some conflicts have been going on even when there are no major political events (Klopp, 2002; Musau, 2008). Since the outbreak of violent conflicts in the 1990s, there were several initiatives by the government to respond to the conflicts, however these did not yield much fruits as the conflicts kept recurring (Nyongesa *et al*, 2016).

There are several initiatives that have been conducted by the government in efforts to curb the recurrence of ethnic conflicts across the country. Some of the initiatives taken have included; disarmament activities, formation of the National Steering Committee (NSC). They act to bring together different actors at all levels to prevent conflicts, establishment and rolling out of the District Peace Committee (DPCs) country wide. This has brought together different actors including government officers, NGOs, religious leaders, and security personnel (Pkalya & Mohamud, 2006). All these initiatives have been aimed at bringing peace in various parts of the country since 1993. However, the conflicts have kept on re-emerging in various parts of the country despite all these initiatives which have in different ways affected the people's livelihoods. This has thereby negatively impacted on the social welfare and the economic capabilities of the affected communities.

Nyakach and Sigowet sub-counties have been major hotspots for conflicts since 1992 (Nyongesa, 2016). The conflicts have since then recurred over the years with similar conflicts experienced in 1992-1993, 1996-1997 and 2002. These conflicts were believed to be politically instigated by the KANU regime, which the Kipsigis community supported. During this time, the violence was targeting the Luo, the Kisii and Luhya communities who were believed to be anti KANU. The most recent case of conflict in the area happened in March 2014 in which several houses were burned and six people killed (Kenya Red Cross, 2014). The conflict occurred just days after the National Cohesion and Integration Commission left the area to facilitate Inter-County Peace and Reconciliation Forum (NCIC, 12 March 2014). It is therefore a concern that even with a national body trying to reconcile communities; it was possible to have conflicts in the area. The recurrent conflicts have led to the loss of many lives including family breadwinners, hence affecting economic abilities and livelihood of communities affected by these conflicts.

2.0 Theoretical Framework

Functionalism Theory

The functionalist perspective is based largely on the works of Herbert Spencer, Emile Durkheim, Talcott Parsons, and Robert Merton. According to functionalism, society is a system of interconnected parts that work together in harmony to maintain a state of balance and social equilibrium for the whole (Mooney, Knox & Schacht, 2007). The functionalist perspective emphasizes the interconnectedness of society by focusing on how each part influences and is influenced by other parts. Functionalism is interested in cohesion and stability of a society based on the role played by each component that makes up the society. This means that in every society, every person, institution and any other components of the society have a role to play as far as the stability of the society is concerned. All the components of the society must thus work together to ensure that the society runs smoothly. That is to say, cooperation of everyone is needed for the society to function properly.

3.0 METHODOLOGY

The study employed descriptive and Evaluation research designs. The research was conducted in Sigowet Sub-county of Kericho County and Nyakach Sub-county of Kisumu County. In this Study, Nyakach and Sigowet Sub counties were purposively sampled because of the frequency and magnitude of the recurrence of inter-ethnic conflicts within the two sub-counties (Red Cross, 2014; Safer World Briefing, 2015). The research was done in eight sub-locations where simple random sampling was used to select the 8 sub-locations out of the 27 sub-locations in the two sub-counties.

The study targeted target population for the study was 11, 037, in this regard therefore, since the target population is greater than 10000, the desired sample population was determined using Fisher's formula for sample size determination (Fisher *et al.*, 1983 cited in Mugenda & Mugenda, 1999). The formula is stated below.

$$n = \frac{z^2 pq}{d^2}$$

Where n=desired sample size (the target population is greater than 10,000).

z=the standard normal deviate at the confidence level of 95% is 1.96.

p=the proportion of the target population estimated to have characteristics being measured is set at 50%

q=1-p (probability of non-success)

d=level of statistical significance set at 0.05

$$n = \frac{(1.96)^2 \cdot 0.5 \cdot (1-0.5)}{(0.05)^2}$$

$$n = 384$$

The sample population of 384 respondents was distributed as follows; 38 government officials were purposively sampled, 10 Non-state actors were purposively sampled and convenience sampling was used for 40 respondents in four Focus Group Discussions (10 respondents per FGD). Stratified proportionate and random sampling was used for 296 household heads. The study employed both probability and non-probability sampling methods. Quantitative data was collected using questionnaires while qualitative data was collected through interview guides and FGD guides. Both primary and secondary data were utilised during the study. Quantitative data was analyzed using SPSS version 17 and Microsoft Excel to obtain descriptive statistics particularly frequencies and percentages and qualitative data was analysed using thematic techniques to support quantitative data. Quantitative data was presented using tables, graphs, and charts while qualitative data was presented inform of narrative reports and verbatim quotations.

4.0 STUDY FINDINGS AND DISCUSSIONS

4.1 AVAILABILITY OF PEACE INITIATIVES IN THE NYAKACH AND SIGOWET SUB-COUNTIES

The study sought to establish the availability of peace initiatives in Nyakach and Sigowet Sub-counties. Respondents were asked to indicate if they knew about any peace initiatives in the study area. The results are given in Figure 4.1.

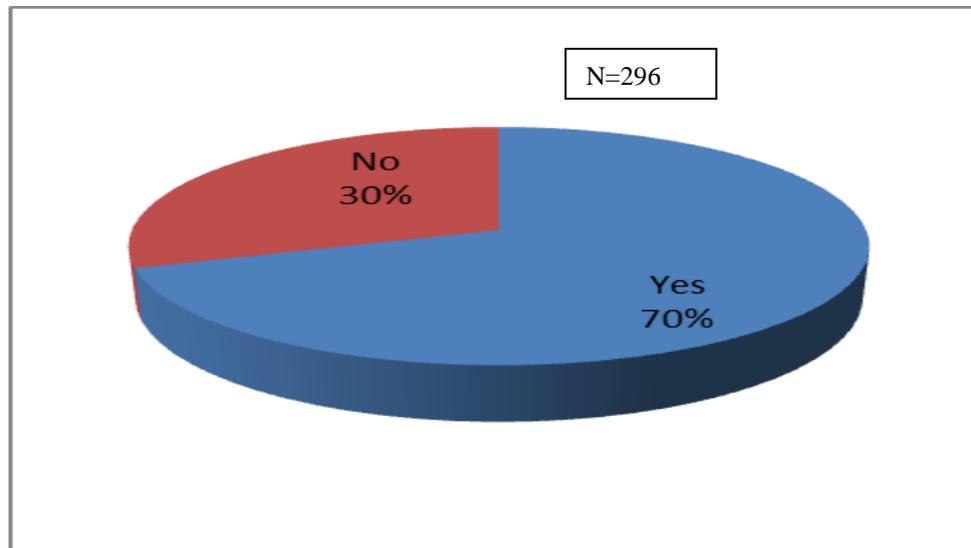


Figure 1: Presence of peace Initiatives in Nyakach and Sigowet Sub-counties

Source: Field Data (2017)

The results indicated that out of the 296 respondents, 207 (70%) specified that they know there were peace initiatives in the study area while 89 (30%) indicated that there were no peace initiatives in the area. The respondents further indicated that the peace initiatives that were available in the area included sporting activities that were organised by various Civil Society Organizations to unite the communities; they also indicated inter-community dialogue meetings that were organised by the faith based organizations and through public *barazas* that were held at the chief's camps. The respondents also mentioned peace caravans that were often common in the area especially during election periods and which were targeting the youths to maintain peace in the area. Other respondents also mentioned the use of social media platforms such as Facebook to reach out to youths in the area to maintain peace. The Kericho Youth *Bunge* which is one of the major platforms for peace was mentioned as having a Facebook page that has been used to preach peace and unity in the study area. The respondents also mentioned that the Local Peace Committee (LPCs) were also mentioned by respondents as a way that has been used to reach out to members of different communities and ensure that there is peace in the study area.

The findings were supported by findings from key informant interviews where the respondents mentioned several peace initiatives that they knew were present in the area of study. Chiefs stated that they held *barazas* every week in their offices to talk to the local communities about the importance of living peacefully with their neighbours.

The NGOs including Red Cross and World Vision all stated that they supported various peace initiatives in the area. These two NGOs provided humanitarian support to people displaced by the conflict and also supported activities that were aimed at restoration of peace in the study area through workshops, dialogues and conferences. CBOs including Kericho Youth Bunge, Nyakach Elders Development Group and Uhai Lake Forum as well as Faith Based Organizations including Catholic Justice and Peace Commission, National Council of Churches of Kenya (NCCCK) as well as Churches including the Anglican Church, the Catholic Church and the Seventh day Adventist Church all indicated that they were involved in activities that were aimed at fostering peace in the study area. The findings from FGDs also indicated that there were several peace initiatives in the study area. Participants in all the four FGDs all agreed that activities including sports, peace caravans and meetings, public *barazas* had been used to encourage peaceful coexistence among members of various communities in the study area.

4.2 PEACE INITIATIVES BY GOVERNMENT AND THE CIVIL SOCIETY IN NYAKACH AND SIGOWET SUB-COUNTIES

The peace initiatives in Nyakach and Sigowet Sub-counties were categorized in terms of peace initiatives by Government and initiatives by non-state actors. Peace initiatives by Government actors included activities by various government officials and agencies in the study area to foster peace. These state actors included the police service, local administration, political leaders (MCAs) and Sub-county administrators. Non state actors included NGOs such as Red Cross, USAID and World Vision, CBOs including Kericho Youth Bunge, Nyakach Elders Development Group and Uhai Lake Forum and FBOs including Catholic Justice and Peace Commission (CJPC), National Council of Churches of Kenya (NCCCK), Anglican Church and the Seventh day Adventist Church.

4.2.1 GOVERNMENT RESPONSE TO THE CONFLICTS

The study sought to establish the opinion of the respondents on the way the government responds to the conflicts in the study area. The respondents were asked to gauge the performance of the government as, excellent, very good, good, fair or poor. The results are as indicated in Figure 4.2.

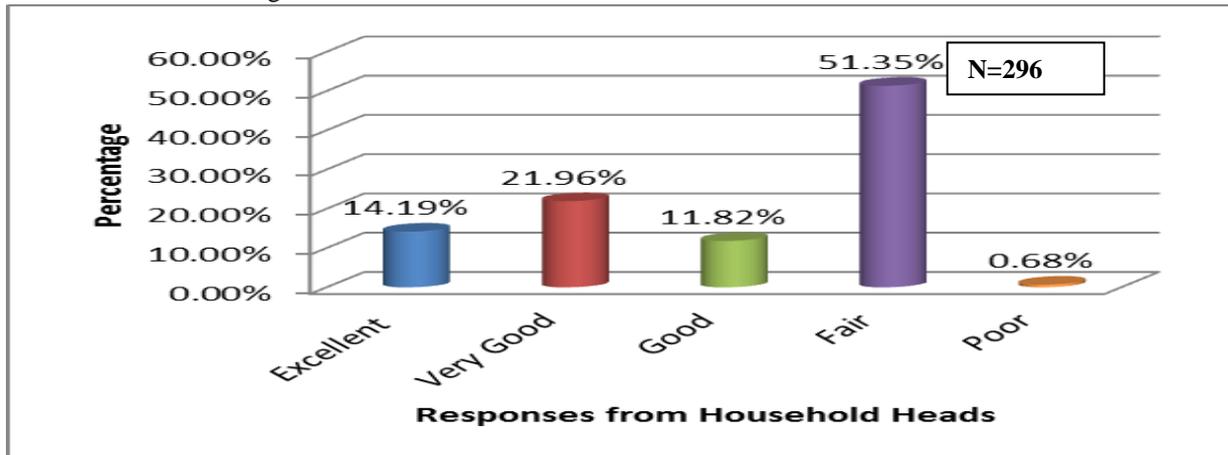


Figure 2: Government’s response of the conflicts in Nyakach and Sigowet Sub-counties
 Source: Field Data (2017)

The results showed that out of the 296 respondents, 42 (14.19%) of them indicated the government did an excellent job, 65 (21.96%) stated that the government’s work was very good, 35 (11.82%) of the respondents indicated good in their response and majority of the respondents 152 (51.35%) stated that the government’s handling of the conflict in the study area had been fair. 2 (0.68%) of the respondents felt that the government performed poorly.

In support of the results from the household heads, the Nyakach Sub-county administrator opined that;

The national government had been actively involved in responding to the conflicts by the use of police and the Anti-Stock theft police Unit. The county government was also involved in helping to calm down tension in the area through dialogue involving leaders. For example the Kisumu and Kericho governors have on several occasions visited conflict affected areas and addressed residents jointly which helped in easing tension in the border area (Nyakach Sub-county administrator 20th March 2017).

It also emerged from the FGDs that the government had worked towards managing the conflict by taking various actions including sending a parliamentary commission in the area to investigate the conflict. 3 out of 10 respondents in an FGD held in Sondu market indicated that they once in 2014 attended a parliamentary commission meeting that was looking for ways to solve the conflicts in the area. The participants praised this as a good move by the government however, they also indicated that since the members of parliament left, nothing has been done and the information that was given to them has never been acted upon and hence, it has not helped in making any difference in helping towards getting lasting solutions for the conflict that has affected the area for decades. FGD participants indicated that the locals have also shared information with government agencies that have always come to the area looking for information but unfortunately the information they have always given has not often been used appropriately by these government agencies to help in getting lasting solutions to the conflicts in the area.

4.2.2 APPROACHES USED BY GOVERNMENT/STATE ACTORS TO PREVENT RECURRENCE OF INTER-ETHNIC CONFLICTS IN NYAKACH AND SIGOWET SUB-COUNTIES

During the study, respondents were asked to indicate initiatives used by the government in dealing with the conflict in the study area that fostered peace. The results were as indicated in Table 1.

4.2.2 APPROACHES USED BY GOVERNMENT/STATE ACTORS TO PREVENT RECURRENCE OF INTER-ETHNIC CONFLICTS IN NYAKACH AND SIGOWET SUB-COUNTIES

During the study, respondents were asked to indicate initiatives used by the government in dealing with the conflict in the study area that fostered peace. The results were as indicated in Table 1.

Table 1 : Peace Initiatives by Government/State Actors in Nyakach and Sigowet Sub-counties

Initiative	Frequency	Percentage
Community Policing	45	15.2
Use of local administrators	83	28.1
Police	143	48.3
Use of Judiciary/Courts	25	8.4
Total	296	100.0

Source: Field Data (2017)

The results from 296 respondents indicated that the approaches used included community policing 45 (15.2%), use of local administration 83 (28.1%), use of security personnel/police 143 (48.3%) and use of judiciary/ courts 25 (8.4%).

4.2.1.1 COMMUNITY POLICING

Community policing which was supported by 45 (15.2%) of the respondents shown in Table 1. Community policing entailed efforts by the police to work with local communities from both Nyakach and Sigowet Sub-counties to ensure durable peace in the study area. Interviews by chiefs revealed that the police had been involved in working with members of the community through village elders and chairmen of community policing. The police however stated that, they did not get direct support and cooperation from locals. This explains why majority of the respondents did not favour community policing as a peace initiative by the government.

During an FGD, a youth participant in the Sondu revealed that;

Reporting to the police may at times land you in trouble. You may in the process become the lead suspect (Luo Men FGD in Sondu, 1st April 2017).

4.2.1.2 LOCAL ADMINISTRATION

The local administration 83 (28.1%) as supported by the household heads (Table 1) through the offices of Chiefs, assistant chiefs and village elders frequently intervene in disputes as mediators. They have played a pivotal role in addressing community conflicts such as local and disputes, fights among community members as well as other interpersonal conflicts.

Interviews with the government officials established their roles to include coordination with various peace building initiatives, for instance, the chiefs stated that they chaired Location Peace and Security committees. The chiefs also attended peace meetings organized by various players in the area to show the government support for the peace process.

Interview by the Chiefs further revealed that the administrators are trained on various skills. These included conflict resolution skills, risk reduction strategies, resource mobilization and utilization, administration and security roles through seminars and workshops majorly organized by the government. The chiefs disseminate such skills to their community members through public *barazas*. They also play a major role in training the security personnel on the basics dispute resolution through meetings held at least once a month in their various works stations.

4.2.1.3 SECURITY PERSONNEL/ POLICE

Security personnel were supported by 143 (48.3%) of household heads as shown in Table 1. The Police targeted by this study included officers from the Administration police and the Anti-Stock Theft Police Unit. During Interview by the Chief from South East Nyakach, it emerged that a number of police posts have been set up in areas perceived to be vulnerable to conflicts especially along the borders of Nyakach and Sigowet sub-counties. The police officers were mandated to respond to local crime and disputes, for instance cattle rustling and land disputes within the area. An interview by the Anti-Stock theft police officers revealed that they are specifically mandated to prevent incidence of cattle rustling in the area by patrolling borders. They are also mandated with ensuring that people do not move with cattle across the border and in the event that this happens the officers should help with tracing and recovery of stolen livestock and safe return to the owners as well as apprehending those behind these crimes.

The study further revealed that, the Anti-Stock theft police officers were mostly deployed in places where there were rampant cases of livestock theft and especially along the borders of the two sub-counties. The Chief of Kapsorok location also indicated that the Administration police officers often provided reinforcement to the Anti-stock theft police officers during incidences of cattle rustling and also helped in sealing off the border areas in the event that there was tension between the communities to prevent either community from attacking the other.

4.2.1.4 JUDICIARY /COURTS

The courts are also used in conflict management in the area as supported by 25 (8.4%) of the household heads in Table 1. The Judiciary is the official state body to deal with disputes as indicated by the laws of Kenya and the Constitution of Kenya (2010). Conflict perpetrators arrested are sometimes taken to the court as noted from the interviews by the police. One respondent pointed out during the interview that;

On several the police do not take conflict perpetrators especially cattle rustlers to court; they are always arrested and then set free after a few days thereby making them have the courage to continue propagating vio-

lence. The police appear to be collaborating with these cattle rustlers (Interview with an Official of Nyakach Elders Development Group, 25th March 2017).

Responses from FGDs also indicated less preference to the court which was viewed as costly and time consuming blaming corruption and ineffectiveness in the official law; Participants in the FGDs noted that conflict incidences reported to the police hardly ever reached the courts. Additionally the costs of travelling and the costs of filing a case at court was viewed by the respondents as high in comparison to the income levels of the people, making it almost impossible for many to seek redress before a court for their grievances.

Contrary to the findings in table 1, Nyukuri (1997) argues that that government has not been actively involved in meaningful peace initiatives but instead has been engaged in acts of police brutality, harassment of activist, harassment of the media and harassment of religious leaders as a way of ensuring it remain in control. These acts only make it possible for people to experience negative peace which comes through force from the government rather than the good will of members of the community.

4.3. PEACE INITIATIVES BY CIVIL SOCIETY ORGANIZATIONS (NGOS, CBOS AND FBOS) IN NYAKACH AND SIGOWET SUB-COUNTIES OF WESTERN KENYA

The study sought to establish the peace initiatives by NGOs, CBOs and FBOs in the study area. The respondents were asked to indicate activities by the civil Society organizations in the study area that fostered peace. The results are as indicated in Figure 3.

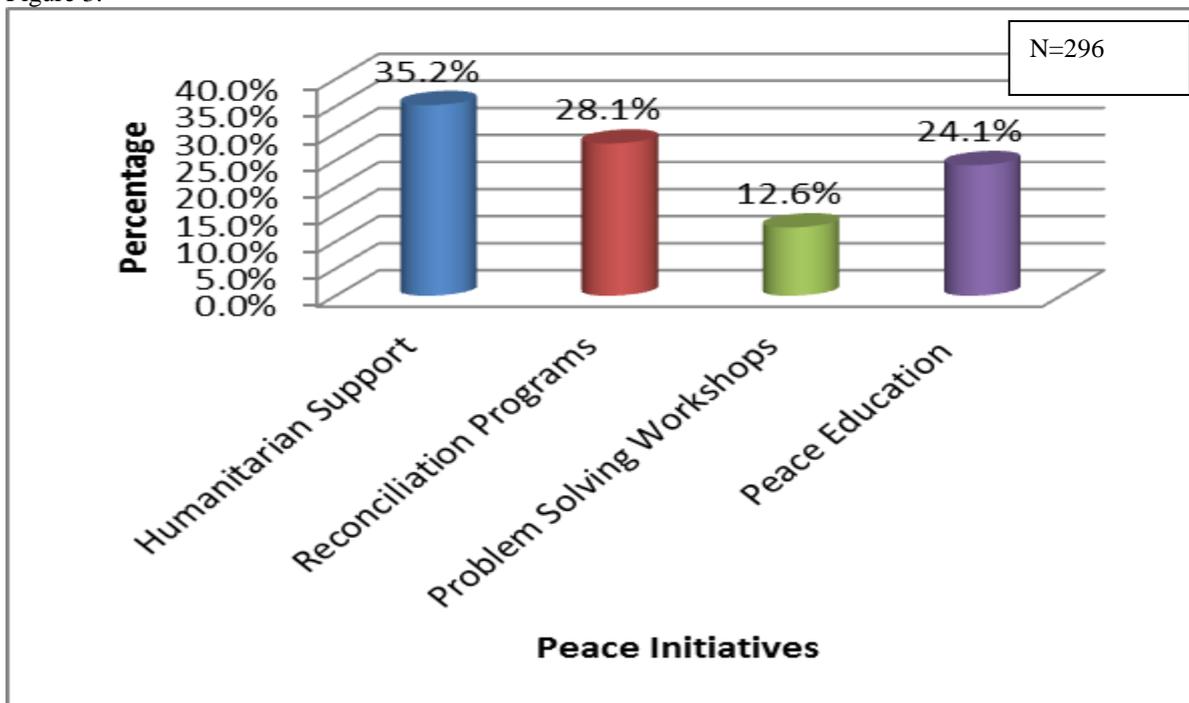


Figure 3: Peace Initiatives by Civil Society Organizations in Nyakach and Sigowet Sub-counties of Western Kenya
Source: Field Data (2017)

The findings signposted that the initiatives by the civil society included humanitarian support 104 (35.2%), reconciliation programs 83 (28.1%), problem solving workshops 37 (12.6%) and peace education 72 (24.1%). The findings from households were in harmony with the results from interviews by various Civil Society Organizations. The CSOs indicated that they were involved in activities that were meant to ensure peace in the study area. An official from Kenya Red Cross indicated during the interview that the major role the organization plays during conflicts is that of providing humanitarian support to the victims of the conflicts and their families. Red Cross official indicated that they always provide basic needs such as food, clothing and other basic necessities during conflicts; the official also indicated that the organization provided first aid services and ambulance services to the injured so as to reduce fatalities from the conflict. Red Cross worked with other partners including the county governments of Kericho and Kisumu to provide shelter to people whose houses are burnt during the conflicts. World Vision also works closely with the Kenya Red Cross and the county governments to provide shelter and economic empowerment to people affected by the conflicts as revealed during the interview. The two major NGOs in the area revealed that the purpose for the support they provide is to make help the communities move on after the conflicts and have people embrace peace so as to avoid incidences of revenge attacks. One of the respondents opined that;

In world vision which is a Christian based organization, we encourage beneficiaries of our programs to embrace peace and preach peace so that we do not have cases of conflicts recurring in the affected areas (An interview with an Official of World Vision- Nyakach, 17th March 2017).

The reconciliation programs in the study area were another important activity that was led by the civil society organizations. Reconciliation activities were done by FBOs and CBOs in collaboration with the NGOs in the study area. These organizations worked

on specific post conflict intervention programs to help in uniting the two communities that were involved in conflicts. The main reconciliation activities sporting activities between youths from Nyakach and Sigowet Sub-counties, dialogue between community members through District Peace Committee meetings, the use of social media to reach out to the youths who are the main participants in conflicts.

During an interview with officials from the CJPC it was revealed that the FBO worked closely with LPCs in the area to make sure that there were dialogue meeting between members of the community in the area which involved village elders, women, youth and local administration to help in the process of reconciliation between community members. CJPC stated that these meetings had been going on since 2008 and had helped in reconciliation efforts in the area. CJPC also indicated that they had been working with various stakeholders through problem solving workshops to make sure that community members lived peacefully. The officials from CJPC also indicated that they reached out to the youths through sporting tournaments as a way of ensuring that the youths are united in working towards lasting peace in the area.

The Kericho County Youth *Bunge* (Parliament) is another organization with Kericho County that has used various methods to ensure peace prevails in the area of study. During the interview it emerged that the CBO is a youth-driven initiative with systemized structures from the county level to the village level comprising of 1000 Village youth *Bunges* (Parliament) mandated to rally youth together to achieve greater voice for the youth in the national reform agenda, to create new livelihood opportunities, to increase public awareness of youth priorities and to promote their effective participation in governance as well as spearhead peace building initiatives. The *Bunge* members work closely with members of the political class in the area to make sure that the politicians do not exploit the youths for violence. The major pillars of the Youth *Bunge* are tolerance, peace dialogue and ethnic harmony among the youths. It is made up of members of both Luo, Kisii and Kipsigis youths from the two Sub-counties especially those living in Sondu area that is the greatest conflict hotspot in the area. Kericho Youth *Bunge* also uses the social media to reach out to young people in the area as a way of ensuring that they youths remain peaceful.

4.4 CONFLICT MANAGEMENT APPROACHES ADDRESSING ROOT CAUSES OF INTER-ETHNIC CONFLICTS IN NYAKACH AND SIGOWET SUB-COUNTIES

The study sought to establish whether the conflict management approaches by state and non-state actors helped in addressing the root causes of conflicts in Nyakach and Sigowet Sub-counties. The results are given in Figure 4.

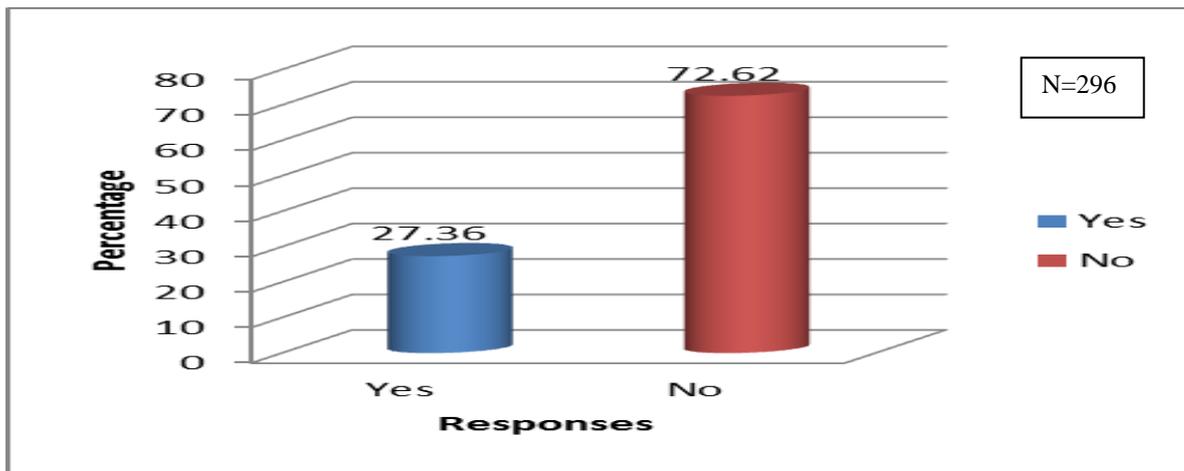


Figure 4: Conflict Management Approaches address root causes of ethnic conflicts in Nyakach and Sigowet Sub-counties
Source: Field Data (2017)

The results in Figure 4 indicate out of the 296 respondents, 81 (27.36%) indicated that the conflict management approaches addressed root causes of inter-ethnic conflicts while 215 (72.64%) of the respondents indicated that the approaches did not address the root causes of inter-ethnic conflicts in the study area. Majority of the respondents therefore believed that the conflict management approaches and the peace initiatives that were used in the area did not address the root causes of the conflict therefore making it possible for the conflict to keep recurring in the area.

These results were consistent with the results from FGDs as the respondents indicated that most of the actions that were taken were meant to stop a conflict that had started. The respondents indicated that these actors were more reactive than proactive to the conflicts and therefore did not do much during the times when there was peace in the area to make sure the peace was maintained.

The results from key informant interviews however disagreed with those from FGDs and households since the key informants indicated that the measures that they had put in place measures that they believed were addressing the root causes of the conflicts. The key informants both from the government and the civil society indicated that they were working with the community at the grass roots to make sure that the issues that were leading the recurrence of conflicts such as poverty, unemployment and insecurity were handled so as to ensure that the communities live in peace. The key informants also indicated that they were ac-

tively involved in peace initiatives at the grass roots with the aim of reaching out to the people affected by the conflict on the ground.

The argument by key informants is supported by Pkalya & Mohamud (2006b) who state that the civil society actors started rallying and involving government official's activities, this intense rallying and lobbying by the civil society gave rise to the official peace building bodies now referred to as DPCs. There are however glaring gaps in terms of coordination between government initiatives, civil society organization and the people at the grassroots.

4.5 INDIGENOUS MECHANISMS OF PROMOTING PEACE IN NYAKACH AND SIGOWET SUB-COUNTIES OF WESTERN KENYA

The study sought to establish the knowledge of the respondents on indigenous mechanisms of promoting peace in the study area. The 296 respondents indicated their responses as shown in Figure 5. The results indicated that 106 (35.74%) of the respondents indicated that they knew that there were indigenous mechanisms of conflict management in the study area, 172 (58.18%) of the respondents indicated that there were no indigenous mechanisms of promoting peace in the area while 18 (6.08%) of the respondent indicated that they did not know whether or not there were indigenous methods of promoting peace in the area. From the results it is evident that the majority of the respondents indicated that there were no indigenous methods of dispute resolution in the study area. However, the respondents who indicated that there were indigenous mechanisms of promoting peace, stated that they knew about efforts that had been made by elders from both communities to promote peace in the area. These respondents also indicated that intermarriage had been an important factor in promoting peace

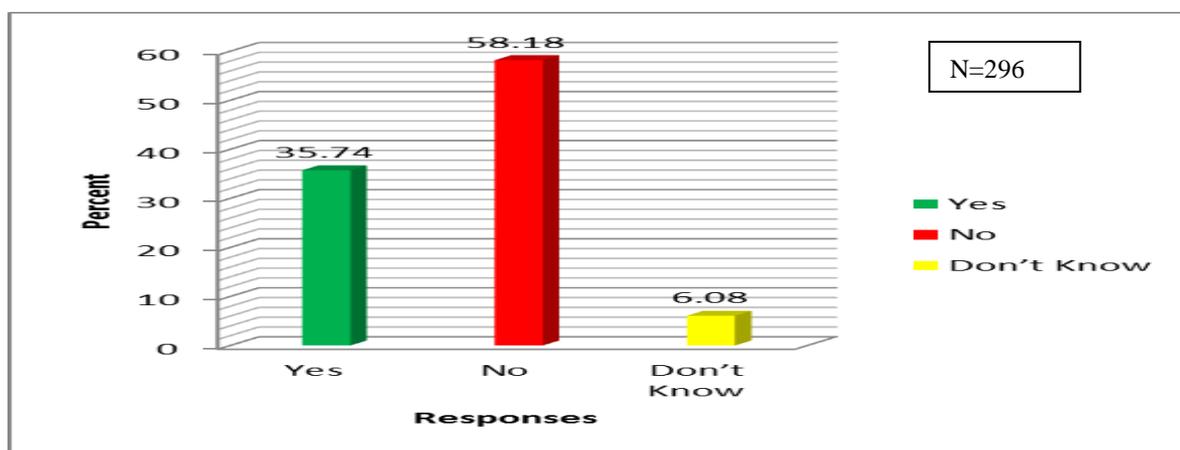


Figure 5: Knowledge on Indigenous methods of promoting Peace in Nyakach and Sigowet Sub-counties
Source: Field Data (2017)

The results from the households were not consistent with those that came from key informants who indicated that there were a number of indigenous efforts to promote peace in the study area. The key informants indicated that they had been part of peace meetings in which elders from the communities living in the study area had met on several occasions to promote peaceful coexistence among community members. The various CBOS, FBOs and NGOs in the area indicated that they had been part of several meetings in the area in recognition of the role of elders as part indigenous institution for promoting peace and always managed to get commitment from the elders to be part of the efforts in promoting peace.

An official of the Uhai Lake Forum opined that;

Our organization has been organizing inter-ethnic dialogue between elders from Luo and Kipsigis communities to bring these two communities together and ensure that they live in peace as neighbours. We will keep on working together with elders since they hold a place of respect among community members and they are likely to influence the way these two communities relate (Interview with Uhai Lake Forum Organization Official, 10th April 2017).

The results from the key informants were supported Akinyi-Dar *et al.* (2011) who indicated that elders were used in tracing of stolen animals, and they had helped to come up with the branding of animals from both Luo communities and Kipsigis communities to help in identifying stolen livestock from either side of the border. Akinyi-Dar *et al.* (2011) further indicated that, elder dialogue had helped in restoration of peace between the Kisii and Kipsigis communities in the area and this could also work between the elders from Kipsigis and Luo communities that were always in conflict. This is further in agreement with a report to the Security Council from former UN Secretary- General, Kofi Annan (2004) emphasizing use of indigenous and informal traditions for administering justice or settling disputes and to do so in conformity with both international standards and local tradition' (UNDP, 2016).

The government officials also indicated that they strongly supported various indigenous initiatives that promoted peace in their areas. Chiefs use their public *barazas* as forums that elders could use to promote peace and solve various inter-community disputes especially those related to land and this had promoted peace in the area.

4.6 AGENCIES FOSTERING PEACE IN NYAKACH AND SIGOWET SUB-COUNTIES

The study sought to establish the knowledge of the respondents on the work done by agencies that fostered peace in the study area. The respondents were asked to state their knowledge of the work done by National Cohesion and Integration Commission (NCIC), National Council of Churches of Kenya, Catholic Justice and Peace Commission (CJPC), National Land Commission (NLC), National Police Service (Police). The results are as shown in Figure 6

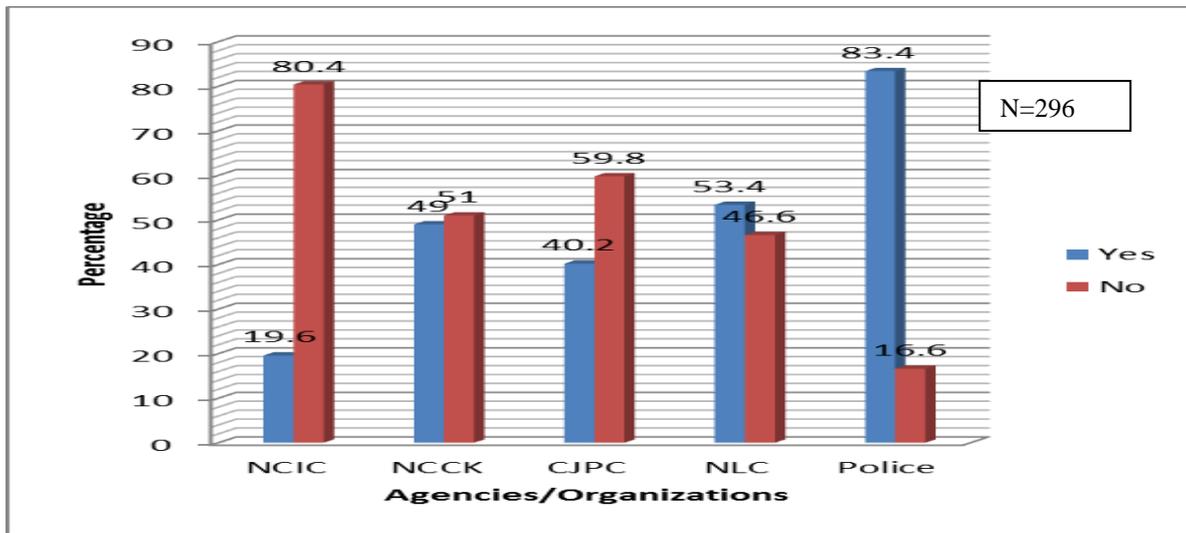


Figure 6.: Knowledge of work done by agencies to foster Peace in Nyakach and Sigowet Sub-counties
Source: Field Data 2017

The Results in Figure 6 show that 58 (19.6%) of the respondents knew about the work of the National Cohesion and Integration Commission (NCIC) while 238 (80.4%) of the respondents indicated that they did not know about the work of the commission; The results also indicated that 145 (49%) knew about work that had been done by National Council of Churches of Kenya (NCCCK) while 151 (51%) were of the contrary opinion; 119 (40.2%) indicated that they knew about the work that had been done by Catholic Justice and Peace Commission (CJPC) while 177 (59.8%) were of the contrary opinion; 158 (53.4%) indicated that they knew about the work that had been done by the National Land Commission while 138 (46.6%) were of the contrary opinion; 247 (83.4%) indicated that they knew about the work that had been done by the National Police Service while 49 (16.6%) gave a contrary opinion.

4.6.1 NATIONAL COHESION AND INTEGRATION COMMISSION

The results indicated that 58 (19.6%) of the respondents knew about the work of the National Cohesion and Integration Commission (NCIC) while 238 (80.4%) of the respondents indicated that they did not know about the work of the commission. Based on the results, it was evident that NCIC is not in contact with the local people at the grass roots level since majority of the respondents stated that they did not know about the work that the commission had done with regard to ensuring sustainable peace in the study area. NCIC was established in 2008 under the National Cohesion and Integration Act Number 12 of 2008 with the key mandate of to address and reduce incidences of inter-ethnic conflicts in Kenya. Therefore, according to these results, the NCIC as a government agency mandated with dealing with issues relating to the cases of inter-ethnic conflicts in Kenya, has not performed its mandate appropriately due to the failure to work with communities at the grassroots, this assessment was made on the basis that the people at the grassroots are ones who often get involved in conflicts and also get affected by these conflicts and as such they are the ones who can help a body like NCIC to find solution that can help in addressing these conflicts.

In support of the results from household participates in FGDs also reiterated that they only knew about NCIC through the Media as mainly on television and that they had not seen any work done by people from NCIC in the area despite the re being a hotspot for conflicts in the study area. One of the respondents made an assertion that he only knew about NCIC as “a hate speech” commission that was only meant to deal with issues of hate speech by politicians. In this regard therefore, despite the commission being one of the few government agencies that had been entrusted with the responsibility to dealing with addressing and reducing cases of inter-ethnic conflicts in the area, it had not helped in any way to reduce the cases of conflict in the area.

4.6.2 NATIONAL COUNCIL OF CHURCHES OF KENYA (NCCCK) AND CATHOLIC JUSTICE AND PEACE COMMISSION (CJPC)

The household respondents also gave their feedback about the knowledge on the role of the key religious organizations that were associated with the issues of conflict management is the study area which were the CJPC and the NCCCK. Based on the results 49% of the respondents knew about the work done by NCCCK while 51% were of the contrary opinion where as 40.2% indicated that they knew the work done by CJPC while 59.8% were of the contrary opinion. These results therefore indicate that the two faith based organization had done some work related to peace building in the area. It is however evident that the activities by these FBOs had not reached a substantial number of respondents in the area. The results from the households were however not in agreement with those from FGDs. The FGD participants indicated that that the two FBOs had been at the centre of preaching

peace in the area through youth, women and men as well as elders workshops. It emerged from the FGDs that CJPC had always organised several meetings in the area to bring communities together through its inter-elder dialogues and intra-elder dialogue programs which were meant to bring together elders between and within communities together and talk about issues of inter-ethnic conflict in the area as well as the need for peaceful coexistence among communities living in the area. Additionally, it emerged that some of the people who were involved in attending meeting that were organised by these FBOs were more interested in the allowances that they drew from these meetings in form of transport disbursements than the actual objective of conflict management which was the sole purpose of them having such meetings in the first place, one of FGD participants in Tabaita pointed out that;

...Hawa watu huwa wanaenda huko kulipwa baada ya mikutano ya amani lakini hakuna kitu wanafanya kuleta anami kati ya jamii, kazi yao ni kubeba tu pesa lakini hakuna faida wanaleta... (This people only go to the peace meetings to collect allowances but there is no significant contribution they make to the community in so far as peace is concerned).

Key informants supported the work that was done by the CJPC and NCKK in the area by indicating that the organizations worked through local churches to make sure the message of peace in the area reached as many people as possible. The Priest from the Anglican Church who was interviewed during the study indicated that NCKK had been working with various partner organizations to implement peace programs in the study area. Similarly, the CJPC program officer in Kisumu indicated that the organization had worked closely with communities in the area through Peace committees, sporting events for the youths, economic empowerment programs and inter-community dialogue meetings in the efforts to foster peace in the area. The CJPC official also indicated that they had been working closely with various Communities-Based Organizations such as Uhai Lake Forum to ensure that they reach various parts of the area that were common hotspots for conflicts.

4.6.3 NATIONAL LAND COMMISSION (NLC)

National Land Commission (NLC) is one of the constitutional commissions that was formed to deal with land related conflicts under the constitution of Kenya 2010. According to the results from the study, 53.4% of the respondents indicated that they knew about the work that had been done by the National Land Commission while 46.6% were vaguely knowledgeable about NLC. These findings were supported by the key informants who indicated that officials from the National Land Commission had been in the area on several occasion to listen to various disputes relating to land in the area. The government officials indicated that some of the residents in the area had received title deeds for their land through the intervention of the NLC. Similarly, chiefs indicated that working closely with officials from NLC had enabled them to constitute traditional dispute resolution committees to help in solving some community land issues within the area such as boundary problems.

Considering that one of the causes of the conflicts in the study area is land related, the role of NLC was therefore key in ensuring sustainable peace in the study area. Article 67 (2) of the Constitution of Kenya 2010 highlights specific functions of the NLC, with regard to its mandate in dealing with land related conflicts in a sustained manner as highlighted in part e of the article where NLC is to;

Initiate investigations on its own initiative or on complaint, into present or historical land injustices and recommend appropriate redress (Article 67 (2) (e), Constitution of Kenya 2010).

Similarly, the article also indicates that the NLC is to;

Encourage the application of traditional dispute resolution mechanisms in land conflicts (Article 67 (2) (f), Constitution of Kenya 2010).

From the foregoing, it is therefore important to note that the constitution has provided ways in which land conflicts can be resolved and sustained peace realized through the National Land Commission (NLC), which is a constitutional commission.

4.6.4 NATIONAL POLICE SERVICE

The National Police Service is another agency that majority of the respondents indicated they knew about in terms of its work in maintaining peace, with 83.4% of the respondents giving a positive feedback on the police work. The results from the household were supported by key informants who reiterated that the police were the most active responders to the incidences of ethnic violence in the area and also had been involved in measures to prevent ethnic conflicts in the area. The Chiefs indicated that there were two police units in the area namely, Anti-stock theft Police Unit and Administration Police who worked closely with the locals to deal with cases of conflicts in the study area. The role of the police included protecting property from damage, creating a buffer zone between the two communities when conflict erupted so as to prevent escalation of the conflict, patrolling borders to prevent criminal elements from crossing borders and causing mayhem and helping in tracing stolen livestock in the area.

Contrary to the findings of the study, KNCHR (2014) report indicated that, the police were not trusted by members of the public due to their heavy handed approach in quelling conflicts and the rampant corruption in the police service. The report further revealed that the police had a poor track record of human rights violations which made them a hindrance in gaining sustainable peace.

4.7 EFFECTIVE METHODS OF GETTING SUSTAINABLE PEACE IN NYAKACH AND SIGOWET SUB-COUNTIES

The study sought to establish the opinion of the respondents on the effective ways of attaining sustainable peace in the study area. The methods identified by the respondents included; use of dialogue forums, police and courts, religious leaders, community elders, government commissions and local administrators. The results are as indicated in Table 2.

Table 2: Effective methods to attain sustainable peace in Nyakach and Sigowet Sub-counties

Effective ways to get Sustainable Peace	Frequency	Percentage
Dialogue Forums	133	45
Police and courts	17	5.6
Religious leaders	30	10.1
Community Elders	18	6.2
Government Commissions	1	0.4
Local Administrators	97	32.7
Total	296	100.0

Source: Field Data 2017

The results in Table 2 indicated that out of the 296 respondents, 133 (45%) supported the use of dialogue forums; 17 (5.6%) supported the use of police and courts; 30 (10.1%) supported the use of religious leaders; 18 (6.2%) supported the use of community elders; 1 (0.4%) supported the use of government commission; and 97 (32.7%) supported the use of local administrators as the common methods used to attain sustainable peace in the area of study. From this study, it is therefore evident that majority of the respondents preferred dialogue as the most efficient way to sustain peace in the study area. In support of the results from the household heads, the FGDs revealed that dialogue was the most effective way of attaining lasting peace since it involved would involve people from the grassroots working towards solving problems affecting them. The findings agreed with a study by UNDP (2013) in which it was reported that through dialogue, communities are bale to shed their distrust and work towards lasting peace.

4.8 ROLE OF DEVOLUTION IN REDUCING INCIDENCES OF INTER-ETHNIC CONFLICTS IN NYAKACH AND SIGOWET SUB-COUNTIES

The study sought to establish whether devolution had contributed to reduction in the incidences of inter-ethnic conflicts in the study area. The respondents were asked to indicate whether or not devolution had contributed to reducing inter-ethnic conflicts in the area. The results were as shown in Figure 7

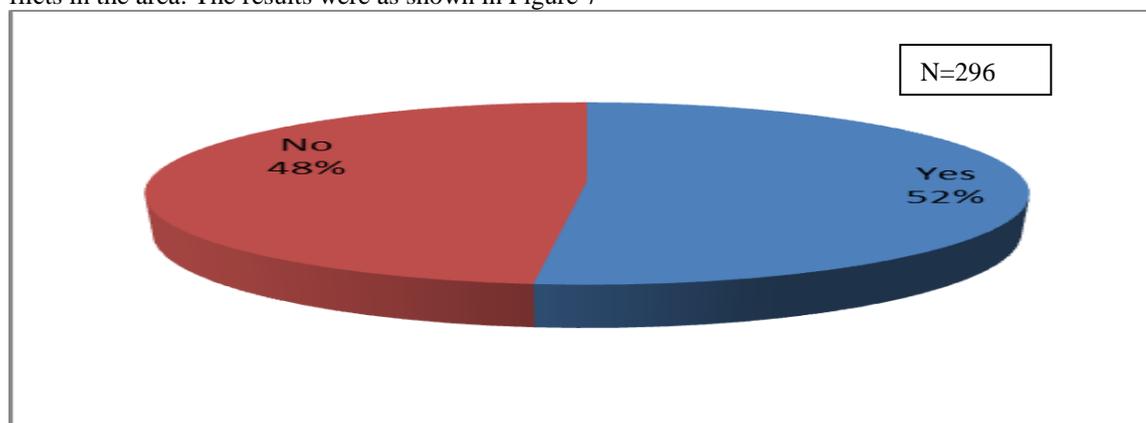


Figure 7: Devolution helped in reducing ethnic conflicts in Nyakach and Sigowet Sub-counties

Source: Field Data 2017

The results in Figure 7 indicate that out of the 296 household heads, 154 (52%) indicted that they devolution had contributed to reducing the incidences of inter-ethnic conflicts in Nyakach and Sigowet Sub-counties while 142(48%) of the respondents were of the contrary opinion. The respondents indicated that the county government had opened up the local areas through economic activities and businesses, hence people especially the youths, had been able to get jobs through the county government initiatives which helped in reducing poverty in the area. The respondents also indicated that the county government had availed bursaries for more people to go to school hence reduce the number of youths who dropped out of schools and who would consequently get involved in criminal activities.

The findings from the household heads were supported by those from the key informants who indicated that devolution had provided a number of opportunities for the youths in terms of education and employment and hence contributed to poverty alleviation in the area. The Sub-county Administrators and MCAs who were interviewed during the study indicated that the projects that were undertaken by the county government benefited the locals especially the youths who got jobs from the projects that

were done in the sub-counties. They reiterated that these youths got income from these projects thus ensuring that they were not involved in criminal related activities that would easily lead to cases of inter-ethnic conflicts in the area.

5.0 CONCLUSION

The study concludes that there were several of peace initiative and opportunities for sustainable peace in Nyakach and Sigowet sub-counties. The peace initiatives in the area were reactive to the conflicts and failed to address the root causes of the conflicts. Additionally, State and Non-state agencies in the area can create an environment for sustainable peace through their mandate and work. Devolution also presents an opportunity of addressing main social and economic issues linked to conflicts in the area. However, the poor coordination between meant to deal with conflicts and local communities has led to the recurrence of conflicts in the study area.

6. 0 RECOMMENDATION

The study recommends improved coordination and integration through enhanced inter-ethnic forums in dealing with the conflict perpetrators as well as strengthening of local peace initiatives. There should be improved working relationship between the government agencies, civil society and the community members so as to make the peace initiatives more effective. Additionally, there is need for strengthening of the indigenous mechanisms of conflict resolution and the integration of this indigenous mechanism with formal mechanism including the judiciary.

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Institutional capabilities of African Peace and Security Architecture (APSA) Framework

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DOI: 10.29322/IJSRP.9.08.2019.p92106

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92106>

ABSTRACT

The African Peace and Security Architecture (APSA) is a policy and institutional framework that the African Union (AU) established in 2002. It was intended to be an operational structure for the effective implementation of the decisions taken by the African Peace and Security Council (PSC), in the areas of conflict prevention, conflict management and post conflict reconstruction in the African continent. Besides, Continental Early Warning System (CEWS), Panel of the Wise (PoW), African Standby Force (ASF) and Africa Peace Fund (APF), have played a preponderant role in complimenting APSA's mandate. However, over a decade since it came into existence, the continent is still mired in violent conflicts. In this regard, APSA performance has been subject of considerable research but the factors that stymie its performance have not been adequately documented. This study sought to fill this research gap. The objective of the study was to establish the extent to which the APSA framework as currently constituted has the institutional capacity to deliver on its mandate. The research findings contribute to the existing body of knowledge while also benefiting policy makers dealing with peace and security in Africa. The research established that APSA has largely successfully achieved its mandate and implemented the PSC decisions despite the numerous challenges it continues to face. It was also established that there is need to invest more in APSA in order to enhance its performance.

KEY WORDS: African Peace and Security Architecture, institutional framework, Security Council

I.Introduction

According to Sharp (2010), the global society has witnessed the growth and spread of various forms of breakdown in law and order popularly christened as world wars, civil wars and ethnic conflicts. World history is replete with accounts of various wars and their attendant destruction but it was the first and second world wars that pushed countries to come together and establish an organization to take the lead in the prevention and management of violent conflicts. Following the Paris Peace Conference of 1919 that ended the First World War, the League of Nations (LoN) was established with the mandate to prevent war and guide pacific settlement of disputes (Williams, 2011).

Despite this effort, the world witnessed another war, the Second World War running from 1939 to 1945. The failure of the LoN to stop this war despite the warning signs led to its replacement with a more empowered organization, the United Nations (UN) in 1945 whose major mandate was to ensure international peace and security. According to the charter of the United Nations, the UN is organized with six key organs namely, the Security Council, the Secretariat, the International Court of Justice, the Economic and Social Council, the Trusteeship Council, and the General Assembly. These organs are designed to complement each other through various established agencies in delivering the organizations mandate of ensuring international peace and security.

According to Ayissi (2004), the UN did not make much headway in ensuring an enabling environment of peace to anchor development in the world. Many countries continued to face protracted violent conflicts that claimed hundreds of thousands of civilian lives as well as immense destruction of property. This was more pronounced during the cold war era between the two superpowers of Soviet Union and the United States of America. This led countries in various regions to come together and form collective security architectures to enable them collectively address security threats in their regions (Gideon, 2016).

In 1947, the US and her allies from Western Europe formed the North Atlantic Treaty Organization (NATO) to provide collective defence to their members in line with article 51 of the UN Charter (Stenn, 2012). Article five of the NATO founding treaty commits

allies to protect each other when any of them is subject to an armed attack. The guiding principle is that an attack on one is an attack on all. This was put to effect after the 9/11 terrorists attack in the US, when NATO troops were deployed in Afghanistan under International Security Assistance Force (ISAF). This has set a spirit of solidarity within the alliance and the region (Stenn, 2012).

According to Hitoshi (2006), the formation of NATO motivated the Soviet Union and its affiliated communist nations to establish a rival alliance, the Warsaw Pact in 1955. In 1967 the Association of the South East Asian Nations (ASEAN) was also formed as a regional security architecture to provide the ten member states of South East Asia with a mechanism to resolve security threats in the region. It fosters protection and stability among the member states through promotion of intergovernmental cooperation, shared values and adherence to norms of international law.

Towards this end, Africa was also not left behind in an effort to search for a collective security mechanism. In Africa, all the present states were under colonialism save for Ethiopia and Liberia. By the early 1960s, states that had achieved their independence came together and formed the Organization of African Union (OAU), which became operational in 1963. The aim of OAU was to rid the continent of colonialism and foster unity for development on the continent. It was replaced by the African Union (AU) in 2002, which had a more expanded mandate (AU Constitutive Act, 2002).

II. Theoretical framework

This study was underpinned by securitization theory. This theory has ushered a paradigmatic shift in security thinking and practice where security is no longer limited to military and political power considerations. The theory is attributed to the Copenhagen school of thought pioneered by Barry Buzan in the early 1990s. This theory argues that security is a social construction of threats which are debated by politicians and presented to the general public which must authorize extra ordinary measures to neutralize the threats. The manner of articulation of the threats to the public depicts panic politics (Buzan, 1998).

The Copenhagen school of thought presents the security sector as one that requires multiple actors working harmoniously to neutralize threats before they can cause any damage. The envisaged actors are both state and non-state. This approach serves to cement the view that the state is a critical actor in security matters but not the only actor. The theory further introduces into the security debate the concept of regional security complexes whose major argument is that geographical regions tend to jointly experience or be affected by security threats emanating from within them (Buzan, 1991). To overcome such threats, the security actors within that region must forge a cooperative arrangement of actors who appreciate the nature of the threats and who must act together to thwart the threats. In this vein, APSA can more traction in peace-building and conflict management in Africa and conflict-ridden states.

Despite the merit of the securitization theory in expanding the scope of security threats and actors, the theory risks expanding the security space too much to render it meaningless or even impossible in terms of academic analysis. This is especially so because of the ability of politicians to frame any issue and rally support for it to be considered a security threat.

III. METHODOLOGY

This study adopted a descriptive research design. A research design is a plan or a blue print that guides and informs how the study was conducted (Kothari, 2004). It provides control over those factors that could influence the outcome of the study. The research design underpins a study or a project that a researcher pursues (Kamau, 2014). This research design was the most suitable in this study because it highlighted developmental disparities of pillars of APSA and association of various aspects that render APSA functionally weak. It also entails choosing subjects who participate in the study, techniques and approaches for collecting data from the subjects and the procedure for collecting information on various aspects relevant to the functioning of APSA components. The study also was guided by the desirable population. Mugenda and Mugenda (2003), defines population as an entire group of individuals' events or objects having common observable characteristics. The target population for this study comprised personnel drawn from institutions, organizations and agencies involved in peace and security activities in Somalia and which work with the African Union. They included the AU Commission Secretariat, APSA office, Peace and Security Division, partners, civil society organizations, sub-

regional mechanisms, African training centres, AU Missions and the media. Besides, a sample size denotes a section of a part that represents the larger population (Kothari, 2004). This is because study population may be too big to be investigated in its entirety, or may be costly or impossible to be studied because of various reasons. When this becomes the case, a smaller subset of the entire research population is selected to be studied in the place of the study population. The selected subset of the study population is called a sample (Kamau, 2014). In this study, several institutions and/or organizations dealing with peace and security in Africa were factored in. Each of the organizations/institution served as a stratum from which the actual number of participants in the study was drawn. Given that the total population of the Africa Union and allied peace and security actors is unknown, the following formula was used to get the sample size for unknown population:

$$n = (Z^2 pq) / d^2$$

Where:

n=required sample size

Z=Z score corresponding to 95% confidence level

p=Standard Deviation taken at 50% to ensure large enough sample

q= 1-p

d=margin of error at 5%

Applying the formula;

$$= (([1.96]^2)(0.5)(1-0.5)) / [0.05]^2$$

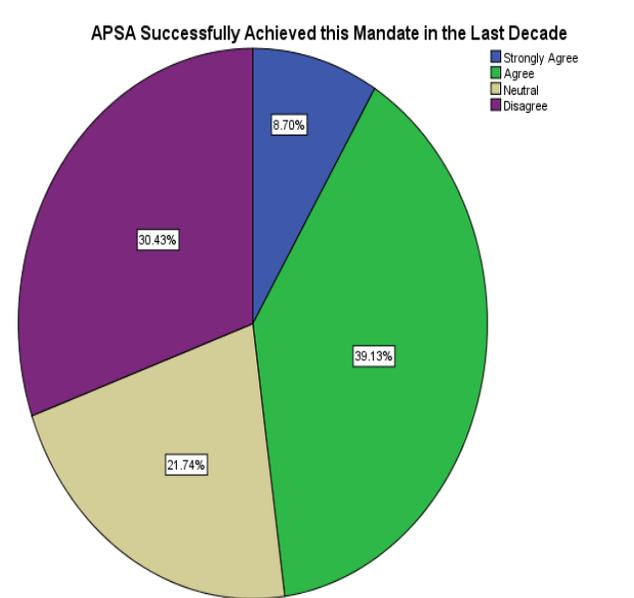
$$= (3.8416 * 0.25) / 0.0025$$

$$= 384.16 \text{ Approximately } 384$$

IV.FINDINGS

A. Institutional capabilities of the APSA framework

According to Shyaka (2012), Africa is today engulfed in a vicious cycle of conflicts as it were over half a century ago, the only difference being the type and nature of conflicts. In the 1960s stretching up to the 1990s, African countries were fighting for their political independence from European colonial powers. It is against this backdrop that the study sought to ascertain the institutional capabilities of APSA framework and its mandate.

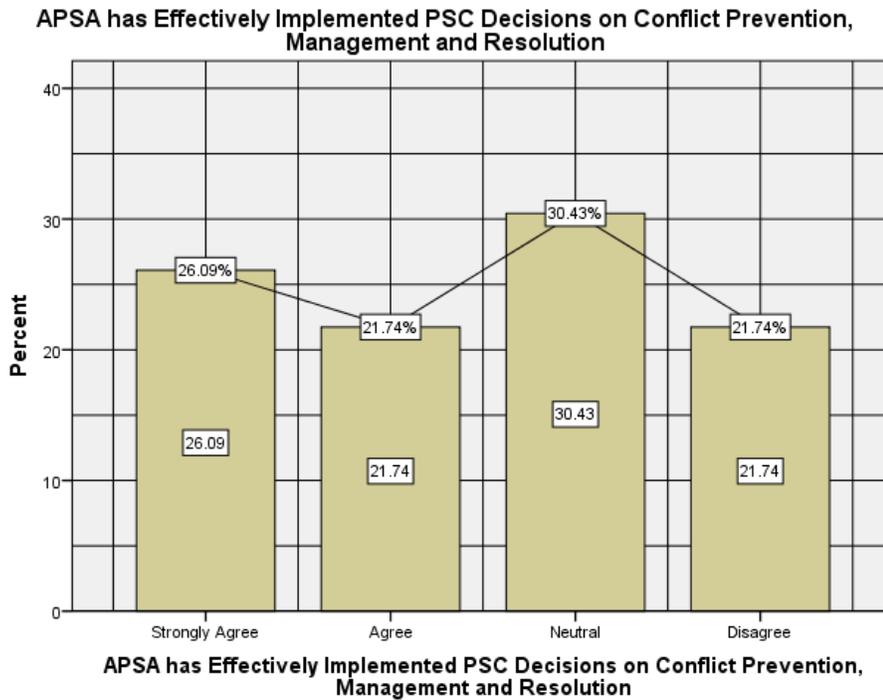


Source: Field data, 2017

Figure 4.1: Respondents' opinion on success of APSA in the last decade

As illustrated in figure 2.1, majority of the respondents, 39.13% agree that APSA has successfully achieved its mandate in the last ten years. This was followed by those respondents who disagree that APSA has successfully achieved its mandate in the last decade as represented by 30.43% of the respondents. 21.74% of the respondents are indifferent about the success of APSA in the last ten years while 8.70% strongly agree that the agency has successfully achieved its mandate in the last decade. No respondent strongly disagreed that APSA has successfully achieved its mandate in the last decade.

B.APSA effective implementation on PSC decisions on conflict prevention, management and resolution in Africa



Source: Field data, 2017

Figure 4.2: Respondents' opinion on APSA effective implementation on PSC decisions on conflict prevention, management and resolution in Somalia.

Drawing from the above bar graph, 30.43% of the respondents are not sure whether or not APSA has effectively implemented PSC decisions on conflict prevention, management and resolution in Africa. On the same question, 26.09% of the respondents strongly agree that APSA has effectively implemented PSC decisions regarding conflict, prevention, management and resolution in the continent of Africa. 21.74% of the respondents agree that APSA has effectively implemented PSC decisions on conflict prevention, management and resolution while an equal number of respondents disagree with the statement. No respondents strongly agreed with the statement.

❖ Association between effective implementation of PSC decisions on conflict prevention, management, and resolution in Africa and successful achievement of its mandate.

H₀: There is no relationship between effective implementation of PSC decisions on conflict prevention, management, and resolution in Africa and successful achievement of APSA's mandate.

Level of Significance: 0.05 (α level)

Confidence Level: 95%

Table 1.1: Correlation between effective implementation of PSC decisions on conflict prevention, management, and resolution in Somalia and successful achievement of APSA’s mandate

Correlations

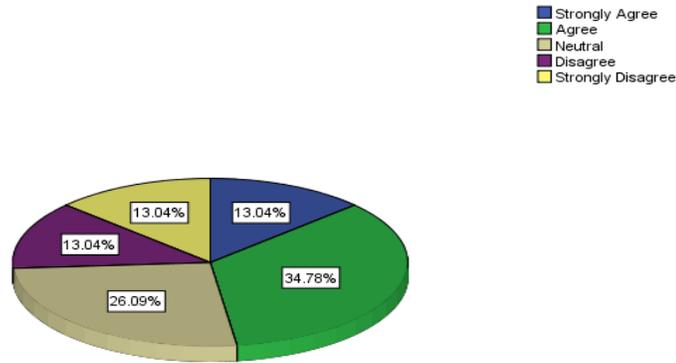
		APSA Successfully Achieved this Mandate in the Last Decade	APSA has Effectively Implemented PSC Decisions on Conflict Prevention, Management and Resolution
APSA Successfully Achieved this Mandate in the Last Decade	Pearson Correlation Sig. (2-tailed) N	1 360	.935 .021 360
APSA has Effectively Implemented PSC Decisions on Conflict Prevention, Management and Resolution	Pearson Correlation Sig. (2-tailed) N	.935 .021 360	1 360

Source: Field data, 2017

A Pearson correlation test was also conducted to determine the relationship between effective implementation of PSC decisions on conflict prevention, management, and resolution in Africa and successful achievement of APSA’s mandate. The results of this test indicated that there was a strong positive association (Pearson $r = 0.935$, $p = 0.021$) between the two variables.

- ❖ **Adequacy of capacity of key components of APSA of the PSC, CEWS, PoW, ASF and APF to support the APSA’s mandate**

Key Components of APSA of the PSC, CEWS, PoW, ASF and APF have Adequate Capacity to Support the Mandate of APSA



Source: Field data, 2017

Figure 1.3: Respondents' opinion on adequacy of capacity of key components of APSA of the PSC, CEWS, PoW, ASF and APF to support the APSA's mandate

When asked their opinion on adequacy of capacity of key components of APSA of the PSC, CEWS, PoW, ASF and APF to support the mandate of APSA, 34% of the respondents strongly agreed that the components have adequate capacity to support the mandate of APSA. Another 13.04% of the respondents strongly agreed with the statement and an equal percentage of respondents disagreed. Equally, 13.04% of the respondents strongly disagreed that the key components of APSA including PSC, CEWS, PoW, ASF and APF have adequate capacity to support APSA's mandate.

❖ Analysis of Institutional capabilities of the APSA framework

The results of the data analysis indicate that capabilities of APSA as an institution is very critical for it to achieve its mandate and in the mission. Consequently, there is need for all relevant stakeholders to work and put a lot of effort in ensuring that APSA is able and adequately capable of delivering on its objectives which are mainly promoting peace and security in Africa. It is important to first of all point out that APSA has largely been largely able to successfully achieve its mandate since its establishment a decade ago.

This is indicated by the results of the questionnaire and interview analyses which indicate that more than 45% of the respondents either strongly agreed or agreed that APSA has successfully achieved its mandate in the last ten years.

In addition to the successful attainment of its mandate, APSA has also largely done well in effectively implementing PCS decisions in conflict prevention, management and resolution in Africa. This is indicated by a combined total of 47% of the respondents who either strongly agreed or agreed to the statement that APSA has effectively implemented PSC decisions on conflict prevention, management and resolution in Africa. A significant number of respondents, slightly over 30% were indifferent to this question statement. This implies that they were not sure whether APSA has effectively implemented PSC decisions on conflict prevention, management and resolution in Africa. A considerable percentage of the respondents disagreed with this question statement. Drawing from the results of the questionnaires and interviews, respondents who were indifferent or who disagreed with this question statement gave a number of reasons as to why they were of the opinion that APSA had not effectively implemented the PSC decisions. For instance, some respondents were of the opinion that the leadership of APSA was not doing enough to implement the PSC decisions on the three mentioned areas. Some interview respondents cited inadequate external support for APSA and fuzzy standard operating procedures from AU was affecting the implementation of the decisions.

The researcher argues that the need to establish whether positions held by individuals in APSA could have effect or potentially shape opinion on the institutional capacity of APSA is key. The results of the Pearson correlation test which indicated that there is a strong relationship between effective implementation of PSC decisions on conflict prevention, management, and resolution in Africa and successful achievement of APSA's mandate suggested that individuals holding different positions in the organization held contradicting opinions on implementation of PSC decisions on conflict prevention, management and resolution in Africa.

V.RECOMMENDATION

The study recommends that governments of African states should provide adequate financial and material support to APSA. Besides, individuals and institutions entrusted with the responsibility of managing and overseeing the activities of APSA need to continuously work towards reducing the institutional challenges facing APSA in order to make it more effective .

VI. CONCLUSION

APSA plays a critical role in ensuring that peace prevails in Africa and that Africa remains peaceful. It also plays a significant role in ensuring that the Africa provides solutions to its own conflict problems without overreliance in other parties external to Africa. In order for APSA to be more effective in attaining its mandate, there is need for all parties and stakeholders to support its mission and helping in addressing the numerous challenges facing the institution.

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Development and Quality Evaluation of Ready to Drink Fruit Flavoured Whey Beverage

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DOI: 10.29322/IJSRP.9.08.2019.p92107

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92107>

Abstract- Dairy industry is one of the main sectors in the food industry of Sri Lanka which produces large amount of cheese per year. The major by-product of cheese manufacturing is cheese whey which retains many milk nutrients with good functional properties and high nutritional value. But in Sri Lanka, the cheese whey is not used in effective manner. Therefore this study was carried out to develop a ready-to-drink fruit flavoured whey beverage as a value addition to cheese whey for human consumption. Three whey beverages were developed using passion fruit, water melon and nelli (*Phyllanthus emblica*). They were evaluated for colour, sedimentation, odour, taste and overall acceptability using nine point hedonic scale. Then crude protein, titrable acidity, moisture percentage, pH and the total soluble solids (TSS) of the most accepted sample were analyzed. The results of sensory evaluation revealed that there was a significant difference among three tested samples with respect to colour, sedimentation, odour, taste and overall acceptability. The whey beverage flavoured with passion fruit had the highest acceptance. It contained 0.47% of crude protein, 0.73% of titrable acidity, 82.03% of moisture and 17.97% of TSS and the pH was 3.82 at 25⁰C. In conclusion, development of a beverage is a good approach for the utilization of cheese whey for human consumption and adding of passion fruit enhanced its nutritional and sensory properties.

Index Terms- Cheese whey, Beverage, Fruit flavoured, Value addition

I. INTRODUCTION

Whey is the basic by-product of cheese manufacturing. Although there are variety types of cheese, all cheeses have to undergo the same basic processes. Finally, the cheese curd is braked up, separating a rich cloudy liquid from the solid curd and this liquid cloudy water is known as whey (Senarathna *et al.*, 2009). Whey constitutes 45-50% of total milk solids, 70% of milk sugar, 20% of milk proteins and 70-90% of milk minerals and almost all the water soluble vitamins originally present in milk (Yadav *et al.*, 2010). In Sri Lanka, it is estimated that large amount of cheese whey is annually derived as a by-product of cheese manufacturing and it is directly discarded to the environment in many cases which leads to the loss of nutritious whey solids and also it causes many environmental problems due to its high BOD value of approximately 35,000 to 40,000 mgL⁻¹ (Yadav *et al.*, 2010).

Discarding cheese whey into the environment or use it as animal feed or as fertilizer is in vain because its nutrients have indispensable value as human food. Considerable work has been done throughout the world to utilize cheese whey for the production of various whey products. But the conversion of whey into beverage is one of the most attractive attempts for utilization of whey for human consumption because it is a thirst quencher, light and refreshing, less acidic than fruit juices, has good health and nutritional qualities and also it provides a good profit margin (Singh *et al.*, 2014).

Ready to drink beverage industry has made significant progress during last several years due to the busy life style of the people and also beverages based on fruits and milk products are currently receiving considerable attention as their market potential is growing. In addition to that, fruits are very much relished for their delicious taste and therefore flavouring the whey beverage with a fruit will further enhance the nutritional value of the beverage and consumer's appetite towards the whey beverage.

Many attempts have been taken to incorporate different fruit types into the whey beverages. But this study was conducted to develop a ready drink fruit flavoured beverage with under-utilized fruits and the fruits which have been not much used in previous studies. Therefore three fruits; passion fruit, water melon and nelli (*Phyllanthus emblica*) were selected considering their nutritional and functional properties to flavour the whey beverage.

II. MATERIALS AND METHODS

Materials: Cheese whey was collected from Digana Milco plant and selected fruits were found from Pabahinna area, Belihuloya. Other required food additives were purchased from Pettah essence at Colombo.

Analysis of cheese whey: Total soluble solid content and pH of the filtered cheese whey through a muslin cloth were measured using refractometer and digital pH meter respectively (AOAC, 2003).

Preparation of fruit juice: Fresh well ripen fruits were selected. Water melon was peeled out and seeds were removed. The flesh was cut into small pieces. Then they were blended to make the pulp and the pulp was strained through a strainer to obtain the juice. Passion fruit was washed well and cut into halves. Then the flesh was scooped out and it was squeezed through a strainer to obtain the juice. In case of nelli (*Phyllanthus emblica*), the fruits were cut into small pieces and they were mixed with water in 1:1 ratio. After that it was blended and the blended mixture was strained through a muslin cloth to get the juice

Analysis of fruit juice: Total soluble solid content and pH of the prepared fruit juices were measured using refractometer and digital pH meter respectively (AOAC, 2003).

Preparation of fruit flavoured whey beverage: 15 g of each fruit juice was measured and 9 g of sugar was added to each sample. All three samples were heated to 65°C and they were cooled below 25°C using crush ice. 75 g of filtered cheese whey was added to each sample separately and they were stirred well. Then 0.3 g of citric acid was added to each sample and all three samples were heated at 75°C for one minute. While heating 0.7 g of pectin dissolved in small amount of hot water was added to every sample. The heated samples were filtered through a muslin cloth and they were allowed to cool below 25°C by dipping them in a crush ice vessel. Finally three prepared whey beverage samples were filled into three pre-sterilized glass bottles and they were sealed well. Then they were kept in the refrigerator until further analysis.

Sensory evaluation of ready to drink fruit flavoured whey beverages: Sensory evaluation was conducted to evaluate their sensory characteristics namely colour, sedimentation, odour, taste and overall acceptability by using semi-trained sensory panel comprising 35 panelists drawn from Department of Food Science and Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka. The panelists were asked to record their observations on the given ballot sheet based on a nine point hedonic scale (9 and 1 points showing like extremely and dislike extremely). All the samples were served in transparent disposable cups labeled with three digit numbers while they were cold (Syed and Babar, 2018). Data from sensory evaluation were analyzed using Friedman non-parametric test in MINITAB software package version 17.1.0 (Minitab, 2010) with 95% confidence interval.

Chemical analysis of ready to drink fruit flavoured whey beverage: Chemical analysis was only done for the most accepted whey beverage sample. Crude protein content and moisture content were analyzed according to the AOAC procedures (AOAC, 2003). Also pH was measured by using digital pH meter (Eutech700, USA) and total soluble solid content was measured using refractometer (AOAC, 2003). Titratable acidity was analyzed by titrating the samples with 0.1N NaOH solution (Fssai, 2015). Sedimentation was observed visually. pH and sedimentation were measured daily for one week at refrigerated condition.

III. RESULTS AND DISCUSSION

Physico-chemical parameters of cheese whey and fruit juices: Table 1 shows the physiochemical parameters of raw cheese whey and the extracted fruit juices which were used for the preparation of ready to drink fruit flavoured whey beverage. The stability of a fruit flavoured whey beverage mainly depends on its pH value, total soluble solids (TSS) and dry matter content (Jelicic *et al.*, 2008). Therefore controlling of those parameters in appropriate range has significant importance to maintain the quality of fruit flavoured whey beverage. Brix value and pH of the cheese whey and the fruit juices used in the preparation of ready to drink fruit flavoured whey beverage are very much important to obtain the desired pH level and brix value of the final product.

Table 1: Physico-chemical parameters of cheese whey and fruit juices

Sample	pH	Brix value
Cheese whey	6.17	7.0
Water melon juice	5.66	6.0
Passion fruit juice	3.23	15.0
Nelli juice	3.10	8.0

Sensory evaluation ready to drink fruit flavoured whey beverage: The whey beverage flavoured with passion fruit juice scored best for all the tested sensory attributes and it had the highest acceptance among the treatments (Figure 1). Moreover, there was a significant difference ($P < 0.05$) among three treatments with respect to all the tested sensory attributes. Also passion fruit was able to mask the cooked flavour and the odour of cheese whey completely compared to other two fruits used. That may be the reason to be selected it as the best scored sample.

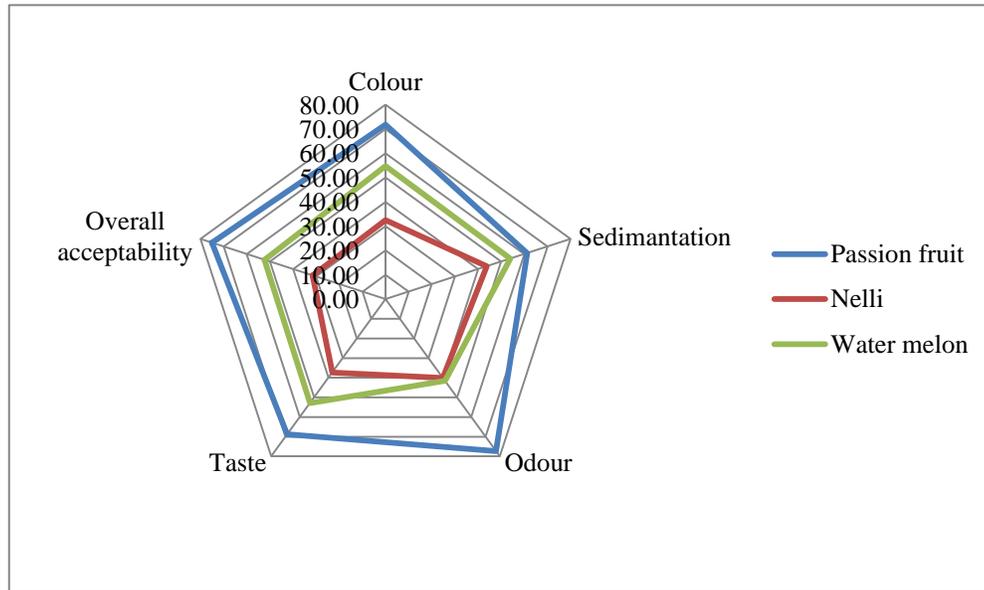


Figure 1: Sensory properties of ready to drink whey beverages flavoured with different fruit juices

Nutritional properties and physico-chemical parameters of ready to drink passion fruit flavoured whey beverage: Table 2 shows the nutritional properties and physico-chemical parameters of passion fruit flavoured whey beverage. The average protein percentage in passion fruit flavoured whey beverage was $0.47 \pm 0.08\%$. But the whey protein percentage in cheese whey is about 0.8% (Yang, 1989). Therefore it can be assumed that whey proteins present in the cheese may have been denatured during the heat treatment.

According to the results obtained, the most abundant constituent in passion fruit flavoured whey beverage was moisture. The moisture percentage of a whey guava beverage was 80% in the study conducted by Singh *et al.* (2014). Also Gad *et al.* (2013) has recorded the moisture percentage of a whey mango beverage as 79%.

Total soluble content of the passion fruit flavoured whey beverage was in agreement with the findings of Chavan *et al.*, (2015). Usually TSS content of a fruit flavoured whey beverage is maintained around 18-20 (Whey processing, 2014). The high amount TSS in the beverage causes for the sedimentation during storage while low amount of TSS in the beverage will lead to the poor sensory qualities.

The average TA percentage in passion fruit flavoured whey beverage was almost same as the value reported by Chavan *et al.*, (2015). Passion fruit juice contains acetic, ascorbic, citric, malic, lactic, malonic and succinic acids. But citric acid is the predominant acid present in both yellow and purple color passion fruits (Hui, 2010). Also citric acid was added in the preparation of this whey beverage as an acidulant. Therefore TA percentage in the beverage was calculated as citric acid.

Table 2: Nutritional properties and physico-chemical parameters of passion fruit flavoured whey beverage

Parameter	%
Protein	0.47 ± 0.08
Moisture	82.03 ± 2.00
Total soluble solids	17.97 ± 2.00
Titrateable acidity	0.73 ± 0.01

Data are presented as means ± SD

Figure 2 shows that pH of the passion fruit flavoured whey beverage dropped down upon storage as an indication of the acidification of the whey beverage. But there was no observable sedimentation in passion fruit flavoured whey beverage during one week storage. The pH value of the whey beverage at the point of heating or thermal treatment is a critical factor to prevent the whey protein denaturation. Whey proteins are heat liable and normally they will tend to coagulate at the temperature above 60⁰C (Whey processing, 2014). But acidification of whey below the pH of 3.9 causes whey proteins to become thermo-resistant and then they do not precipitate even during UHT treatment (Paquin, 2009). The acidification or lowering the pH is done with an acidulant like citric acid. The pH adjustment should always be compatible with the typical flavour profile of used fruit to flavour the beverage. The issue of whey protein denaturation during heat treatment can be avoided by using deproteinised cheese whey.

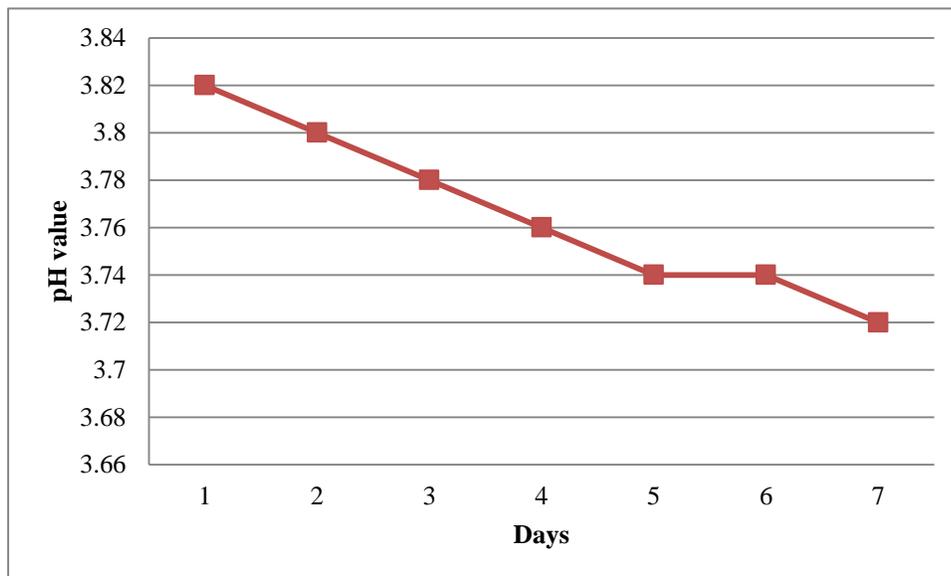


Figure 2: pH variation in the passion fruit flavoured whey beverage upon storage

IV. CONCLUSION

Physicochemical and sensory properties of whey beverage can be significantly improved by flavouring it with fruit juices. The whey beverage flavoured with passion fruit is the most consumer accepted product. Passion fruit could totally mask the undesirable flavour and the odour of raw cheese whey. Development of a ready to drink fruit flavoured whey beverage is a good approach to utilize the cheese whey for human consumption.

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The Emergence and Growth of Slums: The Case Study of East Yangon District, Myanmar

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DOI: 10.29322/IJSRP.9.08.2019.p92108

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92108>

Abstract- East Yangon District is located in Yangon City, the capital city in Myanmar. East Yangon District has many new townships. The study is based on these new townships because they have many open spaces and a little far from the centre of the city. Definition for slum has been defined by many scholars. In this research, the researcher uses the definition of UN-Habitat, 2003. Slums are people living under substandard conditions and squalor. Many homeless people settle here. These new townships have industrial zones. As a consequence, industrial labour from many regions come and work here and then stayed as informal settlers near these industrial zones. The existence of informal settlements is the most common in cities in developing countries. It is the process of urbanization through rural to urban migration and urban to urban migration. Today, cities have to face many challenges – living in not enough space, lacking basic infrastructure, deterioration in the environmental landscape and causing health problems to the surrounding community. However, homeless people are cheap labours for urban community and large labour market for industrial zones. This paper aims to examine the emergence of slum which is shaping the social challenges. We have identified the controlling factors to the emergence and growth of slums: lack of education, population dynamics, housing market dynamics, changing policy and climate change. It needs to develop effective city governance to support housing properly and to improve the capacities of slums.

Index Terms: slum, urbanization, dynamic, capacity

1. INTRODUCTION

This paper examines the emergence of informal settlements in urban area. In Myanmar, over 70 % of population lives in rural areas. Many people in rural areas move to urban because of harder to find jobs and low income in rural, and many job opportunities, better education, better healthcare service in urban area. The more the urbanization is, the more increasing the slum settlement is. Most people move to slum areas without buying the land and house, and construct the huts in open spaces and uninhabited land. They are known as the slums.

Dagon Myothit four townships have 29306 number of slum households. Among them, Dagon Myothit (Seikkan) Township, which is located near Bago River and centre of Yangon City, has the highest number of slum households, 53% of the total households. In Ward 67 of Dagon Myothit (Seikkan) Township nearly all housing units are slum settlements. Likewise, other townships also have many slum settlements. These residents live in inadequate shelter, poor sanitation, water, insufficient environment to healthcare. Governments need to solve and enhance the quality of life of the poor in urban informal settlement areas.

Large slums usually occupy the open spaces in urban area such as dumping ground, farm land, gardens, near public offices, along the sides of railway line and gas pipe line, outer most part of the residential areas.

This paper constitutes five parts. First, geographical and historical background, and research background of the Study Area, Second, the characteristics of slum settlements, Third, controlling factors which determine the emergence and growth of slums, Fourth, researchers apply this framework to discuss the existing literature with a focus on emergence and growth of slum and Finally, researchers will suggest the officials to the challenges of slum dwellers.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

1) Geographical and Historical Background of the Study Area

The study area, Dagon Myothit Townships, is located between North Latitudes 16° 48' 2" and 17° 0' 12", and between East Longitudes 96° 9' 30" and 96° 18' 37". It is bounded by Hlegu Township on the north, Thanlyin Township on the east, South Okkalapa and Thingankyun townships on the south and North Okkalapa Township on the west (Figure1). It has an area of 176.6 sq.km. The shape of Dagon Myothit (East) Township is compact.

The study area has four new townships. They are Dagon Myothit (North), Dagon Myothit (East), Dagon Myothit (South) and Dagon Myothit (Seikkan) townships. Dagon Myothit (North) was established in November 1990. Dagon Myothit (East) was established in

August 1994 according to the order of Ministry of Home Affairs. General Administration Department of Dagon Myothit (East) was opened in September 1994. Dagon Myothit (South) in November 1990. and Dagon Myothit (Seikkan) August 1994.

2) Research Background

Yangon City has four districts. Among them East Yangon District has lower population density than North Yangon District (Figure 1). The former has a chance to be slum populated area. There are 441646 slums and 117079 slum households in Yangon City in 2016 (Table 1). East Yangon District has the second largest number of slum dwellers as it has many cheap labours for industrial zones. For this reason, East Yangon District was selected as the study area. This research investigates controlling factors determining the emergence and growth of slums.

Yangon City has many slum settlers especially in New Towns such as Dagon Myothit (North), Dagon Myothit (South), Dagon Myothit (East), Dagon Myothit (Seikkan) and Hlaingtharyar etc.

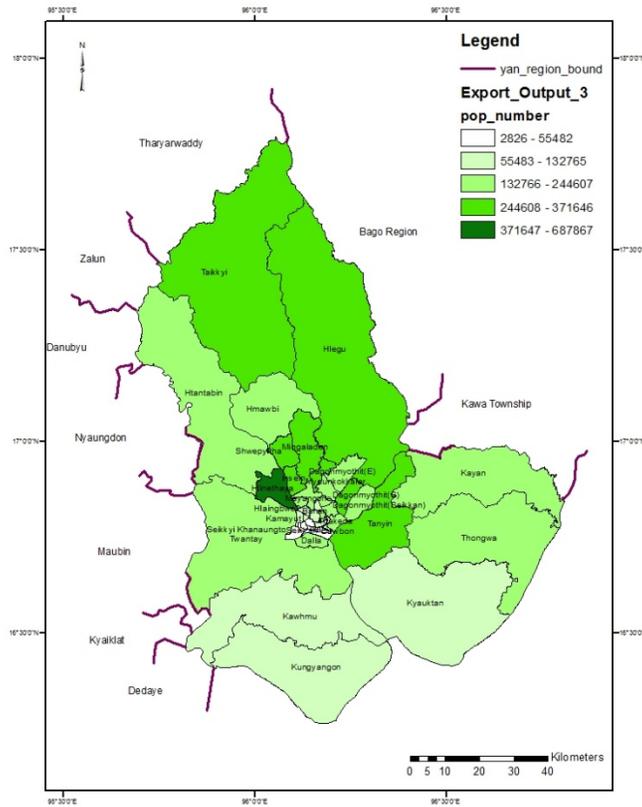


Figure 1: Population Density of Yangon Region including Dagon Myothit Townships and its neighbouring.

Source: Population Census in 2014

Note: The northern, eastern and western parts of the study area are populated areas which are also new towns and have industrial zones.

Second, this paper explains the characteristics of slum settlements and primary data is collected from Dagon Myothit townships in East Yangon District in 2017 and 2018 by using the structured questionnaire.

The existence of informal settlements is the most common in cities. Slums have been in existence since the times of the towns. Although new townships have many wards to settle, there is no settlement in some wards. Informal settlement is usually found in wards and villages where people settle. Urban areas have more slum dwellers than that of rural. In Urban areas, slum settlement is mostly in uninhabited land along Ngamoeyek Creek, Bagon River, No (2) Road, Minyekyawswa Road and near industrial zones (Figure 2).

Table 1 The number of Slums and Households in Yangon Region

District	The Number of Slums	Households
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East Yangon District	169004	41980
West Yangon District	8184	2043
South Yangon District	93483	23653
North Yangon District	170975	49403
Total	441646	117079

Source: Yangon City Development Committee

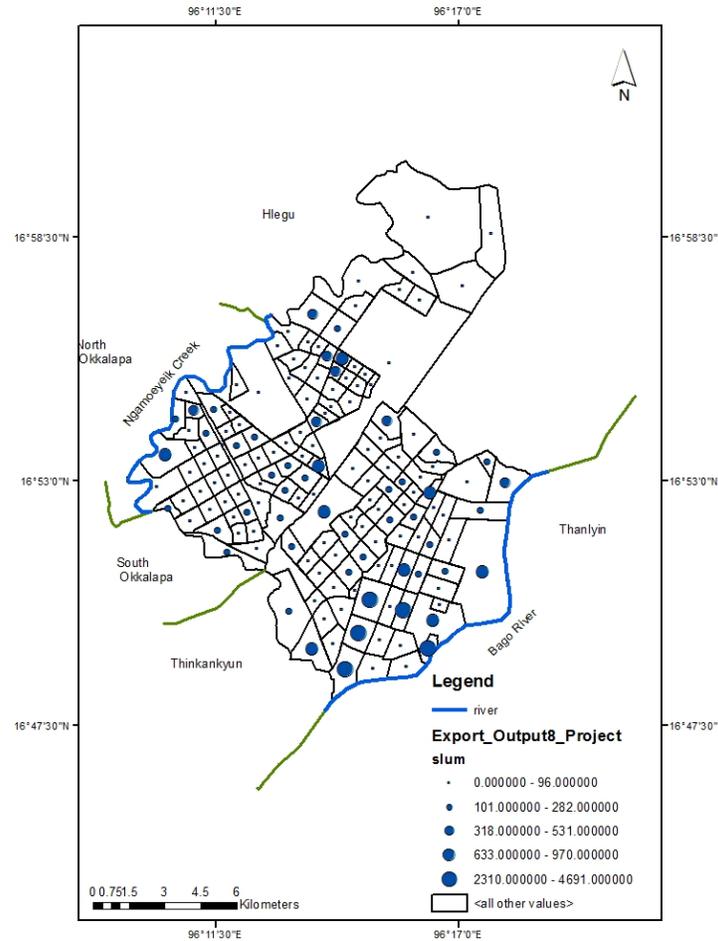


Figure 2: The Number of Slum Dwelling in Dagon Myothit Townships
 Source: Administrative Departments in Dagon Myothit Townships

IV. STUDIES AND FINDINGS

1) Social challenges

Living in not enough space

Slums have to live in not enough space. Most of them live in the area of 100 sq.ft and 200 sq. ft. There are 4 to 8 family members in a house. Some houses have 3 households. The living space of 46% of slum dwellers is under 200 sq.ft. Some are 100 sq. ft. 48% is under 400 sq.ft, and 4% is under 800 sq.ft



Plate 1: The Slum Settlement in Dagon Myothit (South) Township
Source: Photo taken in April, 2018

Lacking basic infrastructure



Plate 2 : The Slum Settlement in Dagon Myothit (East) and (Seikkan) Township
Source: Photo taken in April, 2018

In slum settlement, there is a lack of basic public services. They do not get the water distributed from Yangon City Development Committee and also electricity for both house and street lighting. The street is unpaved, and wet and flooded in the raining season. Their income and expenditure is balance for they have to spend all basic needs such as 400 (MMK) for 1 barrel of water that cannot drink. Drinking water is 500 (MMK) for a bottle. For one light bulb between 6:30 to 10 pm is 100 (MMK). They have no extra money to repair the house and have to stay in a small space, dirty and a weak foundation.

2) Deterioration in the environmental landscape



Plate 3: The Slum Settlement in Dagon Myothit (Seikkan) and (East) Townships
Source: Photo taken in April, 2018

Slums represent disadvantaged communities continuing to have the impact on environmental landscapes. The vast majority of the slum are located in the compound of a university because it is located outskirts of the city and very large compound and has many open spaces. Informal settlement is usually found along main roads, gas pipe lines and the boundary of the wards. Most of the growth in slum populations occurs in the new townships where the slums make significantly less income. The majority of the population has to live in small huts – 100 sq.ft or under 200 sq.ft and the roof is corrugated iron or bamboo, the wall is bamboo or old plastic bag and the floor is bamboo or a small piece of wood that they collect somewhere. They live improper housing that have direct impacts on their residents and its surrounding. This accords with the finding of Napier (2007).

Causing health problems to the surrounding community



Plate 4: The Slum Settlement in Dagon Myothit (Seikkan) Township
Source: Photo taken in April, 2018

Due to lack of basic services resulting in contaminated soil and polluted air and waterway – they dispose the garbage beside and under their house, and near or inside the Ngamoeyeik creek, Bago River located behind their houses. Whether it is raining or dry season, their household waste materials are found elsewhere on the ground near their surroundings. This situation is worse in wet season as wastes block the drain. These make the environment deteriorated and health problems, which extend to communities beyond the slums, e.g, flooding. Therefore, the expansion of slums can threaten urban development. This finding is concurrence of opinion of Patel, 2012.

Cheap labours for urban community



Plate 5: The Slum Settlement in Dagon Myothit (South) Township
Source: Photo taken in April, 2018

Educational background of slums is basic and there are no high school educations. They have no capital, are low wage employees, work on odd-jobs. There are many adult and young people who did not finish the school. There are many young people under the age of 14 and no educated ones. It is need to continue to study for the children and to learn the work for earn money for the adult and youth.

The slum population is increasing between the age of 30 and 49 which is the working age. They are cheap labours for industrial zones. The age between 5 and 24 is the highest percentage and they help their family to earn money. There are few people between 60 and above. Therefore, it is found that most migrated people are new couples and young couples, and few older couples (Figure 3). All the above mentioned reasons explain that slum dwellers are cheap labours for urban community.

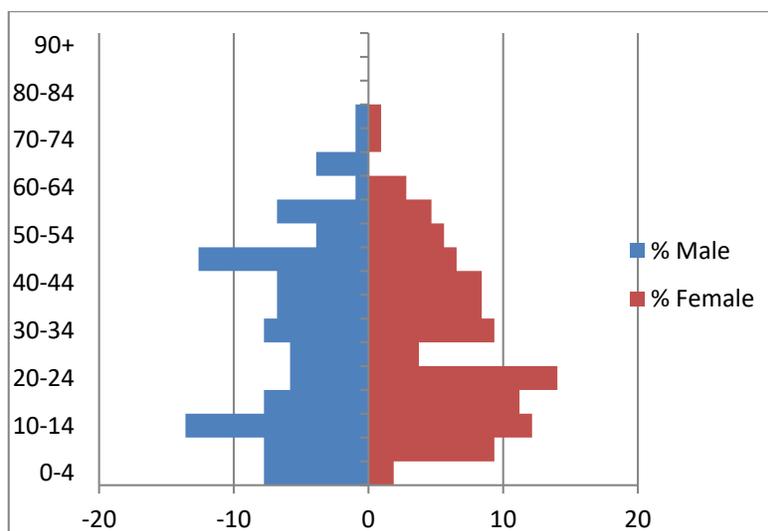


Figure 3: Population Pyramid of Slums in Dagon Myothit Townships

Source: Field Survey in 2018

3) Emergence and Growth of Slums

Third, the paper proposes controlling factors for the emergence and growth of slums; how slums grow and evolve over time.

Hypotheses

- Emergence and Growth of slum depend on having open spaces in urban areas, the access to the centre of the city, many job opportunities, better education, rising housing rent and housing market dynamics in urban area
- Qualitative method is used to analyse the responsible factors for the emergence and growth of slum settlement. The study is based on three periods such as slum started year before 2000, 2001 to 2010 and 2011 to 2018, field survey conducted year.

Fifteen percent of the slum settlement is found in the first period, 17% in between 2000 and 2010 and 68% between 2011 and 2018.

The researcher wanted to know why the percentage of slum dwellers is increasing before 2000 to the present, 2018.

People who settled as slums **before 2000** came from various places. They migrated from Thaketa, Hlaingtharyar, Shwepyithar, Thanlyin, Ayeyarwady Region (Hintada, Bogalay and Ngaputaw), Figure 4 and Figure 5.

Migration pattern is rural to urban migration and urban to urban migration. Some did not migrate here. They are host villagers, but their lands were taken by the governments to establish new wards in Yangon City. This is the consequence of the expansion of urban area which towards its country-side that surrounds it. The rich and real estate speculators have bought the plot of lands, which are extended area of country-side. They are not end-users and they buy and sell real estate assets to make profits. So, these plots of lands are open spaces and homeless people come and stay here by constructing the small huts.

Why they become homeless people are that the former place is difficult in transport and have to go to bus stand by cycle and motor cycle, cannot afford high rent, want to change the job; to raise poultry in this wide area. Some people visit to Yangon, but in Yangon many job opportunities and so, come and settle here. Some people come and settle here after the marriage. So, they are new households, which have school children.

Some were farmers and their farm land were taken over by the government and have to move to another place and then resettled here as slums. Some are guards in the compound, but the landowner sold the compound and the guards have become jobless and then he settled here as slum dweller

Ko Than Phay who live in Dagon Myothit (Seikkan) Township said that “this ward 89 is Sinchayyar village, I was born here and lived since 1970, but the village was designated as ward by the government. So, we have no place to live in our native land.”

U San who live in Dagon Myothit (North) also said that “the ward 33 is Thapyay garden where we live since 1999; we have own house here, but the government does not give back our farm land. So, we have to stay as informal settlers”

As government’s support, government gives Smart card them in 2017 and many people have it now, but natives do not accept it because they are land owners. Another support is that Yangon City Development Committee comes and distributes water if water shortage in May.

Between 2000 and 2010, slum settlement increases to 17%. They migrated especially from townships in Yangon City such as Thaketa, Thinkankyun, Mingaladon, North Okkalapa, Bago, Ayeyarwady and Sagaing Region.

The migration patterns are from rural to urban migration and urban to urban migration. Slums who came from Ayeyarwady Region are mostly from Laputta Township because of the occurrence of natural disaster, Cyclone Nagic in 2008. People who migrated within this period are not native ones. They are mostly from the wards of Dagon Myothit Townships.

Ma Sandar, stays in slum area of Dagon Myothit South and husband is a bricklayer, said that “I stayed in Thapyaychaung in Laputta Township, Ayeyarwady Region before 2008, I only survive when Nargic Storm strikes our village. After Nargi I have no house and no relatives, and move to Pathein and then to Yangon in 2012.”

There are many reasons to move here. Monastery from this Township informed them to settle here. Some transferred here because of the nature of the job such as working in construction side, some did to find the jobs, some the high rent in the former place. Another reason is that it is hard to find job, the land owner sold out the land, some do not like the job, choosing fish in fishing company.

On the other hand, the reasons people migrate from rural to urban areas are that the land here is cheaper than the land in the wards, it has many open spaces, new couples who have no own house come and stay here, some live in rural and they come to Yangon City to finish the school and to get the job.

As government officials’ support, they gave smart cards, distributed basic grocery items in Nargic cyclone broken out in May 2008. Their future expectation is to have own house, to get better job, children to be educated, not to move and just to continue to stay here.

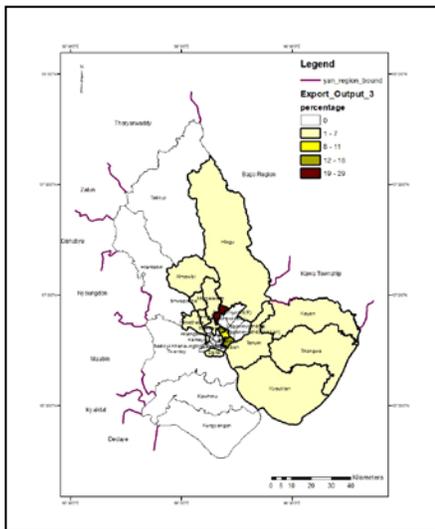


Figure 4: The Migration of People to Four Dagon Myothit Townships from Other Townships within Yangon Region

Source: Field survey in 2018

Note: Migration of people from the lowest, Insein, Hlegu, Hmawbi, Kahyan and Thonekhwa to the highest, North Okkalapa, Thaketa and South Okkalapa Townships

After 2011, the most immigrants are from Neighbouring Townships, such as Thaketa, North Okkalapa and South Okkalaps, and from the other wards and/or the same wards within the same townships, Dagon Myothit Seikkan and South townships. People who settled as slums after 2011 came from various places. They migrated from Kyimyindaing, Dawbon, Thinkankyun, Thuwana located in Yangon Region, Rakhine and Mon States, Ayeyarwady, Magway and Bago regions.

Migration pattern is rural to urban and urban to urban migration, mostly from the same urban areas. Some homeless people are native villagers, ward 33 was Toekyaugkalay village.

The reasons people migrate from rural to urban areas are that getting information from the friends and monks in this township to stay as slums. At first, they have to pay the rent to the head of the Ward Kyat 15,000 for 6 months as a donation to the Ward. However, they do not need to pay later and become slums.

The reasons why people become slum dwellers are that they migrate from urban to urban areas, and they cannot afford the high rent in townships near the city. Other reasons are that their jobs locate in Dagon Myothit Township, and the price of the land is cheaper 20 times than that of the wards. Here the price is 2L or 3L, some places are available to live free of charge by occupying the open spaces or sharing by relatives or friends.

A woman who is 60 years old and live in Dagon Myothit (South) said that “when I arrive here in 2015, this place is open space and the land is wet, and no people lives here so I occupy and construct the house.”

A man who is 73 years old and live in Dagon Myothit (South) said that “I have a house in Thaketa Township that is not far from the city. Later, I was it on mortgage because of bad economy and lose it. So, I buy the land here, the cost is MMK 3.5 Lakh. It is so cheap and I can afford.”

Kay Thwe Myo Chit who live in Dagon Myothit (Seikkan) and is 32 years old and attended basic education, said that “we have six family members, 2 adults and 4 children, we have to spend much for schooling and the house rent and we cannot afford to rent in the ward 22 in Dagon Myothit (South), the rent price is 30000 Kyats per month. So, we construct the house here by cutting and burning this inhabited land.

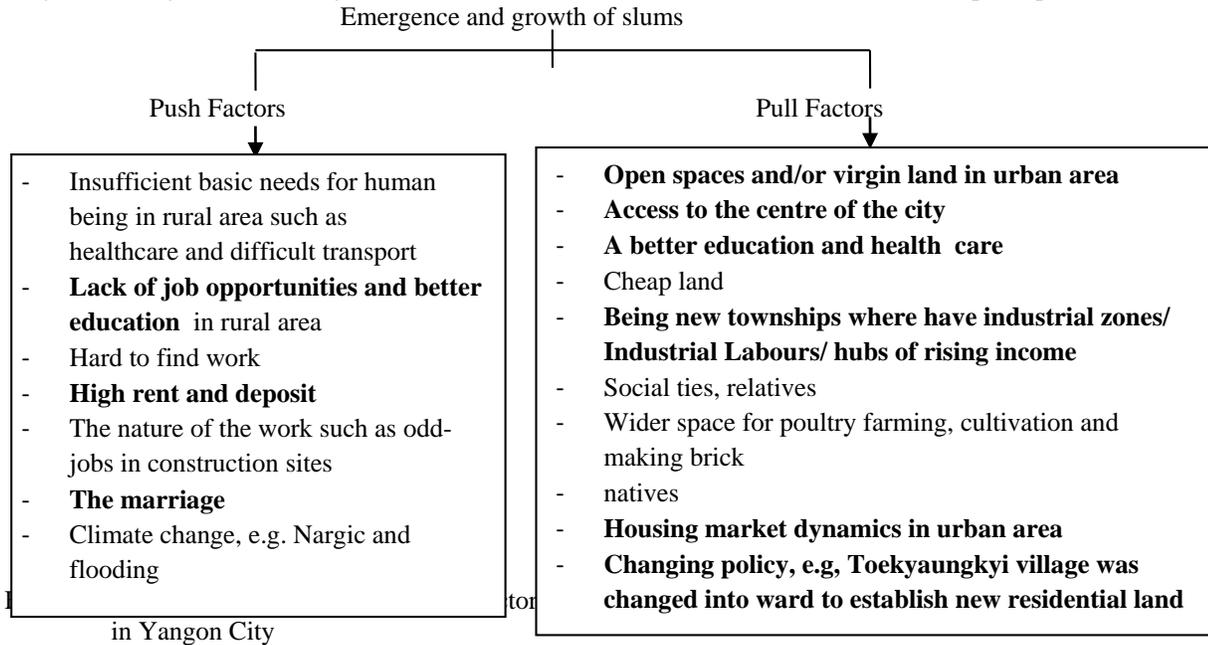
Government supports to them a few basic grocery items in Nargic, medicines for health of children and spraying insect killer.

Government also gives smart cards in 2017. Over 60 % of the slum dwellers get the card.

Future expectation is that they want to own a real estate, a permanent job, and children to be educated.

Other kinds of migration is that slums move from a ward to another ward within Dagon Myothit (East) Township (from ward 120 to Ywathargyi ward, from ward 133 to Sitpintaung ward, from Sitpintaung ward and ward 14 to Layhtaungkan village). At first, the slums owned the house or they rent, but later they cannot afford as not enough income, high rent and poor economy. Some stayed since they were born by farming, but the government took out the lands to extend the city. Some move here to settle as slum because their parents retired and no place.

Migration within the same ward and village is also found. They are ward 1, ward 133, Sitpintaung ward and Layhtaungkan village. In former time, many slum dwellers owned house, but fields near the University of Economics and Dagon University are taken out and then they rent to stay and at last they cannot afford to rent. Some are native, then rent and end up in squalid slums.



Source: Qualitative questionnaire survey in 2018

Fourth, researcher applies the framework, growth model for the emergence and growth of slum in Yangon City, to discuss the existing literature with a focus on emergence and growth of slum.

Lall, Lundberg, and Shalizi (2008), Alonso (1964), Tiebout (1956), Sietchiping (2004), UN-Habitat (2003), Khan et al., (2014), Oberai (1993), Ishtiaque and Mahmud (2011), Mayo and Angel (1993), Werlin (1999)

Many scholars' findings for influencing factors of the growth of slums is shown in figure 6. They focus on rural-to-urban migration. In this paper, researcher focuses on rural-to-urban migration, urban-to-urban migration and native land owners especially they were farmers. The finding is shown in figure 5. Among many reasons of push factors, the most encounter problem is lack of job opportunities and better education in rural area, high rent and deposit, and the marriage. The most common reasons of pull factors are open spaces and/or virgin land in urban area, access to the centre of the city, a better education and health care, being new townships where have industrial zones/ Industrial Labours, housing market dynamics in urban area and changing policy, e.g. Toekyaungkyi village was changed into ward to establish new residential areas.

Theory used

Factors influencing the growth of slums

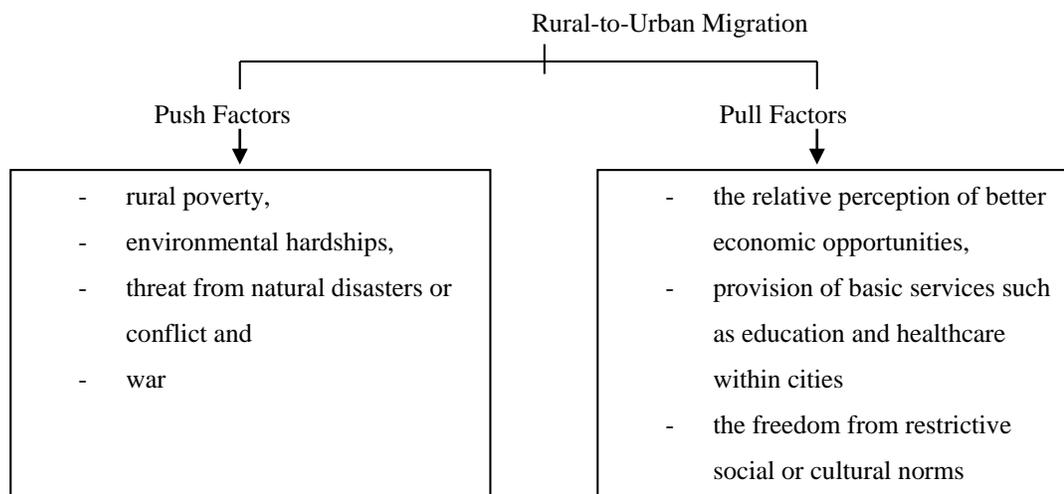


Figure 6: Theoretical Background of the Study

4) Conclusion

Dagon Myothit Townships are new areas located in East Yangon District. They have many farm lands and fallow lands. They are newly constructed industrial zones in Yangon City. Their neighbouring townships are populated.

When the government extended Yangon City, farm lands in these new townships are established as the residential areas. Many speculators bought these plots of lands, but they do not stay, not run business and invest to get profits. Homeless people stay these uninhabited compounds as slum dwellers. These are the consequences of urbanization and built up industrial zones in new towns.

Slum settlement is the largest in new wards, extended ward, wards located along the creek and river, railway line, and major road because they have many open spaces to settle.

There are many reasons to become homeless people. They are working in poorly paid jobs such as workers in construction side as bricklayer, carpenter, joiner, demolition worker, painting and decoration worker and security guards at day or night, bus helpers, tri-Shaw drivers, working odd-job, road-side sellers, green grocers, waste collectors, plumbers, pourer and caster in plastic factory and work in metal joinery. Most of them do not finish their education, but it is generally accepted that people with more education have higher earnings.

In the country primary schools are State-funded, but they cannot attend the school because school-age children have to work for the family. Since the parents have not personally experienced education to improve their quality of life, they do not understand the advantages for their children and thus remain trapped in the cycle of poverty.

Growth and emergence of slums can impact the local economy, both negatively and positively. For example, the negative aspect of slum relates to the fact that they make the environment deteriorated due to lack of the waste disposal systematically. This causes disease burden on urban dwellers. In addition, they migrated from various places and have different social backgrounds. They live in open land without spending the cost of land. This can reduce urban housing market. On the other hand, the positive aspect is that most of them are working aged people. They can participate in urban labour market as cheap labour.

5) Discussion and Suggestions

Why do they become homeless people?

Emergence of slums

Research conducted in the period of before 2000 to the present, 2018 studies slum settlement in Dagon Myothit Townships mainly based on the socio-economic factors such as locational choice factors, level of education, age structure, occupation, income and expenditure, started settle year, preferences, constraints, push factors, pull factors and former living places. Another important thing is the victims of natural disaster; Nargic Cyclone struck in 2008 in coastal areas of Myanmar, especially in villages, Ayeyarwady Regions. The findings concur with Napier, 2007 and in in correspondence to Patel, 2012.

Growth of slums

Growth of slums is the consequences of migration from poor rural settlement area to urban area, from urban to urban area and poor urban governance such as high rent and deposit (it is compatible with Rajiv Awas Yojana in India in 2013) and people born within or in close proximity to slums (accord with UN Habitat, 2003). Another fact to be considered is changing policy in urbanization. For example, in 1990 Dagon Myothit South had 26 wards and six village tracts, but in 2009 many villages, such as Shantekyi, Agricultural and Husbandry No. (1), Layhtuangkan, Thonekhwa, Kyi Su (west) and Ywatharkyi, has become urban residential areas. The number of wards therefore increases to 44 wards. Among them, 22 wards have no residents yet. This is an important fact to grow the slums in these uninhabited places.

Finally, researchers will suggest the officials to the challenges of slum dwellers by pointing out the constraints of the slums and their important needs in order to fulfill or support the living, job and basic needs with short term and long term plans.

How to improve their capacities?

Solution for present situation

Some people who live in informal areas have not got National Registration Card. Some jobs need to have NRC. They have therefore difficulties to join the job. Government should plan urgently to give NRC them and train these slums some works which are relevant to their present education background. It should be completely free of charge and enables them to become professional at work. Moreover, government should get them a job to earn while they are learning. These are more effective, suitable and best ways rather than giving them smart cards to move to low-value housing.

Solution for long-term

As a result of poor quality of education, uneducated parents are more focused on their short-term needs and neglects the long-term benefits of education and thus pull their children out of school to make money.

All school-age children need to complete their education which is the best long-term solution to the problem of poverty, especially in poor communities and thus should focus on education at first. For this, government should plan not to lose of the labour forces of the family.

Families have many school-age children. Most of them cannot study because they help their parents to earn. If the government neglects the problems of the slums, in the future they have to continue to work in low wage jobs and continue to stay a narrow, dirty and unsafe house.

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War events in North Africa as the cause of new migrations

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DOI: 10.29322/IJSRP.9.08.2019.p92109

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92109>

Abstract- The current migrant crisis, that threatens to become epic disaster situation, can also be seen through ecological causal relations. Namely, the sudden rise in food prices has been caused by hunger, unemployment, social unrest and conflicts that have been used by great powers to meet their interests. The devastated countries on which territories war is being led and continues, are also endangering survival of its environment in which they lived until then. People are fleeing and facing new sufferings on the road to a better future.

Index Terms- Migrations, wars, Africa, Europe, suffering, hope

I. INTRODUCTION

Europe is tempting, beautifully sounds everything on which it has built its image, when it comes to Europe there is a feeling of security, protection and peace that come to mind. Europe is democracy, respect and appreciation of all, the giving of equal rights to everyone, the common life of different nations, religions, races. And whether that is so, Europe has found itself in the crisis unprepared, without any idea or a plan how to deal with the influx of a large number of people in a short period of time, faced with terrorist attacks on its territory, only increased the fear of the entry of potential terrorists, began to be some spirits thought to have remained somewhere in the past, such as chauvinism, intolerance and intolerance towards other nations And cultures, the fear of diversity.

The world's media report every day on the scourge that people are on their way to a better life. Scenes are terrifying, inhumane transport conditions, the sinking of overcrowded ships, the plethora of people who are trying to get rich on another's misfortune, trafficking of human beings, violence, refugee camps. Then violence again by the border authorities of countries through which they try to make their way to the final destination mainly as the ultimate goal of Germany). People who travel are mostly aware of what can happen to them, but the conditions from which they flee to save themselves and their children are obviously even more scary. And in Europe, the fear of people who have left everything and can not come back from where they escaped, is constantly heating up.

II. SITUATION IN NORTH OF AFRICA

A several thousands people, (mostly women and children), have been starving in attempts to reach Europe, fleeing from impossible conditions for life, war, illness ... People who left their homes in the past few years (from 2012), were primarily victims of the politics great powers of to gain their natural resources, primarily oil. Refugees originate mainly from Iraq, Libya, Syria, Afghanistan, Pakistan, sub-Saharan countries (Sudan, Eritrea), the territory under the control of the so-called "Islamic state". These are countries where war destruction, murder, hunger, illness, poverty, political persecution of everyday life, climate change in Syria has led to severe drought that has sparked social dissatisfaction and rebellion against the power that has grown into a bloody war that has the effect of shaking the entire planet.

In the war-torn areas there is desolation, hunger, disease, and the population abandons Syria massively. Young military-capable men emigrate not to be mobilized because they do not want to fight for any of the parties in this war. Turkey, which probably has the most direct impact in Syria, uses its own war against the ISIS as a platform for attacks on the Kurds, to date the most successful fighters against ISIS in Syria, Iraq and Turkey itself.¹

Syria is an agricultural country; residents are engaged in agriculture and cotton growing for the production of textiles, cultivation of fruits, vegetables and tobacco. A series of related events, which certainly are the most important long-term drought, and the population on the rise, have led to water shortages, limiting agricultural production and cotton production. About 55 percent of Syria makes a step, where about 1.5 million Bedouins live by and from cattle growing. The drought turned the grassy step into the desert, which in the north-east around Hassake, led to a dramatic exodus towards cities.

The great cities of Syria had a sudden increase in the population. Damascus officially has 4.12 million, and unofficially 7, it needs to provide electricity, water, work, education, treatment and food supplies. By 2050, estimations are that 75 percent of Syria's population will be living in cities.² In 1999, the population amounted to 17.2 million; By 2009, this number has increased slightly more than 21 million people. In addition, there are about

¹ Glass Charles, (2015), In the Syrian Deadlands, The New York Review of Books, dostupno na <http://www.nybooks.com/articles/2015/10/22/syrian-deadlands/pristup17.6.2016>

² Leukefeld K. ,(2011), Syria: A Historical Perspective on the Current Crisis Global Research,Global Research, dostupno na <http://www.globalresearch.ca/syria-a-historical-perspective-on-the-current-crisis/24568,sajtu pristupljeno 16.6.2016>

a million Iraqi refugees and some 500,000 Palestinian refugees living in Syria (from 1948 with their descendants).

Before armed conflicts in Syria, despite the political, important role played the long-standing chronic social and economic crisis. In general, dissatisfaction and a difficult social situation, people react in different ways and begin to recognize certain social phenomena and relationships, which in normal life circumstances would not give any significance, nor would they pay special attention to them. It happened in Syria.

These reactions of the dissatisfied masses need not only concern the strengthening of the prevailing consciousness and the desire for political change, but they can also spread to, terrain of ethnic or religious intolerance and intolerance, which can further represent the front of armed conflicts, civil wars and other widespread catastrophes size. It just happened in Syria.³

Conflicts in Syria began in March 2011. in the city of Daraa, located near the Jordanian border. The local population began to demonstrate an open support to the revolutionary forces in Egypt, which was followed by the reaction of the Syrian police. Shortly thereafter, a series of protests began in the capital Damascus. They then assumed a form of armed conflict.

Always on the ground where there is a war conflict, even in Syria, there are indications that chemical weapons were used for mass destruction of the population. Chemicals are available, and have been used for decades for various tests and experiments around the world are produced by simple chemical processes, which are cheap and do not require expensive and modernly equipped laboratories.

So far, according to official reports of UN, about 320000 people died, more than 4 million Syrians have fled the country, and 7.6 million have been internally displaced. As Syrian neighbors are overwhelmed by refugees, hundreds of thousands of Syrians are now seeking refuge in Europe, which turned out to be one of the biggest challenges in the history of the EU.⁴

The factor of Europe attractiveness for the people who seek to refuge in, must be seen through the prism of development in many fields, from information and communication systems (six billion mobile phones in the world), respect for human rights and universal moral values, to unfair distribution income and various other inequalities around the world. Terrorism and religious extremism also have a major impact, but Europe is fighting it.

Wars, such as those in Libya and surrounding deserts, around the Great Lakes and their surroundings, as well as the long-standing conflict in Somalia, simply "produce" asylum seekers and refugees. Cruel African regimes also contribute to increasing their number. In doing so, it upsets the shyness that African leaders show when they refer to migration, which are related to the Africans themselves. However, this does not provide a complete picture.

Africans who die in the desert or at sea are decisive. They do not want to accept their fate and are ready to risk their lives for that. The youngest population in the world, African, sees developed European countries as the closest lighthouse of hope.

³ Parezanović M.,(2012), Sirija i arapsko proleće dostupno na <http://www.nspm.rs/savremeni-svet/sirija-i-arapsko-prolece.html?alphabet=1>, pristupljeno adresi 17.06.2016

⁴ <http://www.nationalgeographic.rs/vesti/865-velika-seoba-ljudi.html>

For them, this is a house where human rights are respected, in which they will understand their situation and where they will find a job. African youth will still grow when the rest of the world starts to grow old. The failure to accept the fact that wealth is currently in countries whose population is old unsustainable often leads to the most basic economic policy proposals. By accepting the demographic challenge, social and political elections should be thoroughly re-examined in order to ensure a stable economy. We are witnessing the limitations of transfer of value from production and work to knowledge and financial control, and we also see the limits of the leading economic models.

III. THE CONSEQUENCES OF THE MIGRATION CRISIS IN EUROPE

As an example, it can be shown a letter, a public letter, from mayor of Lampedusa, Italian small city, which is the first meeting point for the lucky ones who managed to survive the hell of escape across the Mediterranean Sea and the first shore they encounter on their way to the unknown. Lampedusa is the closest point to Africa, and the first straw of salvation for thousands of unfortunate people fleeing from one evil comes up. Lampedusa, with its 6,000 inhabitants, has never lost humanity during these tragic years that does not distinguish between citizens and illegal immigrants.⁵ Lampedusa Mayor is not a representative of any major political party, she is an environmental protection expert, is struggling to protect the natural beauty of Lampedusa, she does not have much help in this but bravely cope with all the problems and provides assistance to refugees as much as possible within their capabilities.

A letter:

"I am the new Mayor of Lampedusa. I was elected to this position in May 2012, and by November I handed over 21 corpses of people who drowned in an attempt to reach our shores. It's unbearable and very painful for me and our island. We had to ask for the help of the other mayors of this province, to dignify the last 11 bodies, because there was no longer any place in our graveyard. We'll figure it out somehow, we'll dig up new rakes, but I wonder how much it should be that cemetery? I am indignant at the epidemic proportions; I am disturbed by the silence of Europe that has just received the Nobel Peace Prize, and is silent in spite of this massacre, because here people die as if they were war.

Every day I am more and more convinced that European immigration policy consciously agrees to these victims in order to stop immigration flow. Perhaps he sees it as a deterrent. But if the boat is the last gimmick of these people's hopes, then their death is a European embarrassment. If Europe behaved as if it were our dead, then I would like to receive a telegram of co-existence for each drowned person. It's like they have white skin, as if it's about our son who drowned during the break.

⁵ Gatti Fabrizio, (2013), Lampedusa deserves the Nobel Peace Prize, Le Monde/PressEurop, dostupno na <http://www.voxeurop.eu/en/content/article/4215301-lampedusa-deserves-nobel-peace-prize>, pristupljeno 11.5.2016

Mayor Giusi Nicolini " 6

Irony in the whole situation is that Lampedusa is a poor place, which depends on fishing. Its inhabitants in search of a better life go to the coasts of the African continent, and on the coasts of Tunisia and Morocco the most, there are villages that are inhabited by Italians who have found the place to themselves provide for existence. The Lampedusa are Europeans, the first to which ships and refugee boats are on their way to salvation.

Regardless of the years in which hundreds of thousands of people, mostly from sub-Saharan areas, hit a catastrophe of epic proportions, hunger, unemployment, epidemics, crossed the Lampedusa, the domestic population does not perceive them as a threat, and a problem. They are still only people with problems, someone to help to, in the same tragedy that has hit them.

While the rest of Europe is struggling with the virus of xenophobia and racism, while raising the fences across the continent, there are people here, who are overwhelmed by existential problems with hearing and willing (but with so little funds and support from the international community) to ease at least this first step of refugees to escape from all the troubles that drove away from the hearth.

One of the absurds is that European Union received the Nobel Peace Prize in 2012. It's absurd because anyone who has looked at at least one report or read a news story about the tragedies of people who seek help, seek salvation, and become victims of a mass grave called the Mediterranean Sea, or other disasters on alternative routes, can conclude that they in fact, the victims of " inaction or inactivities" of politicians who lead Europe. The death of refugees served as part of a European refugee policy, it is part of the deterrence strategy.

IV. EUROPE'S RESPONSE TO THE MIGRANT CRISIS

After the initial shock, Europe has consolidating its lines and closed the door, before the wave of refugees. In July 2015, the parliament adopted amendments to the asylum laws (on seeking and granting asylum), legal treatment of asylum seekers, and in conclusion, Hungary closed the border with Serbia, which has become the main route for the passage of refugees from Greece and North Macedonia to Europe. Soon the same were done by Croatia, Slovenia Austria ... In vain was statemen in which UN officials agreed and expressed their concern.⁷ To their criticism, Prime Minister Orban replied that he "defends" Hungary and "he defends" and very European Union.⁸

⁶ Nicolini G., (2013), *Evropska Sramota*, dostupno na www.freitag.de/autoren/robert-zion/brief-der-buergermeisterin-von-lampedusa, pristup 4.4.2016.

⁷ UN News Centre,(2015), „UN cites strong concerns over Hungarian border fence plan that could deter refugees and asylum-seekers“, , dostupno na http://www.un.org/apps/news/story.asp?NewsID=51201#.VY2d5_mqqk

⁸ Hungary Today, (2015), "Hungarian Parliament Passes Law Amendments to Tighten Immigration Rules", 6. jul 2015,

The Geneva Convention on the Status of Refugees - signed in 1951, regulates the position of refugees after the Second World War. That convention defines the refugee status, determines the minimum obligations that the receiving State has to fulfill towards refugees. An additional protocol was adopted in 1967, which included refugees who became members after 1951.

Final agreement on this issue has been reached between the European Union and Turkey, according to which all refugees and migrants must remain in Turkey.⁹ In return, Europe has committed itself to providing material assistance to Turkey, as well as a number of concessions ... According to what is known in this agreement, this agreement will bring all refugees and migrants from Turkey to Greece return to Turkey. This closed the Western Balkan route and found a temporary solution for further migration of migrants. This is a major violation of the rules and norms on which the European Union is founded.¹⁰

The main problem of the current migration crisis in Europe is that the European Union has outlined its basic principles, the principle of the freedom of movement of people, goods on which the concept of the European Union is based; allowed us to disregard the human rights of migrants in the 21st century, and in particular the right to naturalization, as well as the rise of xenophobia, and that hatred towards foreigners and neighbors is practiced by countries with which they always represent, declaratively, respect for the principle of equality and tolerance, accusing other nations for disregarding these principles.

A historic absurd is the refusal of the European Union to accept, at the quotas, a part of the refugees by countries like Hungary, Slovakia, the Czech Republic and Poland from which the people's rivers were leaving for Refugees at one time. They have discovered a real relationship with the EU, refusing to share the burden of the refugee crisis, have shown that they only want a one-sided benefit from that relationship. During this crisis, Europe has shown complete unpreparedness and a high degree of disorganization, and too much surprise, and some EU members even panic in facing the migrant wave, although it has been extensively running since 2011 and intensely since 2014.¹¹

Europe will have to wonder if the anomaly or natural reaction is that the nation-state is abolished and the rejected national sovereignty as anachronous phenomena overnight returns to the big door into political life. The latest decision by the Union that all migrants who are not from Afghanistan, Iraq or Syria are declared as economic migrants is direct discrimination and violates the right of migrants to access asylum as individuals, which UNHCR criticized as a decision. The anomaly is that the great, if not the greatest burden of the migrant crisis is now being borne by countries that have not in any way contributed to the

dostupno na <http://hungarytoday.hu/news/hungarian-parliament-passes-law-amendments-tighten-immigration-rules-56850>

⁹ "Refugee crisis: EU and Turkey reach 'breakthrough' deal", *Al Jazeera*, dostupno na engleskom jeziku na <http://www.aljazeera.com/news/2016/03/refugee-crisis-eu-turkey-agree-proposal-160308021149403.html>

¹⁰ Kilibarda Pavle, (2016), Faust, dostupno na <http://pescanik.net/faust>

¹¹ Simeunović D., (2015), Migracije kao uzrok političkih anomalija U Evropi, *Journal of Criminalistics and Law, Kriminalističko policijska akademija, Beograd*

creation of a crisis hotspot in Iraq, Libya and Syria from which refugees mostly come to Europe, nor are these European countries currently the most Affected by a migrant wave like Serbia, anything benefited from the wars that have been or are being led in these countries.¹²

It is increasingly apparent that the migration burden has not been evenly distributed. This anomaly is enhanced by the fact that countries that are currently experiencing the greatest burden of migration are at the same time the poorest or in a severe financial crisis like Greece.

The European Commission is mostly trying to solve the migration crisis with money, and shows its increase in resources for this problem. From May to September 2015, these resources grew from 4.6 to 9.5 billion euros. In addition, the European Commission has announced the granting of 100 million euros as an emergency aid to the most affected EU member states, and 600 million euros in additional assistance to the competent European bodies in 2016, and to add another 300 million euros to the EU humanitarian aid fund in 2016, and that in 2015 additional 200 million euros will be given to organizations such as UNHCR and WFP.

It has been decided to help countries in the EU, Turkey with billion of euros (which was later increased to 3.4 billion euros), and Serbia and North Macedonia together totaling 17 million euros (which has not even been partially realized so far). It was also decided that additional financial injections were injected into countries where refugees were massively deported, such as Lebanon and Jordan, in order to minimize the number of refugees from those countries and move to Europe. It was also concluded that the Union should increase efforts to stabilize those African countries that are the main source of migration.

The European Agenda for Migration was also announced the establishment of EU land and water borders as well as the security and military surveillance of these borders by the newly-designed European Border Guard. Maybe building walls. This is supported by the fact that in Brussels confirmed the right of Hungary to lift the wall towards Croatia and thus strengthen the idea of enclosing the member states of the Union.

Migration can also have positive economic consequences, both in countries receiving migrants, but also in countries from which refugees come. These positive impacts on the countries of origin are that by leaving a large number of people, unresolved social problems are being reduced and the financial benefit of the remittances sent to their families is gaining.

And for the land of reception, they are useful if they are planned, dosed and desired. In most developed countries, immigration has always been an important factor of industrial growth and economic progress, as well as the only opportunity to correct the demographic balance, which has been disturbed by a drastic increase in the trend of aging.¹³

Even despite Europe's fear of terrorism and migrants, it is planned to use a huge pile of the cheapest possible workforce.

Developed countries do not have to move factories where workforce is cheap and costly transport costs for their goods produced in the distance. It is only necessary to concentrate this workforce and use it in a planned and systematic way, and a rich part of Europe will make money on migration.¹⁴

If they are concentrated in one place, immigrants will be forced to work for even less money. The same logic, for example, is used by Japan, which literally imports migrants from less-developed parts of Asia, and despite the great disgrace of the negligence of the Japanese population. However, the important difference between Japan and some European countries is that, in the end of September 2015, Japan donated \$ 830 million to help refugees from Syria and Iraq and showed that it is not only profit-oriented in its attitude towards migration, while some European countries that claim to be threatened by the arrival of migrants "have forgotten" to pay funds for refugees even for 2014.

Although in migrations the most uneducated or low educated migrants are prevalent in the mass, if the war hits countries with a better educated population like Syria, a great number of migrants are with higher education or doctorates, and they are very welcome into developed countries, they usually know the language of the country in which they migrate and, generally speaking, they are easier to fit into a new environment. Due to possibility that the European economy benefits from cheap labor and "brain drain", the goal of European Union is to make the migration merged and integrated into its plans, making those "unwanted" become desirable and regular, and as such being embedded in the social development agenda of the member countries.¹⁵

Positive and negative migration factors

Migration as a social message has negative and positive factors.

Negative factors are in fact those reasons that led people to leave their place of residence and origin. refer to the place they leave and represent the reasons for leaving the place of origin. There may be hunger, poverty, poor health system, political persecutions and killings, natural disasters.

Positive factors are related to the place where the migrant has started and are the reasons why he chose that particular destination. Of the positive factors, the most important are physical security, better treatment conditions, a higher standard of living, opportunities for employment of education and training opportunities, and relatives who have already settled on the same territory. Positive factors for the state lie in the arrival of the young migrant population, because the developed countries usually follow the lack of young people who will fill vacant posts and increase their state coffers with their contributions and taxes. With filled jobs, productivity rises and the economy develops faster. Immigrants bring new energy, ideas and culture, and multicultural places for life can be created.

¹² Simeunović D., (2015), Migracije kao uzrok političkih anomalija U Evropi, Journal of Criminalistics and Law, Kriminističko policijska akademija, Beograd

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¹⁴ Ibid

¹⁵ Simeunović D., (2015), Migracije kao uzrok političkih anomalija U Evropi, Journal of Criminalistics and Law, Kriminističko policijska akademija, Beograd

When mixing very different cultures, there may be tensions between minority and majority communities and cause racial, national, and religious conflicts. In countries of departure, unemployment is reduced, and emigrants, by sending money to their loved ones, indirectly help the country of their origin. Emigrants return with better education, skills, money and international contacts.

Negative side of emigration is the loss of a young and educated workforce, which also has economic consequences in the long run. In addition to economic and cultural influences, emigration can also have a positive impact on social issues such as the preservation of the environment or the improvement of the rights of vulnerable categories of society. The International Red Cross and Red Crescent Movement suggests that migration is not seen as a disadvantage, but as an advantage and a sign of adaptability, especially if we take into account the inevitable consequences of climate change. In their opinion, it is necessary to utilize the full economic and social potential of migration, and to counteract the negative effects, both in the countries of origin and in the countries of arrival.¹⁶

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Design and Fabrication of impeller for Single Suction Centrifugal Pump

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DOI: 10.29322/IJSRP.9.08.2019.p92110

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92110>

Abstract- This paper presents the calculation and production procedure of impeller for single section centrifugal pump. The pump type is single stage centrifugal pump with close impeller type. This impeller develops a head of 20 m and delivers 0.9 m³/min of water. The designed impeller has 97 mm inlet diameter, 226 mm outlet diameter, 20° inlet vane angle and 23° outlet vane angle. The total number of vane is 6 and input shaft power is 6 hp. The inlet and outlet width are 26 mm and 18 mm respectively. The discharge pipe diameter is 80 mm to operate the desired head and capacity. Based on the designed results, the impeller is also fabricated. There are four steps to produce the impeller. The first step is to draw a pattern design and then the pattern machining on CNC milling machine (Optimum, F 105) for pattern making. The mould making and casting process are used the sand casting method. This method is suitable for cast iron material and cheaper than the other methods. In this foundry process, Cupolar type furnace is used. Moreover, this study supports to develop the manufacturing method of pump impeller and to be able to produce in localization and with low costs. The designed single-suction centrifugal pump can fulfill the requirements of chemical plants, domestic applications, water supply process and agricultural process.

Index Terms- Impeller, head, flow rate, speed, production process.

I. INTRODUCTION

A centrifugal pump plays a major role in moving liquids over a wide range of volumes and pressures. Single stage single-suction Centrifugal pump is widely used in domestic water rising from surface water supplies such as river, lakes, canal to a higher level. Moreover, they are widely used in many other industries such as chemical plants, steam power plants, food processing factory, hydraulic system and so on. The principal pumping units of a centrifugal pump are the volute and impeller and general components of centrifugal pump is also shown in figure (1). The impeller is attached to a shaft and the rotating shaft is powered by the motor or engine with the pulleys and belts. The fluid enters into the eye of the impeller and is trapped between the impeller blades. The impeller blades contain the liquid and impart speed to the liquid as it passes from impeller eye toward the outside diameter of the impeller.

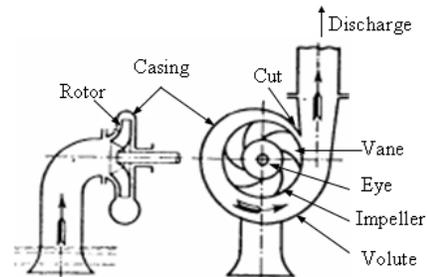


Fig 1. Components and Operation Principle of Centrifugal Pump [1]

II. DESIGN OF CENTRIFUGAL PUMP'S IMPELLER

The centrifugal pump has two main parts, impeller and casing. The impeller is enclosed in a water tight casing which is converted the kinetic energy of water into pressure energy before the water leaves the casing. The design of pump's impeller can be divided into two parts. The first is selection of proper velocities and vane angles needed to obtain the desired performance with the best possible efficiency. The second is the layout of the impeller for the selected angles and areas. The specifications of pump that will be designed are:

Pump head, $H = 20$ m

Discharge, $Q = 0.9$ m³/min

$$Q_s = (Q/60) = 0.015 \text{ m}^3/\text{sec}$$

Rotational speed, $n = 1800$ rpm

Density of water, $\rho = 1000$ kg/m³

Specific speed is firstly specified and it is an essential criterion to determine the impeller shapes. It is mathematically expressed as

$$n_s = \frac{n \times \sqrt{Q}}{H^{3/4}} \quad (1)$$

In this study, the calculated value of specific speed based on designed head and capacity is 180 rpm. Therefore this is low specific speed pump ($80 < n < 600$). So, end-section type single stage centrifugal pump with closed impeller is chosen.

The expected pump efficiency, η is assumed by using Fig A1. And the suction pipe diameter D_s is also estimated from this chart. The discharged pipe diameter D_d is usually equal to or one size smaller than D_s . Thus, the velocities in these pipes are given by

$$V_s = \frac{Q_s}{\pi \frac{D_s^2}{4}} \quad (2)$$

$$V_d = \frac{Q_s}{\pi \frac{D_d^2}{4}} \quad (3)$$

The input power of pump can be estimated by the following equation.

$$L = \frac{\rho Q_s g H}{\eta} \quad (4)$$

For charge condition of the pump work, maximum shaft power or rated output of an electric motor L_r (KW) is decided by using Equation (5).

$$L_r = \frac{(1+F_a) \times L}{\eta_{tr} \times 1000} \quad (5)$$

Where, F_a is the allowance factor, and 0.1~ 0.4 for an electric motor and larger than 0.2 for engines, and it is shown in Table I. And then, η_{tr} is the transmission efficiency, and 1.0 for direct coupling and 0.9 ~ 0.95 for belt drive.

Table I. Rated Output of Electric Motor [2]

Rated output (kW)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.25	22	30	37
Allowance factor F_a	0.4		0.4~0.25			0.25~0.15							

The shaft diameter at hub section of impeller is

$$d_s = \sqrt[3]{\frac{16 T}{\pi \tau}} \quad (6)$$

Where, T is the torsional moment and it can be estimated by

$$T = \frac{60 L_r}{2 \pi n} \quad (7)$$

Allowable shear stress of material for the pump shaft, τ is taken as 24.5 MPa because the main shaft is made of S30C. The estimated shaft diameter will be increased 20% because it is difficult to predict the bending moment at this time.

The hub diameter, D_h and the hub length, L_h are depending on the shaft diameter and these are usually taken from 1.5 to 2.0 times of the shaft diameter and from 1.0 times to 2.0 times of the shaft diameter respectively.

The diameter of impeller eye, D_o is calculated by

$$D_o = \sqrt{\frac{4Q'_s}{\pi V_{mo}} + D_h^2} \quad (8)$$

Where, the flow rate through the impeller, Q'_s is Q/η_v and volumetric efficiency η_v is estimated by

$$\eta_v = \frac{1}{1 + \frac{1.124}{n_s^{2/3}}} \quad (9)$$

For Equation (8), the velocity at the eye section is given by

$$V_{mo} = K_{mo} \sqrt{2gH} = (1.5 \sim 3.0) \leq V_{m1} \quad (10)$$

$$K_{mo} = (0.07 \sim 0.11) + 0.00023 n_s \quad (11)$$

The simplified inlet and outlet velocities diagrams for the impeller are shown in Fig. 2. In this figure, the effect of circulatory flow on the outlet diagram is shown in solid lines and the virtual

diagram is dotted. For a fluid flowing through the rotating impeller, u is the tangential velocity, V is the absolute velocity and v is the relative velocity of a fluid particle to impeller rotation. The angle between V and u is α and the angle between v and u is β and it is the angle made by tangent to the impeller vane and a line in the direction of motion of the vane. The tangential component and radial component of absolute velocity V are V_u and V_r , respectively.

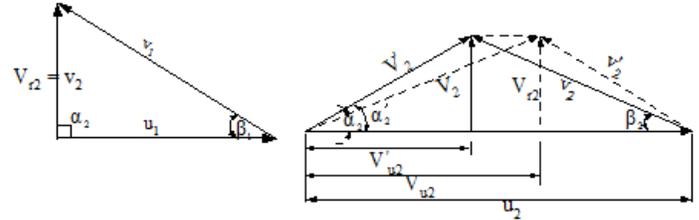


Fig 2. Impeller Inlet and Outlet Velocity Diagrams

The parameters K_u (speed constant), K_{m1} , K_{m2} , and D_1/D_2 are obtained on the value of specific speed in Fig A2. The outlet diameter D_2 is decided by considering the following relationship.

$$D_2 = \frac{u_2 \times 60}{\pi \times n} \quad (12)$$

Where, the peripheral velocity at impeller outlet and inlet are

$$u_2 = K_u \sqrt{2gH} \quad (13)$$

$$u_1 = \frac{\pi D_1 n}{60} \quad (14)$$

And then, flow velocities at the inlet and outlet are

$$V_{r1} = K_{m1} \sqrt{2gH} \quad (15)$$

$$V_{r2} = K_{m2} \sqrt{2gH} \quad (16)$$

If the incoming flow has no pre-rotation, the blade angle β_1 (deg) is given by

$$\beta_1 = \tan^{-1} \left[\frac{K_{b1} V_{r1}}{u_1} \right] \approx \tan^{-1} \left[\frac{V_{r1}}{u_1} \right] + (0 \sim 6) \quad (17)$$

Where, $K_{b1} = 1.1 \sim 1.25$

The vane outlet angle β_2 is usually made larger than the inlet angle β_1 to obtain a smooth, continuous passage. The amount of outlet angle β_2 usually has between 15° and 35° . So, the vane outlet angle is assumed that $\beta_2 = 23^\circ$ in this study. From the velocity triangles, inlet and outlet relative velocities are

$$v_1 = \frac{u_1}{\cos \beta_1} \quad (18)$$

$$v_2 = \frac{V_{r2}}{\sin \beta_2} \quad (19)$$

The virtual tangential component V_{u2} of V_2 is

$$V_{u2} = u_2 - \frac{V_{r2}}{\tan \beta_2} \quad (20)$$

For radial-type impellers, the slip factor, η_∞ varies between 0.65 and 0.75 and it is assumed that $\eta_\infty = 0.7$ average. Thus, the actual tangential component V'_{u2} of V_2 is

$$V'_{u2} = V_{u2} \eta_\infty \quad (21)$$

Thus, the actual outlet is found by

$$\tan \alpha'_2 = \frac{V_{r2}}{V'_{u2}} \quad (22)$$

The absolute outlet velocity from outlet velocity diagram is

$$V_2' = \sqrt{V_{r2}^2 + V_{u2}^2} \quad (23)$$

The number of blades, Z is decided by using the Pfliederer formula. It is

$$Z \approx 6.5 \frac{D_2 + D_1}{D_2 - D_1} \sin \left[\frac{\beta_1 + \beta_2}{2} \right] \quad (24)$$

In this design, blade thickness and shroud thickness are taken as 5 mm and 6 mm respectively. The inlet passage width b_1 and outlet passage width b_2 are calculated by

$$b_1 = \left[\frac{Q_s'}{\pi D_1 V_{r1}} \right] \left[\frac{\pi D_1}{\pi D_1 - S_1 Z} \right] \quad (25)$$

$$b_2 = \left[\frac{Q_s'}{\pi D_2 V_{r2}} \right] \left[\frac{\pi D_2}{\pi D_2 - S_2 Z} \right] \quad (26)$$

Where, S_1 is $(\delta_1 / \sin \beta_1)$, S_2 is $(\delta_2 / \sin \beta_2)$, and δ_1 and δ_2 are blade thicknesses near the leading edge and trailing edge respectively. Moreover, S_2 can also be determined by the following relationship equation.

$$\frac{\pi D_1}{(\pi D_1 - S_1 Z)} = \frac{\pi D_2}{(\pi D_2 - S_2 Z)} \quad (27)$$

A method of drawing the impeller blade by three circular arcs is used for this design. Each radius is given by

$$\rho_A = \frac{(R_A^2 - R_B^2)}{2(R_A \cos \beta_2 - R_B \cos \beta_B)} \quad (28)$$

$$\rho_B = \frac{(R_B^2 - R_C^2)}{2(R_B \cos \beta_B - R_C \cos \beta_C)} \quad (29)$$

$$\rho_C = \frac{(R_C^2 - R_D^2)}{2(R_C \cos \beta_C - R_D \cos \beta_1)} \quad (30)$$

Where, R_A, R_B, R_C and R_D are base circle radii, $R_A = D_2/2$ and $R_D = D_{1h}/2$.

$$R_B = R_A - \frac{R_A - R_D}{3} \quad (31)$$

$$R_C = R_B - \frac{R_A - R_D}{3} \quad (32)$$

The angles between β_1 and β_2 are divided into three angles.

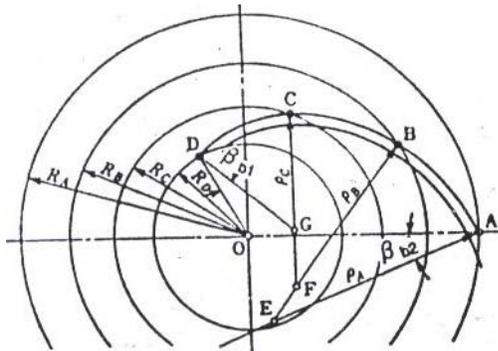


Fig. 3 Curvature of Impeller Blade

III. DESIGN RESULTS OF PUMP'S IMPELLER

The result data of the designed pump's impeller are expressed in table II. By using these results, the three dimensional model of designed pump's impeller is shown in Fig 4. The modeling of impeller is created by Solidwork software tool.

Table II. Results of Centrifugal Pump Impeller Design

No	Descriptions	Symbols	Results
1	Input Power	L_r	6 hp
2	Shaft diameter	d_s	34 mm
3	Hub diameter	D_h	51 mm
4	Hub length	L_h	68 mm
5	Impeller eye diameter	D_o	95 mm
6	Impeller inlet diameter	D_1	97 mm
7	Impeller outlet diameter	D_2	226 mm
8	Inlet angle of impeller blade	β_1	20°
9	Outlet angle of impeller blade	β_2	23°
10	Impeller passage width at inlet	b_1	26 mm
11	Impeller passage width at outlet	b_2	18 mm
12	Number of impeller blades	Z	6 blades

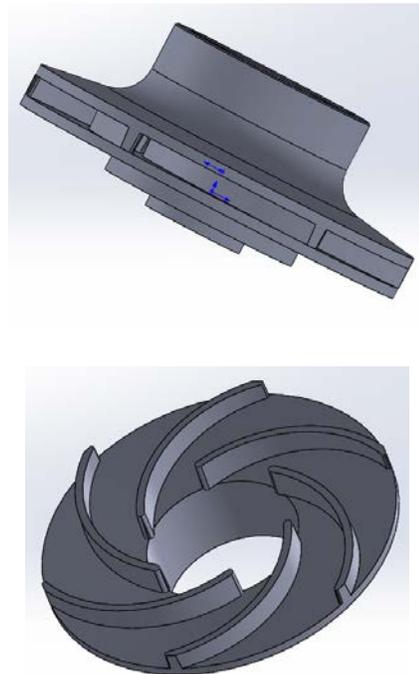


Fig.4 Three Dimensional View of Designed Impeller

IV. PRODUCTION PROCESS OF IMPELLER

There are many steps of production process for the single suction centrifugal pump' impeller. Firstly, 3-D model of impeller design is drawn. And then, the pattern design of designed impeller is created by using Solidwork software tool. After that, pattern making, mould making, sand casting and foundry process are made step by step respectively.

A. Creating Design Model and Patten Design of Impeller

In this study, the design model of impeller is firstly drawn by using Solidwork software tool from the calculated results. The next step is pattern making. Based on the finishing part drawing,

the pattern size and shape are determined. Pattern means full size model of the casting, is used to produce a mould cavity into which liquid metal is poured. For this impeller design, there are four main parts of pattern design. These are core pattern for front impeller shroud, core pattern for impeller eye and blades, core pattern for back impeller shroud and core pattern for impeller shaft. These patterns are separately drawn because the pattern type used for design model is solid and single pattern type. In these pattern drawings, contraction allowance and machining allowance must be considered. The contraction allowance is depending on the material of impeller. In this study, the contraction allowance is taken about 2% because the designed impeller is made of cast iron (HRC 10 from applying load 150 Kg or HRA 60 from applying load 60 Kg by using the portable Rockwell hardness tester). Moreover, these patterns require the form taper; it is to remove easily from mould box in mould making process. In this pattern design, form taper is taken about 2 degree. Moreover, the material of designed patterns is made by wood (teak) because it is suitable for machining.

B. Pattern Making of Impeller

In pattern making for designed impeller, 3axis CNC milling machine (OPTIMUM,F 105) with SIEMENS control is used and machining program is produced by using the Master CAM software tool. The accuracy for machining is good finishing and rough height rating is 1.6 μm according to losses due to friction. The type of tool path, tool diameter, depth of cut, machining type and operation time for all pattern of impeller are shown in Table III.

Table III. Machining Process of Pattern Making

Name	Tool path	Tool	Depth of cut (mm)	Spindle speed	Feed rate	Cutting method	Operation time	Preparation time
Core Pattern for Impeller Eye and Blades	Rough	End mill, Φ 12	1.5	2100	1000	True spiral	7 hr 45 min	1 hr
	Finish	Ball mill, Φ 8	0.2	2500	1200	parallel	4 hr 42 min	-
Core Pattern for Impeller Shaft	Rough	End mill, Φ 16	1.5	2100	1000	True spiral	40 min	15 min
	Finish	Ball mill, Φ 10	0.3	2500	1200	Radial	28 min	-
Core Pattern for Impeller Back Shroud	Rough	End mill, Φ 12	1.5	2546	1450	True spiral	7 hr 10 min	1 hr
	Finish	Ball mill, Φ 10	0.4	2546	1350	Radial	1 hr 27 min	-
Core Pattern for Front Impeller Shroud	Rough	End mill, Φ 16	1.5	2500	1500	True spiral	8 hr 51 min	1 hr
	Finish	Ball mill, Φ 10	0.3	3000	1650	Radial	1 hr 19 min	-
Total time							35 hr 37 min	

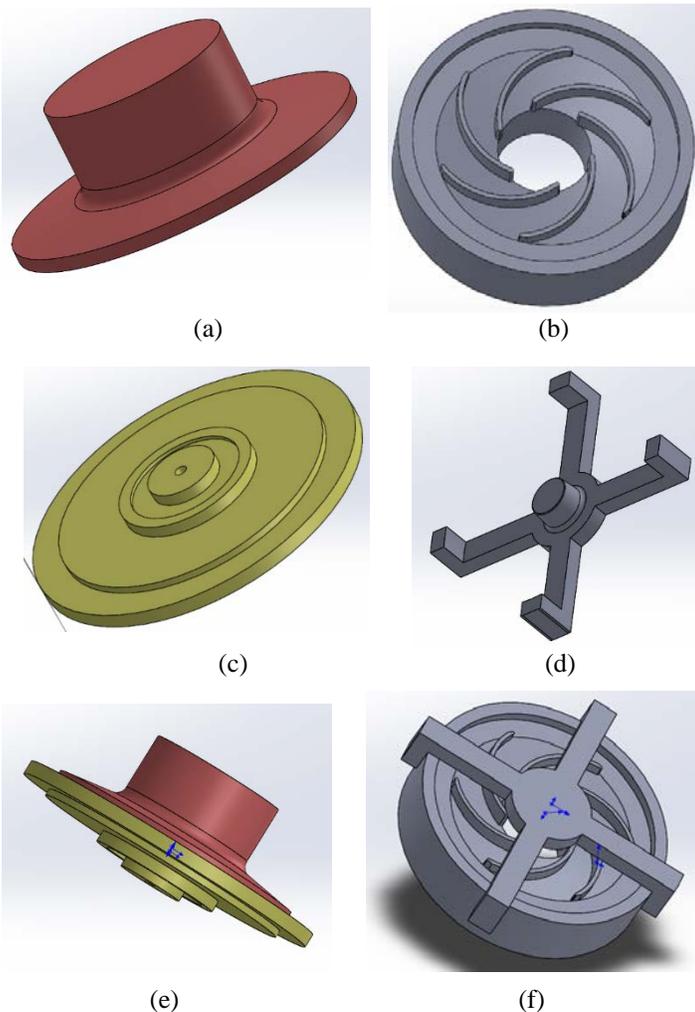


Fig 5. Pattern Design of Impeller (a) Core Pattern for Front Impeller Shroud (b) Core Pattern for Impeller Eye and Blades (c) Core Pattern for Impeller Back Shroud (d) Core Pattern for Impeller Shaft (e) Assembly Pattern for Front and Back Impeller Shrouds and (f) Assembly Pattern for Impeller Eye and Blades



Fig 6. Machined Process for Impeller Design

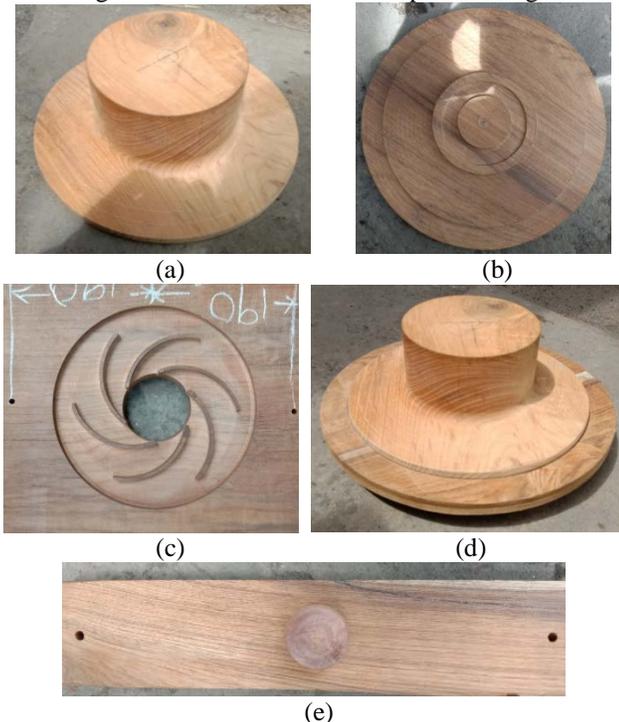


Fig 7. Machined Pattern of Impeller Design (a) Pattern for Front Impeller Shroud (b) Pattern for Impeller Back Shroud (c) Pattern for Impeller Eye and Blades (d) Assembly Pattern for Front and Back Impeller Shrouds and (e) Pattern for Impeller Shaft

C. Mould Making and Sand Casting of Impeller

After making the pattern of pump's impeller, the next step is mould making. The mould is split in center, which creates a parting line, parting line is flush with the top of the cavity and casting. The pattern not only makes the cavity but also the two impressions into which the sand core will fit. Cores are generally made of dry sand with high strength. The mould should be included runner, raiser and guide pin. In this study, single runner and single riser is used and the designed moulds are as shown in Fig 8.



Fig 8. Mould Making and Sand Casting for Impeller

In casting, the sand casting method is used. This method is simple and low cost, and also cheaper than the forgings and welding method. In this processes, the mould are housed in a flask which consist of two boxes. The upper box is called cope, which is including the pouring basin and raiser. The molten metal is poured through the pouring basin and the flows across the sprue into the cavity. The raiser basin should hold enough metal to feed the casting until complete solidification takes place. The lower box is called drag, these drags are made on the ground. After solidifying the metal, the sand mould is broken away and the casting is taken.

D. Foundry Process for Impeller

Foundry process is the process of forming object by putting liquid material (cast iron) into a prepared mould. A casting is a objected formed by allowing the molten metal to solidify. In this case, the traditional old design furnace (Cupolar type furnace) is used. This furnace is suitable to melt cast iron metal and is separated to two portions. In the upper portion of it, metallic raw material and coke are placed together. This furnace has 8 holes tuyeres. The melting occurs and proceeds and molten metal is collected at the bottom of furnace. Molten metal may be tapped at intervals before each skimming, or the tap-hole may be left open with metal flowing constantly. In most cupolas slag is drained from the slag hole at the back of furnace. When metal is melted completely the bottom bar is pulled sharply under the plates and bottom is dropped. All remaining slag, un-burned coke or molten metal drops from the furnace. Molten metal is collected in ladles from furnaces and is poured into the mould. In this process, the capacity of the furnace is ½ tons of raw materials and the ratio of the raw material and the coke is 8:1. The melting time is taken about two and half hours.



Fig 9. Foundry Process of Impeller

E. Machining Process for Impeller

After inspecting the casting, the final process is machining process. The casting of designed impeller is machined on the lathe machine to obtain the required dimensions of designed centrifugal pump impeller.



Fig 10. Machining for Finishing Product

V. CONCLUSION

The designed pump is aimed to use in agricultural application especially for river pumping project. Moreover, this study promotes to develop the manufacturing method on centrifugal pump and to able to construct the most effective type of pump in localization and with low cost. The designed pump can develop a head of 20 m and deliver 0.9 m³/min of water at 1800 rpm. The designed impeller has 97 mm inlet diameter, 226 mm outlet diameter, 20° inlet vane angle and 23° outlet vane angle. The number of vanes is 6. And then, the inlet width and outlet width are 26 mm and 18 mm respectively. The material of designed impeller is made of cast iron (HRC 10 or HRA 60). In fabrication process of impeller, the machining costs for all patterns are 150000 kyats (\$ 100). In pattern making, 3-axis CNC Milling machine is used and the total machining time is taken about 35 hr and 37 min. The costs of casting are 10000 kyats (\$ 6) for one

item. To obtain the finishing product, lathe machine is used and the machining costs are 5000 kyats (\$ 3). Therefore, these costs are so reasonable to produce in localization and are less than the price in local market. The designed single-suction centrifugal pump can fulfill the requirements of domestic application and industrial application.

APPENDIX

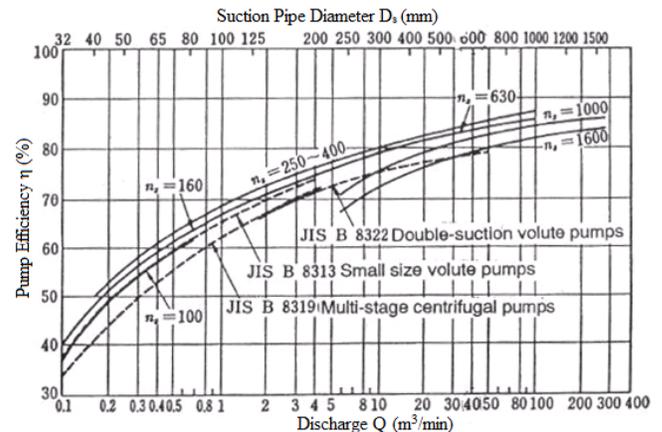


Fig A1. Overall Efficiency Curve

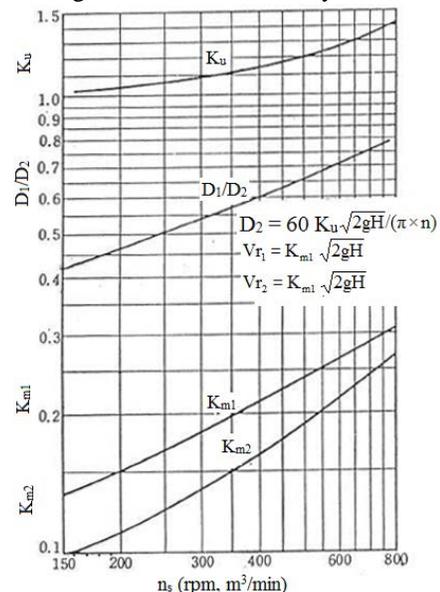


Fig A2. Stepanoff Chart

ACKNOWLEDGMENT

The author would like to express his special thanks to Dr. Nyi Nyi, Professor, Faculty of Precision Engineering, Technological University (Cyber City) and U Nay Win Sein, Associated Professor, Department of Mechanical Engineering, Technological University (Mandalay) for their kind supervision, encouragement, suggestion and valuable guidance of this paper.

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The Influence Of Project-Based Learning With Support Miniature Work Media On Activity And Learning Outcomes Students Of Grade Iv Muhammadiyah Elementary School 4 Surabaya

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DOI: 10.29322/IJSRP.9.08.2019.p92111

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92111>

Abstract: The study aims to determine the influence of the *Project Based Learning* for miniature work media on student activity and learning outcomes. The sample of this research is grade IV students in the elementary School of Muhammadiyah 4 Surabaya amounting to 38 students. This study was carried out in thematic learning on the ward subtheme where I lived semester II of lesson 2018/2019. This type of research is Pre-experimental design, with a quantitative approach, and the research design used is One Group Pretest-Posttest Design. The data collection techniques used are observations and tests. The research instruments used include an observation sheet of learning activity and a test sheet of students' learning outcomes. As for the data analysis techniques using statistical analysis and T-test test. The results showed that there was a significant influence from the PjBL learning model for the work of a miniature work media and student activity on the learning outcomes of Grade IV Elementary School Muhammadiyah 4 Surabaya which was demonstrated by the acquisition of Significance for the results of the pretests percentage of student activity with an average of 59.4, while the value of significance for the results of the percentage of posttest student activity with an average of 77.6. As for the learning outcomes, there is a significant influence on the use of model PjBL assisted miniature media work is indicated by Tcount 16.158 (df 30) > Ttable 2.011 (df 30) and the value of sig. (2-Failed) $0.000 < 0.005$. So, H_0 is rejected and H_a is accepted, there was a difference in student learning outcomes before given treatment. Thus, the use of the PjBL model for miniature work media has been a positive influence on the activity and learning outcomes of grade IV students.

Keywords: *Project-Based Learning, Miniature Work Media, Activity, and Learning Outcomes*

Introduction

Education is a process of learning knowledge, skills, and habits in which later knowledge, skills and habits that have been owned by students can be used for students themselves and the community around the students. Law No. 20 of 2003 on the national education system, article 1 states that education is a conscious and well-planned effort to create a learning atmosphere and learning process so that students actively develop their own potential To possess the spiritual power of religion, self-control, personality, intelligence, noble morality, as well as the necessary skills of himself, society, nation, and state.

Education can be obtained through formal education and non-formal education. Formal education can be done by students through educational institutions or educational foundations that have permission from the Education office. Nonformal education can be carried out by the institution or Education Foundation. The ordinary nonformal education we refer to as education that students from the environment around students in the form of education with parents, community education and so on. In non-formal education, there are no structured rules from the Education office or the central government, while informal education there is a structured rule of service that can be called by the curriculum.

According to the laws and regulations, Kemendikbud compiles, develops and establishes a curriculum that is prevailing in Indonesia at the time of curriculum 2013. With the new curriculum is expected problems that exist in education in Indonesia will be quickly resolved. The 2013 curriculum is a combination of the development of a pre-existing curriculum. The 2013 curriculum emphasizes the improvement of soft skills and hard skills that cover aspects of attitude, skills, and knowledge.

In the 2013 curriculum application, learning is in the integrative thematic in all subjects where all subjects are melted into one so there are no restrictions in each subject. In addition, learning is active in students, teachers are

no longer an informant but the teacher is more acting as a facilitator for the students. In the implementation of an integrative thematic 2013 curriculum, the activities undertaken by each student in the school are not separated from learning and learning activities.

Learning is a deliberate activity and is done by individuals in order to change self-ability (MKDP, 2011:124). Learning is a complex process that occurs in every person of his life (Arsyad, 2013:1). Learning is a complex student action or behavior, which is the process of acquiring something (science) from the surrounding environment called a learning process. The learning process is part of the learning system. While the learning system is an interfusion of human beings, facilities or equipment, and procedures that are interconnected in achieving a learning objective.

Learning is an effort made by a teacher or educator to teach students who learn (MKDP, 2011:128). Learning is a process of interaction between educators and students with students in order to acquire the new knowledge you want using a variety of media, methods, and learning resources that fit Need (Fadlillah, 2014:173). From two opinions it can be concluded that learning is a process by educators with learners to gain knowledge in learning activities.

Learning and learning cannot be separated from each other. In the learning process, there will be learning. Learning is an activity performed by the students, while learning is the process of learning itself. In the learning process, the teacher holds an important role in achieving learning and learning. In the learning and learning process, the teacher not only acts as a source of information but the teacher also serves as a facilitator.

The main task of a teacher in learning activities is to design students' activities or learning activities so that all the information in the learning process can be understood by the students. In addition, the teacher's job as a learning designer is to determine learning outcomes by designing how to use the instrument along with its success criteria.

Student learning outcomes are determined by how teachers can make students understand or understand the lessons taught by the teacher. There are many ways a teacher can enable the classroom atmosphere or the learning atmosphere to become active and students can understand the information or knowledge that is delivered or taught in school. In teaching, teachers can use a variety of learning strategies, learning models, learning methods and learning media.

To get maximum learning outcomes, teachers should be able to plan their learning activities well. For that, teachers need a proper learning model in the process of teaching. According to Priansa (2017:187), Learning models are teacher blueprints in preparing and implementing the learning process, as the learning model is an overview or learning flow design that teachers will use. According to Arends (in Trianto, 2012:74) suggests that the teaching model directs to a particular learning approach including its purpose, its syntax, its environment, and its management system. One of the learning models that teachers can use in the learning process to get maximum learning results by using Project-based learning model.

Project-Based Learning is a learning model that can make students think creatively to participate in a performance and implement a live learning experience. Project-based learning models are a model that regulates learning through a particular project. Further explained by Putri (2012:7), Project-based learning is a project conducted individually as well as a group that is implemented within a certain period of time. Project-based learning has a distinctive feature of engaging students in designing, solving problems or giving students an experience to work independently and think of creative ideas to solve problems. Project-based learning is applied to the motivation of students to be more active, innovative and creative in thinking and implementing solutions in resolving the problems faced to acquire desirable objectives of both cognitive, affective Psychomotor.

The learning process is not only fixed on the use of learning models only. To get maximum learning outcomes in addition to using the right learning model, teachers must also be able to attract students' attention and need the right help of learning media to steer, describing an abstract object into More concrete so that the knowledge gained by the students of each other can be fixed in the same direction/flow. There is a variety of learning media that can be applied and developed in accordance with the ability and environment around the school. Learning Media is a tool that is used to clarify specific learning, and must be appropriate to achieve specific learning objectives and materials with certain characteristics.

Media is an intermediary from the source of information to information recipients (Sanjaya, 2012:57). Media learning is a component of learning resources or physical rides that contain instructional material in a student environment that can stimulate students to study (Arsyad, 2013:4). Learning Media is a tool used by teachers with customized Desai to improve the quality of learning (Musfiqon, 2012:28). So, learning Media is a prop that can be used/utilized by the teacher in a learning process. Media learning has a great influence on the learning process because the media is not only as a teacher in teaching aids but can also serve as a source of information or communication bridge teachers with students so that learning can Easily be accepted or understood by students. Media can be utilized to stimulate students' curiosity and can stimulate students' activity in the learning process. With a high curiosity and the level of student activity in learning high, students' learning outcomes can increase.

Sanjaya said, (2012:68) suggests that students will be more able to gain knowledge through direct experience, through artificial objects, experiences through drama, travel demonstrations, and exhibitions. This allows it because students can directly relate to the object being studied. Compared to using learning where teachers explain

all learning without using the media, students will become bored and passive.

The merger of student work products in the implementation of Project-based learning (PJBL) learning models can be processed or displayed as learning media that can explain or describe what students have done during their project work. In addition, to work on the project well, teachers must stimulate students in the ongoing learning process. The Stimulus done by teachers in addition to implementing learning models can also be done with the help of learning media that stimulates students' knowledge.

In this study, researchers were interested in researching the influence of the project-based learning model with miniature media work. Researchers want to know how influential project-based learning models have a miniature media job and activity on student learning outcomes of Grade IV Elementary School. Researchers choose to use fourth graders as they begin to learn critical thinking, abstract thinking, and further digging deeper information. Therefore, the appropriate model of learning is required to support the matter. In addition to requiring the right learning model, teachers also need learning media that can support the learning process that is done to work well and can attract students' interest in learning. With this research expected the learning process in school can be implemented more varied by teachers and learning can be absorbed by both students. In the explanation that has been submitted above, researchers choose the title the influence of project-based learning with support miniature work media on activity and learning outcomes students of grade IV Muhammadiyah elementary school 4 Surabaya.

Method

The type of research used in this research is quantitative research (experimental Research) is a quantitative study that has a primary goal to test causal relationships. The hallmark of other experimental studies is to test the influence between variables and test the truth of the hypothesis. So, it can be said that experimental research is predictive. This study, researchers selected experimental research. The purpose of this research is to know the effect of a treatment on something controlled. This study, researchers used Pre-Experimental design with the form of One group Pretest-Posttest Design. In this case, the treatment is a model of PjBL learning with a miniature media job. The population in this study is class IV elementary School Muhammadiyah 4 Surabaya, semester 2017/2018. Sampling used is a purposive sampling technique with the number of Students 38 students. The Data In this study was gathered through study results tests.

RESULTS AND DISCUSSION

Result

Exposure to students' learning outcomes before and after implementation of based Learning Project Model with a miniature media work on the activity and learning outcomes of Grade IV Elementary School Muhammadiyah 4 Surabaya hasilnya can be seen below:

Table 1. Average student learn activity before and after Treatment

Value	Student Learning Activity	
	Before Treatment	After Treatment
Average	59,4	77,6
Highest value	66,6	83,3
Lowest value	50,0	66,6

Table 2. Paired Samples Test Student Activity On Model Project-Based Learning With Support Miniature Work Media

	Paired Differences	t	df	Sig. (2-tailed)
	95% Confidence Interval of the Difference			
	Upper			
Pair 1 pretest - posttest	-16,10358	17,577	37	,000

Table 3. Average Student Learning Outcomes In Project-Based Learning Model With Support Miniature Work Media

No	Value	Student Learning Outcomes	
		Pretest	Posttest
1	Average	65,47	83,16
2	Highest value	76	92
3	Lowest value	52	76

Table 4. Paired Samples Test Student Learning results in Project-Based Learning Model With Support Miniature Work Media

	Paired Differences	t	df	Sig. (2-tailed)	
					95% Confidence Interval of the Difference
					Upper
					Lower
Pair 1	pretest - posttest	-15,46660	16,158	37	,000

Discussion

Research results relating to student activity, indicating a significant difference in activity value. Before treatment obtained the value of learning activities at 59, 4and the value of learning activities after giving a treatment of 77.6. Starting from the data that has been obtained, the researcher to process the data using SPSS for Windows generates T-count > T-table with a signification status value (2-tailed) of 0.000. So the significance value is smaller than 0.05. Thus, the PjBL learning model with a miniature media work affects the activity of students at SD Muhammadiyah 4 Surabaya.

In addition to discussing the influence of treatment of students' activities, the study also discusses student learning outcomes. Good activity will encourage the creation of a conducive learning atmosphere that leads to an increase in student learning outcomes. Because basically, learning is a process that people do in a conscious condition that aims to acquire concepts, knowledge, and new information that causes the emergence of self-change for the better. As originally did not know to know and that initially could not be able to.

In this research, the measurement of student learning is done by giving a test result of learning in the form of pretests and posttest. Before being taught with the PjBL model of media-assisted miniature work, the results of the study were very much below average and after treatment, the student learning test was increased. In the results of early observation, results can be obtained average pretests value of 65.47. After the treatment was given the average posttest value of the learners increased to 83.16. Starting from the data that has been obtained, the researcher processed the data using SPSS for Windows and obtained the value of T-count > T-table with a signification status value (2-tailed) of 0.000. So the significance value is smaller than 0.05. Thus, the model PjBL assisted miniature media work affects the outcomes of students' learning at Muhammadiyah Elementary School 4 Surabaya.

CONCLUSION

Based on the results of the data processing obtained at the time of the study accompanied by relevant research and supporting theory, it can be concluded that the PjBL learning model of miniature work media is an influence on activities and Student outcomes in class IV elementary school. This can be seen from the difference of results ttest pretests and posttest both activity and student learning outcomes. For calculation of activities and learning outcomes, students obtained a significance value of 0.000 with T-count > T-table. So, it can be concluded that:

1. Model PjBL support work with miniature work media influence in the study activity students of grade IV Muhammadiyah Elementary School 4 Surabaya.
2. Model PjBL support work with miniature work media influence in the study learning outcomes students of grade IV Muhammadiyah Elementary School 4 Surabaya.

Based on the conclusion of the above research, it is hoped that the teacher to apply the model in various other KD to increase the interaction of learners in discussing and expressed his opinion. In addition, learning media can be used as clearance in the learning process so as to help students understand the learning materials that are performed in concrete learning in the equation of understanding in the learning process will Well when learning

can be carried out well too.

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Chemical use in intensive white-leg shrimp aquaculture in Ben Tre province, Vietnam

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DOI: 10.29322/IJSRP.9.08.2019.p92112

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92112>

Abstract- The study was done through interview of 60 white-leg shrimp farmers in Binh Dai and Thanh Phu District, Ben Tre province in order to investigate the chemical use, disease occurrence and farming practice. Results showed that the most common shrimp disease are AHPND (56.7% and 63.3%) and white feces disease (50 and 63.3%), reported by farmers. The commonly used antimicrobials were amoxicillin (20-30%), cotrim (16.7-26.7%) and oxytetracycline (10-26.7%). The used antimicrobials were belonged to the allowed listed issued by Ministry of Agriculture and Rural Development, Vietnam. Most of farmers in both models using product containing chlorin as disinfectant in water input ponds while iodine and BKC were used during grow-out. Nearly all farmers used probiotic for digestive enhancement and water quality improvement, common species were *Bacillus subtilis*, *B. licheniformis*, *B. megaterium*. However, the effectiveness was unknown. Thus, there is an urgent need to provide training to shrimp farmers to enhance knowledge on effectiveness use of chemicals, guarantee the food safety for the final product.

Index Terms- antimicrobial, chemical, intensive, white-leg shrimp

I. INTRODUCTION

Vietnam has a long coast line which is favorable for the development of coastal aquaculture. Aquaculture shrimp production increased following years, accounted for 683 thousand tons in 2017. Ben Tre is a coastal province in the Mekong Delta, Vietnam. Shrimp aquaculture area is above 4000 ha with two culture species of back tiger shrimp and white-leg shrimp. In recent years, white-leg shrimp aquaculture increased in area, shifting from black tiger shrimp.

Because of increased in stocking density, weather and environmental problems, disease has occurred. Acute hepatopancreatic necrosis disease (AHPND), white spot syndrome virus (WSSV) and white feces syndrome have been important disease in shrimp aquaculture (Oanh *et al.*, 2008; Tran *et al.*, 2013; Flegel and Sritunyaluucksana, 2018). Farmers used antibiotic and chemicals to prevent and control disease (Chi *et al.*, 2017).

Rico *et al.* (2013) reported that shrimp aquaculture used less chemical and antibiotic compared to fish aquaculture. Shrimp farmer in the North of Vietnam used oxytetracycline to control and prevent AHPND and white feces syndrome (Chi *et al.*, 2017), 20% farmers reported. Limit or no information on chemicals use in shrimp aquaculture in the South of Vietnam. Thus, the aims of this study are to investigate the chemical use, disease occurrence and farming practice of white-leg shrimp aquaculture in Ben Tre province, Mekong Delta, Viet Nam in order to provide information for better management of chemical use.

II. METHODS

The study was conducted from May to December 2018 by interviewing shrimp farmers in Binh Dai and Thanh Phu District, Ben Tre province. A total of 60 shrimp farmers was face to face interviewed. The interviewed farms divided as earthen ponds (30 farmers; MHNAD) and super intensive system with pond liner (30 farmers; MHNLB) were randomly selected from the list provided by provincial agriculture and rural development.

The semi-structured questionnaire was piloted in two households in each group including technical information e.g. grow-out pond, input pond and waste pond area, stocking density, year of farming, production, FCR, training. Disease occurrence included types of disease, and chemical use. Information on chemical use were focused on types of chemical, disinfectant, probiotic and antibiotic. Information about handling of chemical was also obtained.

Results are expressed in descriptive statistics e.g. frequency of occurrence, mean value, and standard deviation. Statistical independent sample T-test was applied to compare the differences in technical indicators with a significance level of 95%.

III. RESULTS AND DISCUSSION

3.1 General information of shrimp farms characteristics

Farmers in rearing shrimp in earthen ponds (MHNAD) had more experience on shrimp farming compared to farmers

rearing shrimp in supper intensive system with pond liner (MHNLB) (Table 1). This is because the model named supper intensive system with pond liner (MHNLB) is newly applied in recent years and farmer in this model converted from models rearing shrimp in earthen ponds (MHNAD). Average area of grow-out ponds in model MHNLB was smaller than the model MHNAD. In the MHNLB, during culture, it required more water exchange compared to MHNAD, thus number of input water pond in MHNLB was higher than MHNAD which less exchange water during cultivation.

Table 1. General information of shrimp farms

	MHNAD* (n=30)	MHNLB (n=30)
Year of farming	7 ± 5 (1-18)	3 ± 2 (1-10)
Training	73.3%	46.7%
Total farm area (m ²)	6637 ± 4951 (1000-4000)	4033 ± 2475 (900-4500)
Area of grow-out pond (m ²)	2096 ± 698 (1000-4000)	1640 ± 732 (900-4500)
No of grow-out ponds	3 ± 2 (1-9)	3 ± 2 (1-10)
Area of water input pond (m ²)	1986 ± 2025 (200-10000)	3218 ± 3616 (400-20000)
Area of waste storage (m ²)	1285 ± 1466 (200-5000)	1220 ± 1156 (200-5000)
No of water input pond	1 ± 1 (1-3)	2 ± 1 (1-5)
Stocking density (shrimp/m ²)	90 ± 21 (40-125)	219 ± 96 (150-500)
Productivity (tons/1000m ²)	1.6 ± 0.7 (0.7-3.1)	2.6 ± 1.8 (0.8-6.3)
FCR	1.15 ± 0.09 (1-1.4)	1.19 ± 0.14 (1-1.6)
Sell to middle man	96.7%	100%
Checking antibiotic before selling	60%	70%

* rearing shrimp in earthen ponds (MHNAD) and in supper intensive system with pond liner (MHNLB)

Between two rearing models, stocking density in MHNAD was two times higher than in MHNAD leading to higher productivity. However, the feed conversion ratio was similar. Most of farmers sold their products to middle men and few farmers sold directly to processing plants. In term of food safety, 60 and 70% of farmers checked antibiotic residue before harvest, done by

buyer. Farmers received training mainly by feed and chemical producers which less getting information from authorities though getting approval for farms operation done by local authorities.

3.2 Shrimp disease reported by farmers

Results showed that Acute Hepatopancreatic Necrosis Disease (AHPND) and White Feces Disease (WFD) have been still common diseases reported by farmers in both models whereas White Spot Syndrome Virus (WSSV) was dominated in model MHNAD. AHPND occurred 20 to 40 days after stocking post-larvae, and 30-60 days for WFD and WSSV. AHPND has been firstly reported in Vietnam since 2010, caused by *Vibrio parahaemolyticus* with massive mortality (Tran *et al.*, 2013; Nghia *et al.*, 2015). Chi *et al.* (2017) reported that AHPND was also main serious disease in shrimp aquaculture in the North of Vietnam. Flegel and Sritunyaluucksana (2018) confirmed that AHPND causing by *Vibrio parahaemolyticus* carried gene in pVA plasmid containing two genes PirAVP and PirBVP.

Table 2. Diseases reported by shrimp farmer (%)

	MHNAD (n=30)	MHNLB (n=30)
Acute hepatopancreatic necrosis disease (AHPND)	63.3	57.6
White feces disease (WFD)	50	66.7
White spot syndrome virus (WSSV)	40	10

* rearing shrimp in earthen ponds (MHNAD) and in supper intensive system with pond liner (MHNLB)

WFD was identified as multi-factors diseases e.g. parasite, bacteria or virus infection. The other cause was reported as microsporidian parasite *Enterocytozoon hepatopenaei* (Ha *et al.*, 2011; Flegel and Sritunyaluucksana, 2018).

3.3 Antibiotic use in white-leg shrimp farming

Farmers used five types of antibiotic during cultivation of shrimp in order to prevent and control AHPNS and WFD (Table 3). Farmers in model MHNAD used more common on cotrim (containing sulfamethoxazole and trimethoprim), amoxicillin and oxytetracycline whereas in model MHNLB, the percentage of farmers used antibiotic was higher with similar common antibiotic as MHNAD.

Table 3. Used antibiotic reported by farmers (%)

	MHNAD (n=30)	MHNLB (n=30)
Florfenicol	3.3	3.3
Tetracycline	3.3	13.3
Oxytetracycline	10	26.7
Cotrim	16.7	26.7
Amoxicillin	20	30

* rearing shrimp in earthen ponds (MHNAD) and in supper intensive system with pond liner (MHNLB)

According to regulation from the Ministry of Agriculture and Rural Development in Vietnam, these types of antibiotic has been allowed to use in aquaculture. However, the prophylactic use should not be encouraged.

3.4 Chemical, probiotic and nutritional products

Farmers in both models reported to use CaO and CaCO₃ for first step of pond preparation after removal of sludge from input water pond or grow-out ponds (Table 4). In model MHNAD, there were 8 farms did not possess the input water ponds, thus directly taking water from the river and doing the disinfection treatment in the grow-out ponds. After taking water to input ponds (or grow-out pond, in case farmer do not possess the input water ponds), farmer disinfect water mainly by chlorin based products (86 and 100% farmers used). Other farmers used KMnO₄ or Iodine to disinfect water, before pumping to grow-out ponds. Benzalkonium chloride (BKC) sometimes used for water disinfection.

During the shrimp cultivation, many farmers used iodine or BKC every 10 or 15 days to disinfect bacteria in culture water (Table 4). Few farmers reported to used chlorin based products which may be harmful to shrimp health. Virkon (containing peroxygen) was also used to disinfect the pond water, however, it was reported to be expensive to farmer, effectiveness was also confirmed by farmers. The way of using chemical for water disinfection was found similar to report by Chi *et al.* (2017).

Nearly all of shrimp farmers used probiotic products as feed inclusion for improving shrimp digestibility and used as water quality improving agents. Common bacteria listed in products including *Bacillus subtilis*, *B. licheniformis*, *B. megaterium*, *Lactobacillus acidophilus* and *Saccharomyces cerevisiae*. Other bacteria also included as *Bacillus amyloliquefaciens*, *Bacillus pumilus*, *Bacillus firmus*. The finding was similar as report of Rico *et al.* (2013) and Chi *et al.* (2017) that most of shrimp farmers used probiotic during farming. However, quality of product has not been guaranteed, reported by farmer. Noor Udin *et al.* (2015) did analysis of probiotic products. Results revealed that most of products did not contain the claimed bacteria while other bacteria

contained in the products. Other studies reported that using *Bacillus* bacteria in shrimp culture can improve feed digestibility as in feed inclusion (Wang *et al.*, 2005; Balcázar *et al.*, 2006; Wang 2007 and 2008; Newaj-Fyzu *et al.*, 2014).

Table 4. Chemical, probiotic and nutritional supplied products using in shrimp farming

	MHNAD (n=30)	MHNLB (n=30)
<i>Chemical use during pond preparation and water treatment in input water ponds</i>		
CaO	53.3	40
CaCO ₃	66.7	30
Chlorin	86.7	100
KMnO ₄	3.3	26.7
Iodine	23.3	6.7
BKC	16.7	13.3
Formalin	6.7	-
<i>Chemical use for water treatment during grow-out stage</i>		
KMnO ₄	3.3	-
Chlorin	16.7	6.7
Iodine	66.7	56.7
BKC	50	50
Virkon (peroxygen)	10	16.7
<i>Probiotic</i>		
Probiotic for feed inclusion	93.3	83.3
Probiotic for water treatment	96.7	100
<i>Nutritional supplied products (mineral and vitamin)</i>		
	96.7	90

3.5 Handling of chemical, guidance and safety

Most of farmers used chemicals following their own experience, 86.7 and 93.3% farmers reported (Table 5). Also, they got guidance from technician in chemical shop and feed company. Missing the support from authorities e.g. extension service, local aquaculture department because of the few officers in the region. Nearly all farmers bought the chemical and stored them in the storage next to ponds, away from living area. However, this place is used for farmers and workers to take a rest during working, thus, it may affect worker health due to the chemical placing there. It is interesting that farmer used gloves, mask during handling of chemicals that less being used in other aquaculture species. One third of farmers recorded the chemical, feed and pond water quality parameters.

Table 5. Handling of chemical, guidance and safety

	MHNAD	MHNLB
--	-------	-------

	(n=30)	(n =30)
<i>Making decision on chemical use</i>		
Following label instruction	26.7	40
Support from technician from chemical company	40	20
By their own experience	86.7	93.3
Local authority support	3.3	-
<i>Record chemicals and others</i>	33.3	23.3
<i>Safety on handling chemicals</i>		
Available chemical storage cabinet	-	3.3
Purchase and store the chemicals in storage	100	90
Using gloves, masks during handling	76.7	80

* rearing shrimp in earthen ponds (MHNAD) and in supper intensive system with pond liner (MHNLB)

IV. CONCLUSION

The MHNLB model, supper intensive system with pond liner, had two times higher stoking density and production compared to MHNAD, rearing shrimp in earthen ponds. AHPND and WFD were two common disease reported by farmers in both models. Farmer used cotrim (containing sulfamethoxazole and trimethoprim), amoxicillin and oxytetracycline to prevent and control disease during farming. Most of farmers used probiotic products to improve water quality and feed digestibility. In general, there is an urgent need to train farmer on chemical use and knowledge on disease diagnostic in both models.

ACKNOWLEDGEMENT

This study is funded by the Can Tho University Improvement Project VN14-P6, supported by Japanese ODA loan. The authors would like to thank the ODA Project for funding this study. We also like to thank students Mr Sĩ, Ms Thur, Linh and My Anh for support during survey.

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Image Noise Reduction Using Linear and Nonlinear Filtering Techniques

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DOI: 10.29322/IJSRP.9.08.2019.p92113

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92113>

Abstract— Noise is always presents in digital images during image capturing, coding, transmission, and processing steps. The performance of imaging sensors is affected by a variety of factors, such as environmental conditions during image capturing, and by the quality of the sensing elements themselves. For instance, in capturing images with a CCD camera, light levels and sensor temperature are major factors affecting the amount of noise in the resulting image. Images are corrupted during transmission principally due to interference in the channel used for transmission. Noise is very difficult to remove it from the digital images without the prior knowledge of noise model. That is why, review of noise models are essential in the study of image noise-reduction techniques. In this paper, we express a brief overview of various noise models. These noise models can be selected by analysis of their origin. In this paper we present results for different filtering techniques and we compare the results for these techniques. Noise removal is an important task in image processing. In general the results of the noise removal have a strong influence on the quality of the image processing techniques. The nature of the noise removal problem depends on the type of the noise corrupting the image.

Index Terms— Noise model, PDF(Probability Density Function), filtering techniques, Linear smoothing filter, non-linear median filter, wiener filter, adaptive filter and Gaussian filter .



1 INTRODUCTION

NOISE is a random variation of image intensity and visible as a part of grains in the image. It may cause to arise in the image as effects of basic physics-like photon nature of light or thermal energy of heat inside the image sensors. It may produce at the time of capturing or image transmission. Noise means, the pixels in the image show different intensity values instead of true pixel values that are obtained from image.

Noise removal algorithm is the process of removing or reducing the noise from the image. The noise removal algorithms reduce or remove the visibility of noise by smoothing the entire image leaving areas near contrast boundaries. But these methods can obscure fine, low contrast details. Many techniques, of considerable interest in the field of image denoising, need continuous and uniform review of relevant noise theory. Different noises have their own characteristics which make them distinguishable from others. Image noise can also originated in film grain and in the unavoidable shot noise of an ideal photon detector. Image noise is an undesirable by-product of image captured.

In this paper, the literature survey is based on statistical concepts of noise theory. We start with

noise and the roll of noise in image distortion. Noise is random variation of image intensity. It is used to destroy most of the part of image information. Image distortion is most pleasance problems in image processing. Image distorted due to various types of noise

such as Gaussian noise, Poisson noise, Speckle noise, Salt and Pepper noise and many more are fundamental noise types in case of digital images. These noises may be came from a noise sources present in the vicinity of image capturing devices, faulty memory location or may be introduced due to imperfection/inaccuracy in the image capturing devices like cameras, misaligned lenses, weak focal length, scattering and other adverse conditions may be present in the atmosphere. This makes careful and in-depth study of noise and noise models are essential ingredient in image denoising. This leads to selection of proper noise model for image denoising systems IJSER staff will edit and complete the final formatting of your paper.

2. Noise Models

The principal sources of noise in the digital image are: i) The imaging sensor may be affected by environmental conditions during image acquisition. ii) Insufficient Light levels and sensor temperature may introduce the noise in the image. iii) Interference in the transmission channel may also corrupt the image. iv) If dust particles are present on the scanner screen, they can also introduce noise in the image.

Nowadays, with advances in sensor design, the signal is relatively clean for digital SLRs at low sensitivities, but it remains noisy for consumer-grade and mobile-phone cameras at high sensitivities (low-light and/or high-speed conditions). Adding to the demands of consumer and

professional photography those of astronomy, biology, and medical imaging, it is thus clear that image restoration is still of acute and in fact growing importance. Working with noisy images recorded by digital cameras is difficult because different devices produce different kinds of noise, and introduce different types of artifacts and spatial correlations in the noise as a result of internal post-processing.

Noise to be any degradation in the image signal caused by external disturbance. If an image is being sent electronically from one place to another via satellite or wireless transmission or through networked cables, we may expect errors to occur in the image signal. These errors will appear on the image output in different ways depending on the type of disturbance in the signal. Usually we know what type of errors to expect and the type of noise on the image; hence we examine some of the standard noise for eliminating or reducing noise in color image. Image Noise is classified as Amplifier noise (Gaussian noise), Salt-and-pepper noise (Impulse noise), Shot noise, Quantization noise (uniform noise), Film grain, on-isotropic noise, Speckle noise (Multiplicative noise) and Periodic noise.

2.1 Gaussian noise

Because of its mathematical tractability in both the spatial and frequency domains, Gaussian (also called *normal*, *amplifier*) noise models are used frequently in practice. In fact, this tractability is so convenient that it often results in Gaussian models being used in situations in which they are marginally applicable at best. In Gaussian noise, each pixel in the image will be changed from its original value by a (usually) small amount. A histogram, a plot of the amount of distortion of a pixel value against the frequency with which it occurs, shows a normal distribution of noise.

The PDF of a Gaussian random variable, is given by

$$p(z) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(z-\bar{z})^2}{2\sigma^2}}$$

where z represents intensity, \bar{z} is the mean (average) value of z , and σ is its standard deviation. The standard deviation squared, σ^2 is called the *variance* of z . A special case is white Gaussian noise, in which the values at any pair of times are identically distributed and statistically independently (and hence uncorrelated). In

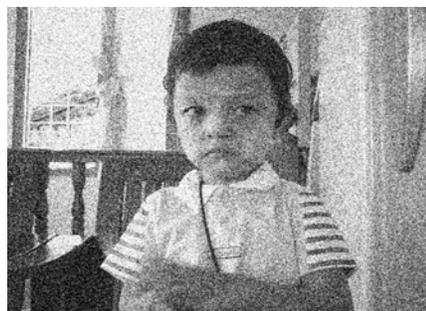
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92113>

communication channel testing and modeling, Gaussian noise is used as additive white noise to generate additive white Gaussian noise.

Example of gaussian noise ;



Original Image



Noisy Image

```
Ariel=imread('Ariel.jpg');
AG=rgb2gray(Ariel);
imshow(AG);
N1=imnoise(AG,'gaussian',0,0.05);
figure,imshow(N1);
```

2.2 Impulse (salt-and-pepper) noise

Salt and pepper noise is sometimes called impulse noise or spike noise or random noise or independent noise. In salt and pepper noise (sparse light and dark disturbances), pixels in the image are very different in color or intensity unlike their surrounding pixels. Salt and pepper degradation can be caused by sharp and sudden disturbance in the image signal. Generally this type of noise will only affect a small number of image pixels. When viewed, the image contains dark and white dots, hence the term salt and pepper noise.

The PDF of (*bipolar*) impulse noise is given by

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$$p(z) = \begin{cases} P_a & \text{for } z = a \\ P_b & \text{for } z = b \\ 0 & \text{otherwise} \end{cases}$$

If $b > a$ intensity b will appear as a light dot in the image. Conversely, level a will appear like a dark dot. If either P_a or P_b is zero, the impulse noise is called *unipolar*. For this reason, bipolar impulse noise also is called *salt-and-pepper* noise. *Data-drop-out* and *spike* noise also are terms used to refer to this type of noise. We use the terms *impulse* or *salt-and-pepper* noise interchangeably.

Example of salt and pepper noise ;



Original Image



Noisy Image

```
Ariel=imread('Ariel.jpg');
AG=rgb2gray(Ariel);
imshow(AG);
N1=imnoise(AG,'salt & pepper',.5);
figure,imshow(N1);
```

2.3 Speckle noise

Whereas Gaussian noise can be modelled by random values added to an image; speckle noise (or more simply just speckle) can be modelled by random values multiplied by pixel values, hence it is also called multiplicative noise. Speckle noise is a major problem in some radar applications. Although Gaussian noise and speckle noise appear superficially simi-

lar, they are formed by two totally different methods, and, as we shall see, require different approaches for their removal. The PDF Speckle noise is given by

$$F(g) = \frac{g^{\alpha-1} e^{-\frac{g}{a}}}{\alpha-1! a^\alpha}$$

Example of Speckle noise ;



Original Image



Noisy Image

```
Ariel=imread('Ariel.jpg');
AG=rgb2gray(Ariel);
imshow(AG);
N1=imnoise(AG,'speckle',.5);
figure,imshow(N1);
```

3. Removing Noise from Images by Filtering

It turns out that filters offer a natural mechanism for finding simple patterns because filters respond most strongly to pattern elements that look like the filter. For example, smoothed derivative filters are intended to give a strong response at a point where the derivative is large. At these points, the kernel of the filter looks like the effect it is intended to detect. Smoothing filters are used for blurring and for noise reduction. Blurring is used in preprocessing tasks, such as removal of small details from an image prior to (large) object extraction, and bridging of small gaps

in lines or curves. Noise reduction can be accomplished by blurring with a linear filter and also by non-linear filtering.

3.1 Smoothing Filter (Linear Filter)

The output (response) of a smoothing, linear spatial filter is simply the average of the pixels contained in the neighborhood of the filter mask. These filters sometimes are called *averaging filters*. As mentioned in the previous section, they also are referred to a *low-pass filters*. The idea behind smoothing filters is straightforward. By replacing the value of every pixel in an image by the average of the intensity levels in the neighborhood defined by the filter mask, this process results in an image with reduced “sharp” transitions in intensities. Because random noise typically consists of sharp transitions in intensity levels, the most obvious application of smoothing is noise reduction. Linear filters also tend to blur sharp edges, destroy lines and other fine image details, and perform poorly in the presence of signal-dependent noise.

3.2 Order-statistic Filters (Nonlinear Filters)

Order-statistic filters are nonlinear spatial filters whose response is based on ordering (ranking) the pixels contained in the image area encompassed by the filter, and then replacing the value of the center pixel with the value determined by the ranking result. The best-known filter in this category is the *median filter*, which, as its name implies, replaces the value of a pixel by the median of the intensity values in the neighborhood of that pixel (the original value of the pixel is included in the computation of the median). Median filters are quite popular because, for certain types of random noise, they provide excellent noise-reduction capabilities, with considerably less blurring than linear smoothing filters of similar size. Median filters are particularly effective in the presence of *impulse noise*, also called *salt-and-pepper noise* because of its appearance as white and black dots superimposed on an image.

For example, suppose that a neighborhood has values (10, 20, 20, 20, 15, 20, 20, 25, 100). These values are sorted as (10, 15, 20, 20, 20, 20, 25, 100), which results in a median of 20. Thus, the principal function of median filters is to force points with distinct intensity levels to be more like their neighbors. In fact, isolated clusters of pixels that are light or dark with respect to their neighbors, and whose area is less

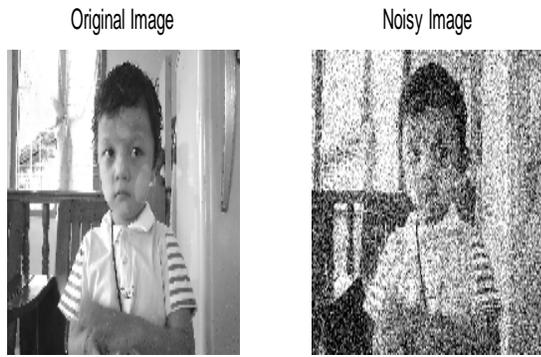
than (onehalf the filter area), are eliminated by a median filter. In this case “eliminated” means forced to the median intensity of the neighbors. Larger clusters are affected considerably less.

4. Noise Reduction from image using Filters

4.1 Using Adaptive filter to remove Gaussian noise

Adaptive filters are a class of filters which change their characteristics according to the values of the greyscales under the mask; they may act more like median filters, or more like average filters, depending on their position within the image. Such a filter can be used to clean Gaussian noise by using local statistical properties of the values under the mask.

Suppose we take the noisy image shown in figure and attempt to clean this image with adaptive filtering. We will use the `wiener2` function, which can take an optional parameter indicating the size of the mask to be used. The default size is 7 x 7. Being a low pass filter, adaptive filtering does tend to blur edges and high frequency components of the image. But it does a far better job than using a low pass blurring filter. We can achieve very good results for noise where the variance is not as high as that in our current image. The image and its appearance after adaptive filtering are as shown in figure. The result is a great improvement over the original noisy image.



4.2 Using Median filter to remove salt and pepper noise

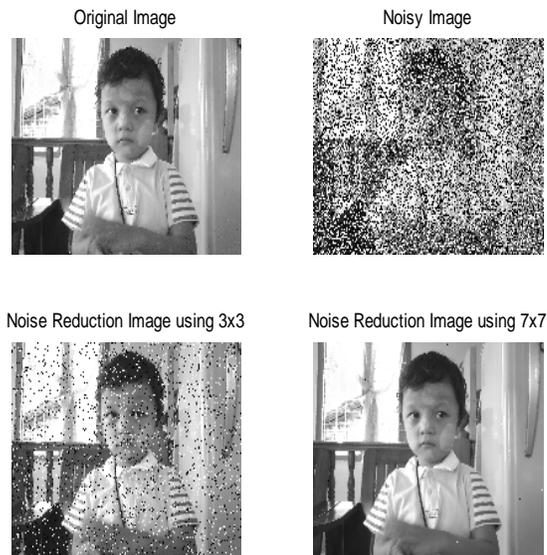
Median filtering seems almost tailor-made for removal of salt and pepper noise. Recall that the median of a set is the middle value when they are sorted. If there are an even number of values, the median is the mean of the middle two. A median filter is an example of a non-linear spatial filter; using a 3 x 3 mask, the output value is the median of the values in the mask. For example:

50	65	52
63	255	58
61	60	57

→ 50 52 57 58 60 61 63 65 255 → 60

The operation of obtaining the median means that very large or very small values _noisy values_ will end up at the top or bottom of the sorted list. Thus the median will in general replace a noisy value with one closer to its surroundings. To remove noise completely, we can either try a second applica-

tion of the 3 x 3 median filter, the result of which is shown in following figure or try a 7 x 7 median filter on the original noisy image:



```
Ariel=imread('Ariel.jpg');
AG=rgb2gray(Ariel);
subplot(2,2,1);
imshow(AG); title('Original Image');
N1=imnoise(AG,'salt & pepper',0.5);
subplot(2,2,2);
imshow(N1); title('Noisy Image');
N2=medfilt2(N1,[3,3]);
subplot(2,2,3);
imshow(N2); title('Noise Reduction Image using 3x3');
N3=medfilt2(N1,[7,7]);
subplot(2,2,4);
imshow(N3); title('Noise Reduction Image using 7x7');
```

5. Conclusion

During image acquisition and transmission, noise is seen in images. This is characterized by noise model. So study of noise model is very important part in image processing. On the other hand, image denoising is necessary action in image processing operation. Without the prior knowledge of noise model we cannot elaborate and perform denoising actions.

Hence, here we have reviewed and presented various noise models. In this paper, we discussed different filtering techniques for removing noises in gray level image. Furthermore, we presented and compared results linear and nonlinear filtering techniques. The re-

sults obtained using median filter technique ensures noise free and quality of the image as well. The main advantages of this median filter are the denoising capability of the destroyed color component differences. Hence the method can be suitable for other filters available at present. But this technique increases the computational complexity. Our future research will be focused on the construction of other Median filtering methods for color images to suppress other types of noises.

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A Review Paper on an Impact of Goods and Service Tax (GST) on Indian Economy

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DOI: 10.29322/IJSRP.9.08.2019.p92114

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92114>

Abstract— GST generally called the Goods and Services Tax is portrayed as the goliath winding evaluation structure planned to help and update the monetary improvement of a country. More than 150 countries have realized GST up until this point. Regardless, the likelihood of GST in India was mooted by Vajpayee government in 2000 and the ensured adjustment for the identical was passed by the Loksabha on 6th May 2015 anyway is yet to be embraced by the Rajyasabha. In any case, there is a huge holler against its execution. It is fascinating to comprehend why this proposed GST routine may hamper the development and improvement of the nation.

Keywords-Goods and service tax; Indian economy.

I. Introduction

The Goods and Services Tax (GST) is a colossal thought that streamlines the beast obligation structure by supporting and redesigning the budgetary advancement of a country. GST is a broad obligation request on collecting, arrangement and usage of product and adventures at a national measurement. The Goods and Services Tax Bill or also suggested as The Constitution (One Hundred and Twenty-Second Amendment) Bill, 2014, begins a Value included Tax to be executed a national measurement in India. GST will be an abnormal appraisal at all the periods of creation to acknowledge consistency in the structure.

On bringing GST into preparing, there would be amalgamation of Central and State rushes into a singular evaluation portion. It would similarly redesign the circumstance of India in both, family similarly as worldwide market. At the customer level, GST would diminish the general tax collection rate, which is at present surveyed at 25-30%.

Under this system, the purchaser settles the last administrative cost at this point a beneficial data appraisal credit structure ensures that there is no falling of charges charge on obligation paid on wellsprings of information that go into collecting of product .

To avoid the portion of various costs, for instance, remove commitment and organization charge at Central measurement and VAT at the State level, GST would unite these appraisals and make a uniform market all through the country. Joining of various obligations into a GST system will understand a convincing cross-utilization of credits. The present system charges creation, however the GST will intend to force use.

Specialists have enrolled the advantages of GST as under:

- It would display two-layered One-Country-One-Tax schedule.
- It would subsume every meandering cost at within and the state level.

- It would not simply broaden the cost everyday practice by covering items and endeavors yet also make it clear.
- It would free the amassing part from falling effect of charges, along these lines by improve the cost-forcefulness of product and ventures.
- It would chop down the expenses of product and ventures and as such by, increase usage.
- It would make business-obliging condition, subsequently by addition charge GDP extent.
- It would upgrade the simplicity of working together in India.

Why no to GST?

In any case, the inquiry is: is the image as ruddy as it is delineated?

Money Street firm Goldman Sachs, in a note 'India: Q and An on GST — Growth Impact Could Be Muted', has put out evaluations that show that the Modi Government's model for the Goods and Services Tax (GST) won't raise progression, will push up purchaser costs expansion and may not achieve broadened commitment compensation get-togethers.

There appears, apparently, to make sure escape provisos in the proposed GST charge routine which may block in passing on the perfect results.

They are: India has gotten twofold GST instead of national GST. It has made the entire structure of GST really befuddled in India. The center ought to encourage with 29 states and 7 affiliation spaces to realize such cost daily practice. Such normal is most likely going to make money related similarly as political issues. The states are presumably going to lose the state in choosing rates once GST is executed. The sharing of earnings between the states and within is up 'til now just clash with no

understanding touched base concerning pay unbiased rate.

Supervisor Economic Advisor Arvind Subramanian on 4 December 2015 prescribed GST paces of 12% for concessional items, 17-18% for standard product and 40% for excess items which is significantly higher than the present most noteworthy organization evaluation pace of 14%. Such action is likely going to push development.

Supervisor Economic Advisor Arvind Subramanian on 4 December 2015 prescribed GST paces of 12% for concessional items, 17-18% for standard product and 40% for excess items which is significantly higher than the present most noteworthy organization evaluation pace of 14%. Such action is likely going to push development. Online business does not leave signs of the trade outside the web and has lack of definition related with it. Subsequently, it ends up being for all intents and purposes hard to pursue the business trade happening through web which can be business to business, business to customer or customer to customer. Yet again, there appears, apparently, to be no clearness about whether a thing should be seen as an organization or a thing under the possibility of E-business. New techniques can be made to track such trades anyway until such advancements become quickly open, time of evaluation pay from this zone would continue being faulty and much underneath the craving. Again E-business has been ensured against duty evaluation under custom commitment prohibition on electronic transmissions by the WTO Bali Ministerial Conference held in 2014 .

Correspondence is viewed as need and one can't regulate without correspondence. In recent developments, correspondence has foreseen the segment of media transmission.

The proposed GST system seems, by all accounts, to be negative for media transmission area too

"One of the huge drawbacks of the GST routine could be the prompt spike in the organization cost rate from 14% to 20-22%" (GST: Impact on the Telecommunications Sector in India). The proposed GST appears, apparently, to be calm on whether media transmission can be considered under the arrangement of items or organizations. The entire issue of media transmission portion acknowledge a real degree when India's nation teledensity isn't even half.

The proposed GST system expects to keep oil based goods, power, land and alcohol for human utilization out of the domain of GST

Oil things have been an important supporter of swelling in India. Extension in India depends upon how the organization intends to fuse oil based items under GST in future.

Power is central for the improvement and headway of India. In the occasion that power is joined under standard or lavishness stock in future, by then it would seriously impact the improvement of India. It is said that GST would influence antagonistically on the land promote. It would demonstrate 8% to the cost of new homes and diminish demand by about 12%.

The proposed GST system "would be fit for being demanded at a bargain of papers and promotions in that"

This would give the councils the passage to significant enduring wages since this industry has irrefutably been expense absolved totally". It sounds senseless yet the course of action of GST is most likely going to make the supervision of undertakings by its Board/positioning chiefs over the association's working environments in different bits of the country an assessable organization by empowering each state to raise a GST demand on the association.

Again there has every one of the reserves of being nonattendance of understanding over fixing the pay

rate similarly as edge limit. One thing is no ifs, ands or buts, benefits in India will be steeply costly if GST is fixed over the present organization obligation pace of 14% which in this way will ending up swelling in India. "Asian countries which realized GST all had seen retail extension in the season of execution.

Conclusion

The organization of India should consider the GST routine set up by various countries and besides their aftermaths before executing it. Meanwhile, the lawmaking body should make an undertaking to ensure the enormous poor masses of India against the achievable swelling in view of use of GST. Apparently, GST will improve existing underhanded obligation structure and will oust inefficient perspectives made by the present stream heterogeneous assessment accumulation system only if there is a sensible understanding over issues of edge limit, pay rate, and thought of oil based merchandise, power, liquor and land. Until the agreement is accomplished, the organization ought to restrict from completing such daily practice.

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Effect of Mycorrhizal Inoculation and Watering Regimes on the Growth Performance of *Garcinia kola* (Heckel) Seedlings

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DOI: 10.29322/IJSRP.9.08.2019.p92115

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92115>

Abstract- The experiment was carried out at the Forest Nursery Unit of the Federal University of Agriculture, Abeokuta, to determine the effect of mycorrhizal inoculation and watering regime on the growth performance of *Garcinia kola* seedlings (Heckel). *Garcinia kola* seedlings were inoculated with no mycorrhizal (M₀), ectomycorrhizal (M1) and endomycorrhizal (M2) and watered every day (W₀), every other day (W1) and once a week (W2) for a period of 12 weeks. The Experiment was laid out in a 2 × 3 factorial in Completely Randomized Design (CRD) with five (6) replications in each treatment. Data obtained were subjected to both descriptive and factorial analysis using ANOVA, while significant means were separated using Fisher's Least Significant Difference. The result indicated that leaf number (4.56) and absolute growth rate (-1.99gwk⁻¹) were significantly influenced (p<0.05) in seedlings inoculated with ectomycorrhizal. Seedlings that were watered daily (W₀) recorded the highest growth in leaf number (4.41) and plant height (12.22) with no significant difference. Seedlings watered once daily with inoculation with endomycorrhizal had the maximum growth. The study concludes that irrespective of watering regime *Garcinia kola* seedlings will perform better with or without mycorrhizal. As a water-loving plant, *Garcinia kola* seedlings will perform better when watered once daily to pot capacity in terms of leaf number and plant height. It can be concluded that this plant species may be selective in its mycorrhizal association.

Index Terms- Watering regime, mycorrhizal inoculation, *Garcinia kola*, seedlings, growth rate.

I. INTRODUCTION

A mycorrhizal is a symbiotic association between a green plant and a fungus. The plant captures the energy coming from the sun by means of utilizing its chlorophyll and supplies it to the fungus which supplies water and mineral nutrients taken from the soil to the plant. Mycorrhizal plants are often more tolerant to diseases, such as those caused by microbial soil-borne pathogens. These associations have been found to assist in plant defense both above and below ground. Mycorrhizae are known to excrete enzymes that are toxic to soil borne organisms such as nematodes (Azcon-aguilar, 2018) and defense responses are stronger in plants with mycorrhizal associations (Jung *et al.*, 2012). Additionally, Babikova *et al.*, (2003) also reported that the mycorrhizal fungus

assists by preventing the plant's carbon relocation which negatively affects the fungi's growth and occurs when the plant is attacked by herbivores. The absence of mycorrhizal fungi can also slow plant growth in early succession or on degraded landscapes (Jeffries *et al.*, 2003). The introduction of alien mycorrhizal plants to nutrient-deficient ecosystems puts indigenous non-mycorrhizal plants at a competitive disadvantage (David, 2000).

Water is an important factor in the growth, development and productivity of plants. Hartmann, *et al.*, (2005) reported that water stress due to drought is the most significant abiotic factor limiting plant growth and development. Water stress drastically decreased fresh and dry weight, leaf number, total leaf area and stomata conductance (Vandoorne, *et al.*, 2012). Plant species respond differently to water availability, also, different plant parts adapt differently to varying water stress conditions. Seeds of many crop species are sensitive to flooding stress during germination (Sesay, 2009; Wuebker *et al.*, 2001; Sung, 1995).

Garcinia kola is one of the Non-Timber Forest Products that are of high socio-economic importance in Nigeria. It is endemic to the humid lowland rainforest vegetation of the west and central African sub regions. It is found in coastal areas and lowland plains up to 300m above sea level with an average of 2000mm–2500mm rainfall per annum and temperature ranges from 32.15°C to 21.40°C and with minimum relative humidity of 76.34% (Raven *et al.*, 2005).

Garcinia kola is one of the tropical plants found in Africa, America and Asia. These species are commonly used for many purposes (Rai, 2003). The plant grows as a medium size tree, up to 12-14m high and produces reddish yellowish or orange coloured fruit (Okwu 2005; Adesanya *et al.*, 2007). Each fruit contains 2-4 yellow nuts and a sour tasting pulp. Its nuts are commonly called bitter kola (may be because the nuts when chewed have a bitter astringent taste) or false kola (since they often serve as an alternative to true kola nuts, *Cola acuminata*). Bitter kola is also known as African wonder nut. In Nigerian languages, it is commonly called 'Namijigoro' in Hausa, 'Agbilu' in Igbo, and 'Orogbo' in Yoruba. *G. kola* has economic and cultural values across West and Central African countries where the nuts are commonly chewed and used for traditional ceremonies (Eleyinmi, 2006).

In Nigeria, low populations of *G. kola* are found in home gardens and few stands are found in the wild due to rapid deforestation and heavy exploitation in the natural forests. These factors seriously depleted the populations of the species. But

demand for *G. kola* is currently very high in Nigeria and though few seeds are available in the markets, production of the species is limited due to problem of seed dormancy. The seeds need to be treated to enhance germination. During a priority setting exercise, *G. kola* was one of the useful indigenous trees prioritized by farmers in West and Central Africa. For many farmers who practice agroforestry, medicinal and fruit trees turn out to have higher priority. The challenges to development institutions are to help overcome these problems and to respond to priorities of rural communities, especially in the area of conserving highly endangered and valued species. In spite of great demand for *G. kola* seeds, its cultivation is not popular owing to the difficulty in germination (Adebisi, 2004), although *G. kola* is one of the most useful indigenous tree species prioritized by farmers in Central and West Africa (Anegbeh, 2006). The study focused on the effect of different types of mycorrhiza and watering regime on the growth performance of *G. kola* (Heckel) seedlings to determine the best treatment levels as well as the most appropriate moistures needed or suitable for the growth of *G. kola* (Heckel) seedlings.

II. MATERIALS AND METHOD

Experimental site

The experiment was carried out in the forest nursery of the Department of Forestry and Wildlife Management in Federal University of Agriculture, Abeokuta. This area falls within the latitude 7° 0' N and 7° 58' N and longitude 3° 20' E and 3° 37' E. It has a gentle slope undulating landscape and mild slope. The site is punctuated in parts by ridges, isolated, residual hills, valley, and low lands. The soils are sand and clay with crystalline basement complex. It has an annual rainfall of 1200 mm with a peak in June and July; there is a dry season of three months. The relative humidity of the area is 82.54 % and an average monthly temperature of 35.80 C.

Experimental methods and layout

A 2 x 3 factorial in CRD was the experimental design used with 6 replicates to assess the effect of mycorrhizal inoculation and watering regimes on the growth performance of *Garcinia kola* seedlings. A source of mycorrhizal which was no mycorrhizal (M₀), ectomycorrhizal (M₁) and endomycorrhizal (M₂) constituted factor A while the frequency of watering namely: Watering daily 7/7 (W₀), Watering every other day 2/7 (W₁) and Watering once a week 1/7 (W₂) were the factor B. Total of nine treatments were used for this study and were represented below as M₀W₀, M₀W₁, M₀W₂, M₁W₀, M₁W₁, M₁W₂, M₂W₀, M₂W₁, and M₂W₂. Thereafter, the inoculated replicates were prepared thus: two head pans of top soil were thoroughly mixed with one head pan of ectomycorrhizal soil and two head pans of top soil were thoroughly mixed with 2kg of endomycorrhizal soil, the mixture was used to fill the polythene pots, while those that were not inoculated, top soil was used to fill their polythene pots. Sufficient quantity of water was added to the filled polythene pots and allowed to drain before transplanting. The seedlings of *Garcinia kola* were transplanted at 2-4 leaf stage into the filled drained polythene pots and watered daily to pot capacity for one week to enhance the establishment of the plants. For each replicate of the experiment at one seedling per pot, 18 seedlings were allocated for each sources of soil used while 6 seedlings were

allocated to each watering regime. At the commencement of the 2nd week of transplanting, seedlings under each treatment were subjected to varying watering regime.

Data collection

During the period of growth, measurements of both the morphological and physiological parameters were taken fortnightly for 12 weeks. Morphological parameters include; seedling heights, collar diameter, leaf number, leaf area. The physiological parameters measured at the end of the experiment were; relative water content, chlorophyll content and leaf turgidity.

Fresh weight

After twelve weeks of experimental treatments, the seedlings of each species were harvested from the pot and were separated into leaf, root, and stem. Root and shoot length was measured with a ruler, fresh weight of each component were taken with sensitive weighing balance and then the average were recorded

Dry matter

Dry weights of each component (leave, root and shoot) were obtained after being oven dried for 24 hours at 600 C. Also the net assimilation rate, relative growth rate and absolute growth rate was determined.

Relative turgidity

To determine the relative turgidity, the fresh leaf was soaked in water in a petri-dish overnight and was weighed. Mathematically,

$$\text{Relative turgidity} = \frac{\text{Weight of leaf (soaked in water)} - \text{initial fresh weight}}{\text{initial fresh weight}} \times 100 \dots\dots\dots 1$$

$$\text{Net assimilation rate} = \frac{(W_2 - W_1) (\log_e A_2 - \log_e A_1)}{(T_2 - T_1) (A_2 - A_1)} \dots\dots\dots 2$$

$$\text{Relative growth rate} = \frac{\log_e W_2 - \log_e W_1}{T_2 - T_1} \dots\dots\dots 3$$

$$\text{Absolute growth rate} = \frac{W_2 - W_1}{T_2 - T_1} \dots\dots\dots 4$$

Where: Fwt= Fresh weight, Dwt = Dry weight, Twt = Turgidity weight, T2 = Final time, T1 = Initial time, T2-T1 = Time interval between initial time and final time, A2 = Leaf area at T2, A1 = Leaf area at T1, W2 = Total dry weight at T2, W1 = Total dry weight at T1

Data analysis

Data collected were subjected to statistical Analysis of Variances on the general linear model of SAS Software (SAS institute, inc.1999). Least Significant Difference (LSD) was used to further separate the means that were significantly different.

III. RESULTS

Effect of mycorrhizal inoculation on morphological and physiological parameters

Mycorrhizal inoculation had no significant effect ($p > 0.05$) on the variables measured. However, seedling height, relative turgidity and net assimilation rate had their highest mean value as (12.51cm), (8.47g) and (0.12gwk⁻¹) respectively in the absence of the inoculation with mycorrhizal (M₀) while the leaf number, leaf area and absolute growth rate had highest mean value of (4.56), (6.83 cm²) and (-1.99gwk⁻¹) respectively with ectomycorrhizal inoculation (M₁) while leaf number (4.56) and absolute growth rate(-1.99gwk⁻¹) were significantly different ($p < 0.05$). Also, collar diameter (3.73mm) and relative growth rate (-0.07gwk⁻¹wk⁻¹) were increased in soil amended with ectomycorrhizal (Table 1).

Effect of watering regime on morphological and physiological parameters

The results showed that was no significant effect of watering regime on the morphological parameters and physiological parameters of *Garcinia kola* seedlings ($p > 0.05$). The study showed that seedlings watered daily had the highest growth in leaf number and plant height as value of 4.41 and 12.22cm respectively. However, collar diameter (3.83mm) and net assimilation rate (0.13gwk⁻¹) had the highest effect at two days interval. Also, leaf area (6.77cm²), relative turgidity (7.82g), relative growth rate (-0.10gwk⁻¹wk⁻¹) and absolute growth rate (-1.96gwk⁻¹) had greater effect when watered once in a week (Table 2).

Interactive effects of mycorrhizal inoculation and watering regime on morphological and physiological parameters

The interactive effect of mycorrhizal inoculation and the watering regime had no significant effect ($p < 0.05$). Seedling height(14.03cm) were not significantly different when watered once a week with no mycorrhizal inoculation(M₀W₂), leaf number (5.22) were not significantly different when watered once daily with ectomycorrhizal inoculation(M₁W₀), leaf area (6.92cm²) were not significantly different when watered once in a week with ectomycorrhizal inoculation(M₁W₂) and collar diameter (3.95mm) were not significantly different when watered once in a week with endomycorrhizal inoculation(M₂W₂), while the net assimilation rate (0.21gwk⁻¹), relative growth rate (0.10gwk⁻¹wk⁻¹) and absolute growth rate (0.97gwk⁻¹) were not significantly different with no mycorrhizal inoculation and watering every other day (M₀W₁). The relative turgidity (9.46g) was not significant with no mycorrhizal inoculation and watering once in a week (M₀W₂), (Table 3).

IV. DISCUSSION

Seedlings inoculated with no mycorrhizal (M₀) recorded greater plant height, relative turgidity, net assimilation rate; Seedlings inoculated with ectomycorrhizal (M₁) recorded greater leaf number, leaf area, absolute growth rate and seedlings inoculated with endo mycorrhizal (M₂) recorded greater collar diameter and relative growth rate. However, the result showed non significant ($P > 0.05$) difference between on plants inoculated with

either of the mycorrhizal type (M₁, and M₂) in terms of plants height, collar diameter, relative turgidity, net assimilation rate, relative growth rate and absolute growth rate. These findings support the observations made by Allen and Boosalis, (1993) on *A. auriculiformis*, *A. lebeck* and *Leucocephala*. Jasper, *et al.*, (1989) also found that root infection with mycorrhizae increases plant productivity and drought tolerance by improving phosphorus uptake. Similarly, Levy *et al.*, (1983) and Read and Boyd, (1986) reported that mycorrhizal inoculation increased soil water extraction and root hydraulic conductivity. According to Smith and Read, (2008), ectomycorrhizal is beneficial for tree seedlings both in the moist and dry environment, the study revealed that the leaf number was significantly different in seedlings that were inoculated with ectomycorrhizal. The result revealed that there was no significant difference in ectomycorrhizal inoculated seedlings, endomycorrhizal inoculated seedlings and no mycorrhizal inoculated seedlings and this can be supported by Smith and Read (2008) that plants are selective in their mycorrhizal association and it may be that *Garcinia kola* is selective in its association with ectomycorrhizal and endomycorrhizal.

Subsequently, it was noted that Bitter kola also responded to several watering regimes. Among the three watering regimes studied, the general growth response and reaction to water stress suggested that the seedlings that were watered daily (W₀) recorded the highest growth in leaf number and plant height, seedlings watered every other day (W₁) has the highest values in collar diameter and net assimilation rate and seedlings watered once in a week (W₂) has highest value in leaf area, relative turgidity, relative growth rate and absolute growth rate. Plant species respond variably to water availability and different plant parts adapt differently to variable water stress conditions (Gbadamosi, 2014). The amount of chlorophyll present in the plant was observed to be enhanced in seedlings watered every other day. Oyun *et al.* (2010), opined that cell division, its elongation as well as chlorophyll formation depends on plant water availability. In the presence of chlorophyll which is a vital unit for photosynthesis, there is an increase in the production of carbohydrate and water being an essential element in its formation as well as transportation in plants (Oyun *et al.*, 2010). Cernac *et al.*, (2006) also reported that adequate water supply is essential for effective growth and development of African breadfruit seedlings.

The interactive effect of mycorrhizae and watering regime showed no significant effect on major morphological parameters and physiological parameters of *Garcinia kola* seedlings. Seedling height were not significantly different when watered once a week with no mycorrhizal inoculation, leaf number were not significantly different when watered once daily with ectomycorrhizal inoculation, leaf area were not significantly different when watered once in a week with ectomycorrhizal inoculation and collar diameter were not significantly different when watered once in a week with endomycorrhizal inoculation, while the net assimilation rate, relative growth rate and absolute growth rate were not significantly different with no mycorrhizal inoculation and watering every other day. The relative turgidity was not significant with no mycorrhizal inoculation and watering once in a week.

V. CONCLUSION

The study concludes that irrespective of watering regime *Garcinia kola* seedlings will perform better with or without mycorrhizal. As a water-loving plant, *Garcinia kola* seedlings will perform better when watered once daily to pot capacity in terms of leaf number and plant height. It can be concluded that this plant species may be selective in its mycorrhizal association.

It is therefore recommended that *Garcinia kola* seedlings should be raised with no mycorrhizal and watering once daily because *G. kola* seedling is water loving species. For effective growth further studies should be conducted on the different soil media on the growth performance of *Garcinia kola*.

ACKNOWLEDGMENT

I acknowledge the amiable and fascinating academic mentorship of my supervisor Prof. M.A Aduradola, His teachings and exposition about research and paper writing exposed me to the fundamental basis of academics as a discipline. I also appreciate the contributions of some of my colleagues who made a significant input to the study, Mr Atanda, Mr Lawal, Mr Osoba and other great individuals who contributed to the success of this research. I would like to also salute the contributions of the entire staff of Forest Nursery unit of Department of Forestry and Wildlife Management, Federal University of Agriculture Abeokuta.

Table 1: The effect of mycorrhiza inoculation on the morphological and physiological parameters of *Garcinia kola* seedlings.

Treatment	Plant Height (cm)	Collar Diameter (cm)	Leaf Number	Leaf area (cm ²)	Relative Turgidity (g)	Net Assimilation Rate (%)	Relative Growth Rate (%)	Absolute Growth Rate (%)
M₀	12.51 ^a	3.53 ^a	3.98 ^{ab}	6.51 ^a	8.47 ^a	0.1184a	-0.0174a	-0.2033a
M₁	12.05 ^a	3.61 ^a	4.56 ^a	6.83 ^a	6.14 ^a	0.0998a	-0.0166b	-1.9966b
M₂	11.79 ^a	3.73 ^a	3.36 ^b	6.44 ^a	7.33 ^a	0.0907a	-0.0687ab	-1.3177a

Mean values with the same superscript in each column are not significantly different ($P>0.05$). **LSD**
M₀ – no mycorrhiza, M₁ – ecto mycorrhiza, M₂–endo mycorrhiza.

Table 2: The effect of watering regime on the morphological and physiological parameters of *Garcinia kola* seedlings.

Treatment	Plant Height (cm)	Collar Diameter	Leaf Number (cm)	Leaf area (cm ²)	Relative Turgidity (g)	Net Assimilation Rate (%)	Relative Growth Rate (%)	Absolute Growth Rate (%)
W₀	12.22 ^a	3.43 ^b	4.41 ^a	6.21 ^a	6.52 ^a	0.0994a	-0.0952a	-0.8355a
W₁	11.97 ^a	3.83 ^a	3.90 ^a	6.65 ^a	6.49 ^a	0.1301a	-0.0589a	-0.7177a
W₂	12.15 ^a	3.61 ^a	3.58 ^a	6.69 ^a	6.77 ^a	0.0795a	-0.0981a	-1.9644a

Mean values with the same superscript in each column are not significantly different ($P>0.05$). **LSD**

W₀ – watering once daily, W₁ – watering once every two days, W₂–watering once in a week.

Table 3: The effect of mycorrhiza inoculation and watering regime on the morphological and physiological parameters of *Garcinia kola* seedlings.

Treatment	Plant Height (cm)	Collar Diameter (cm)	Leaf Number	Leaf area (cm ²)	Relative Turgidity (g)	Net Assimilation Rate (%)	Relative Growth Rate (%)	Absolute Growth Rate (%)
M₀W₀	11.48 ^b	3.39 ^a	4.49 ^{ab}	6.21 ^a	7.99 ^b	0.0939 ^{ab}	-0.0380 ^b	-0.2833 ^{ab}
M₀W₁	12.03 ^{ab}	3.93 ^a	3.69 ^b	6.99 ^a	7.96 ^b	0.2140 ^a	0.0960 ^a	0.9666 ^a
M₀W₂	14.03 ^a	3.27 ^a	3.27 ^c	6.63 ^a	9.46 ^a	0.0474 ^{ab}	-0.1100 ^{ab}	-1.2933 ^a
M₁W₀	13.36 ^{ab}	3.44 ^a	5.22 ^a	6.65 ^a	6.42 ^c	0.1106 ^a	-0.1183 ^{ab}	-1.1300 ^{ab}
M₁W₁	11.43 ^b	3.78 ^a	4.63 ^{ab}	6.90 ^a	6.25 ^c	0.0870 ^{ab}	-0.1881 ^{ab}	-2.4433 ^{ab}
M₁W₂	11.35 ^b	3.62 ^a	3.83 ^b	6.92 ^a	5.74 ^c	0.1019 ^a	-0.1918 ^{ab}	-2.4166 ^{ab}
M₂W₀	11.83 ^b	3.47 ^a	3.05 ^c	6.69 ^a	5.61 ^c	0.0936 ^{ab}	-0.1294 ^{ab}	-1.0933 ^{ab}
M₂W₁	12.45 ^{ab}	3.77 ^a	3.38 ^c	5.88 ^{ab}	8.11 ^{ab}	0.0894 ^{ab}	-0.0841 ^{ab}	-0.6766 ^{ab}
M₂W₂	11.08 ^b	3.95 ^a	3.63 ^c	6.75 ^a	8.25 ^{ab}	0.0892 ^{ab}	0.0075 ^a	-2.1833 ^{ab}

Mean values with the same superscript in each column are not significantly different ($P>0.05$).

LSD

M_0 – No mycorrhizal, M_1 – Ectomycorrhizal, M_2 –Endomycorrhizal, W_0 – Watering daily, W_1 – Watering every other day, W_2 – Watering once in a week

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Technology Acceptance Models and Adoption of Innovations: A Literature Review

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DOI: 10.29322/IJSRP.9.08.2019.p92116

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92116>

Abstract: *This paper reviews the main models and theories that used in previous studies to study the adoption of innovations in different areas such as online banking, mobile banking, E-learning and E-health care systems. Despite of the increasing development of technology and its incorporation into users' privacy and professional life, a decision regarding to adopt or reject it remains an open question. Thus, a well thought-of amount of research work dealing with the technology acceptance models was conducted among various disciplines.*

Such research work originated in the psychological theories such as theory of reasoned action and theory of planned behaviour. The models Technology acceptance have evolved to become a mix of psychology, sociology and Information Technology. These models assist in understanding predictors of human behavior toward potential adoption or rejection of the innovation / technology.

The overall aim of this paper is to provide an up-to-date, well-researched resource of past and current references to related literature of technology acceptance models and to identify possible directions for future research in this regard. The paper presents a comprehensive literature review of the technology acceptance models and its applications across different areas and to highlight the main factors that influence the adoption of new technologies. The previous studies have been selected and classified according to which model they used to study the adoption / acceptance of specific technology.

In order to identify relevant studies which addressed the main dominant technology acceptance models, a structured approach followed by searching on particular keyword(s) in the leading journal databases, then selection of publications with a matching criteria and quick scan of the selected studies by reading their titles, abstracts, and full text to select those relevant to technology acceptance models research; and finally detailed process of reading and analyzing a full text of the selected research publications.

Keywords: TRA, TPB, UTAUT, TAM, Mobile Banking.

Introduction

The success of a new system or innovation depends on the extent of acceptance of such new technology among its users (Al-Tarawneh, 2016, Al-Tarawneh et al., 2017). Therefore, there is a need to understand the initial decision that is made by individuals to accept or reject new technologies (Venkatesh et al., 2003). This need of deep understanding about user's acceptance has led to the development of several theories and models that are used to explain and forecast the adoption of new products, systems, innovations, technologies, etc., which help to explain why individuals adopt or reject them. After reviewing the literature related to this field of study, the researcher found there are many models and theories used to examine and explain people's behaviour relating to technology adoption (Benbasat & Barki, 2007; Venkatesh et al., 2012). Moreover, there are some theories in

the field of human behaviour, such as the theory of reasoned action (TRA) (Ajzen & Fishbein, 1975) and the theory of planned behaviour (TPB) (Ajzen, 1985) that, while not directly related to technology adoption, have been adapted by researchers to fit the technology adoption sphere (e.g. Shih & Fang, 2006).

Each model has developed over time and each addition is a result of each era of which they are representative. As mentioned before, the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975), in which psychology was a factor, was essentially developed to predict human behaviour. It was further evolved into the Theory of Planned Behaviour (TPB), (Ajzen, 1985), and later extended to the Decomposed Theory of Planned Behaviour, (DTPB) (Taylor & Todd, 1995). Another example, this time with information systems being a contributory factor, is the Technology Acceptance Model, (TAM) (Davis, 1986), which developed from the Theory of Reasoned Action. TAM further developed into TAM2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology, (UTAUT) (Venkatesh et al., 2003). In addition to these, other combinations of theories and models include Rogers' Diffusion of Innovations, (DOI) (1983), Bandura's Social Cognitive Theory, (SCT) (1989), Deci and Ryan's Motivational Model, (MM) (1985), and Triadis's Model of PC Utilization. Therefore, models that are applied to the acceptance of technology are not necessarily concerned with technology specifically and must also be considered chronologically, as this enables the tracking of how each model evolved and how they are interconnected. The next section will explain the main theories that have been researched by this paper to determine the relevant factors that affect the adoption of innovation.

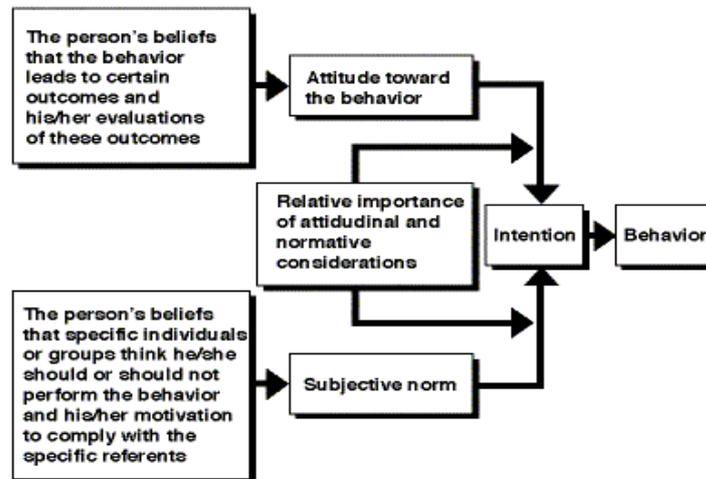
1.1 Theory of Reasoned Action (TRA)

This theory was developed in the social science field of social psychology and is the earliest model used to explain technology acceptance. Fishbein and Ajzen's (1975) work focussed on the prediction behaviour undertaken in both laboratory and applied settings and their work was a result of a research programme that began in the latter years of the 1950s. The approach they used was a juxtaposition of diverse theories and research regarding attitudes, including learning and expectancy-value theories, balance theory, theory of cognitive dissonance and theories of attribution (Sheppard et al., 1988). Their aim was to develop a theory that could predict, explain, and influence human behaviour (Ajzen & Fishbein, 1980).

This theory since has been redeveloped and refined as well as put to the test within different disciplines and domains such as consumer behaviour, the industrial sector, education and technology adoption. TRA has been used as base-theory for many models and theories in the fields of human behaviour and technology acceptance such as TPB, TAM, and UTAUT (Davis et al., 1989; Ajzen, 1991; Venkatesh et al., 2003). TRA assumes that all individuals are systematic in their use of information that is available to them and that they are all rational in how they use this information when taking action: in other words, they consider the implications before engaging in a particular behaviour (Ajzen & Fishbein, 1980).

This theory focuses on behavioural intention rather than attitude and considers it as the main predictor of behaviour. An individual's behaviour is determined by behavioural intentions, according to TRA, and is the most important factor. Behaviour, and the intention to perform or act on behaviour, is a mixture of attitude towards performance of the behaviour and subjective norms. The theory is presented as a model in Figure (1).

Figure 1: Factors determining a person's behaviour



Source: Ajzen & Fishbein (1980, p.8)

To explain the main factors of TRA (behavioural intention, attitudes toward behaviour and subjective norms), theoretically Fishbein and Ajzen, (1980) defined behavioural intention as an indicator of a person's readiness to perform certain behaviour. Intention is considered to be the immediate antecedent of behaviour. According to the TRA, there are two determinants to behavioural intentions: personal or attitudinal factors and social or normative factors. Attitudes toward behaviour refers to the degree to which performance of behaviour is positively or negatively valued (Fishbein & Ajzen 1975). If an individual's beliefs and their attitude toward an object are known, then their behaviour and attitude can be predicted with accuracy and this has been demonstrated by Ajzen and Fishbein (1980).

In the same way that Subjective Norms refers to the way in which the social environment influences behaviour, so an individual perceives that the people who are important to them will decide if they should or should not act out the behaviour in question. General subjective norms are a result of expectations held by groups and individuals and of an individual's motivation to observe these expectations, according to TRA.

Across the studies and applications of TRA within the context of electronic banking solutions, some researchers have applied TRA to predict customers' adoption of such e-solutions in the banking sector (Al-Majali, 2011; Yousafzai et al., 2010; Shih & Fang, 2006). For example, Shih and Fang' study in 2006 showed results that the TRA explained 46% variance in behavioural intention while only 20% of variance in usage behaviour. However, Wan et al. (2005) claimed that adoption of online banking solutions cannot be clearly explained by TRA. Likewise, Yousafzai et al. (2010) claimed that TRA provided less accurate predictions of users' intention and adoption of online banking comparing with TAM and TPB models; it explained only 37% of variance in intention towards adoption of Internet banking.

There are several criticisms of TRA from different perspectives. For example, Ajzen (1985) realised that TRA was restricted by correspondence, because action, target, context, timeframe and specificity must be in agreement with attitude and intention in order to predict behaviour (Sheppard et al., 1988). The assumption that behaviour is under conscious control is a limitation of the theory, therefore the theory cannot account for any behaviour that is not conscious, such as irrational decisions and habitual actions (Sheppard et al., 1988). Moreover, there are some doubts about the applicability of TRA to explain users' behaviour in the context of technology acceptance (Hale et al., 2002; Davis et al., 1989; Sheppard et al., 1988).

1.2 Theory of Planned Behaviour (TPB)

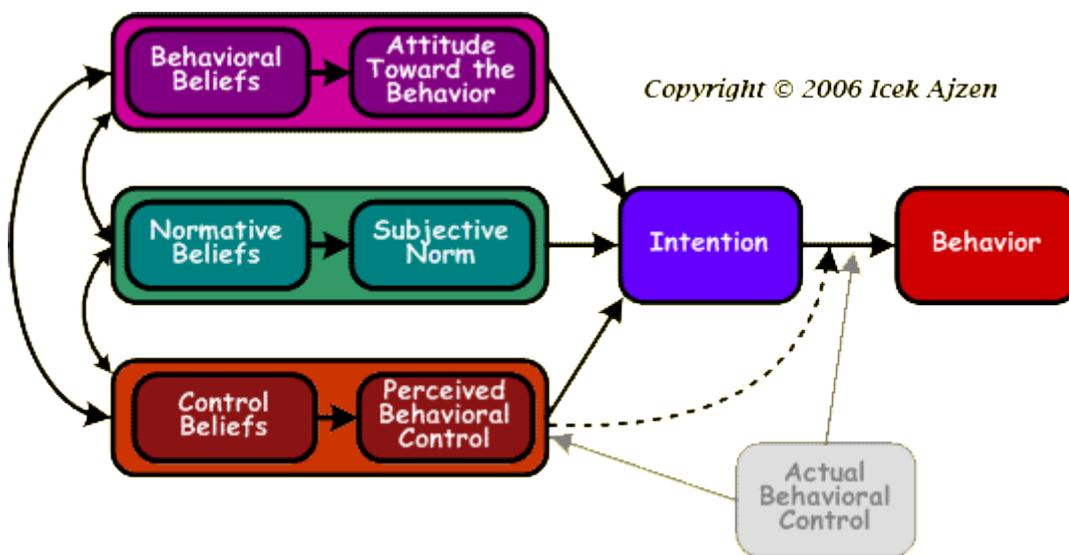
Ajzen (1985) put forward the Theory of Planned Behaviour due to the shortcomings of TRA. Ajzen (1985) extended TRA by adding the construct of perceived behavioural control (PBC) as a key factor affects both of behavioural intention and actual behaviour. TPB considers unconscious behaviour that is out of an individual's control and differs from TRA due to the addition of PBC. PBC accounts for behaviour where individuals have less control over their actions in certain situations and includes variables according to the situation and the actions involved (Ajzen, 1991).

PBC is viewed in general as the perception of simplicity or difficulty to perform a particular behaviour by the individual, which interrelates with belief, intention, behaviour and attitude within the TPB and accordingly influences intention and behaviour (see Figure 2). Its effect can be either direct or interactive. When an individual has control over their behaviour then objectives are all that are needed to predict behaviour, as the TRA states. Ajzen (1991) also debates that in situations where there was a small variance in behaviour that PBC should be independently predictive. Intentions and PBC have equal relevance when foretelling behaviour, but in certain conditions one may have a greater importance over the other.

In order for an accurate prediction, certain conditions must be apparent. Firstly, compatibility must be met between the measures of intention, PBC, and the behaviour to be foretold. Secondly, PBC must be stable in addition to intentions remaining stable between assessment and the observation of behaviour. Changes in behaviour control and intentions can alter if events intervene. The third condition necessary to gain an accurate prediction is accuracy of behavioural control. PBC and the resultant prediction of behaviour from it should improve to the extent that perception of behavioural control realistically reflects actual control (Ajzen, 1991).

TPB examines the originators of attitude, subjective norms and PBC to predict and explain behaviour. It assumes behaviour is a function of beliefs and therefore those beliefs are relevant to that behaviour and are predominant causes of a person's intentions and actions, Figure (2) illustrates these main beliefs:

Figure 2: Theory of Planned Behaviour



Source: Aizen (2006)

Aizen (2006) summarises these originators as behavioural beliefs; in other words, they are assumed to influence an individual's attitude towards behaviour, and the idea that the behaviour will determine a set outcome becomes a subjective probability. In terms of research, only a small number of behavioural beliefs are accessible at a time, regardless of the fact that an individual may hold many beliefs regarding a particular behaviour.

Normative beliefs are perceived behavioural expectations of important individuals or groups. When combined with motivation to comply with different referents it is assumed that this determines the subjective norm. Therefore, the incentive to conform to each referent contributes to the

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92116> www.ijsrp.org

subjective norm in direct proportion to the person's subjective probability as to whether they should or should not perform the behaviour in question. Control beliefs are the perceived presence of factors that may facilitate or impede performance of behaviour; each control factor enjoys a certain power. It is this recognised power that contributes to PBC and the amount contributed is determined by the factors that are present in a situation requiring certain behaviour.

Ajzen (2002) also recognises at the general level differences of self-efficacy and PBC and previous ambiguous mistakes of PBC in terms of being able to effectively interchange with self-efficacy. He also acknowledged the difference between self-efficacy and PBC at the general level and recognised the misleading effect of the previous use of PBC interchangeably with self-efficacy. Furthermore, he mentioned that perceived control over performance of behaviour should be the term used for perceived behavioural control, to avoid further misinterpretation. However, he did argue that Bandura's (1977) theory regarding self-efficacy belief is restricted to internal factors and he claimed that PBC in TPB refers to expectations an individual has of the ability to perform a behaviour as well as whether they have the required resources, both internal and external.

TPB has been adapted and extended by numerous studies to predict the individuals' behavioural intention and actual usage across different technological contexts including banking solutions (Al-Lozi and Papazafeiropoulou, 2012; Lee, 2009; Chen et al., 2009; Choudrie and Dwivedi, 2006). for example, Lee (2009) adapted a theory of planned behaviour to fit with a technology acceptance model (TAM) to explain the adoption of Internet banking, while Chen et al. (2009) proposed TPB alongside with the technology readiness and TAM in a unified combined model to predict the users' satisfaction and continual intention toward using self-service technology. TPB combined with the diffusion of innovation (DOI) model by Liao et al. (1999) in order to examine the users' intention to adopt different channels of online banking in Hong Kong, and they reported that TPB can predict the intention to adopt such technologies with high variance in explaining the behavioural intention.

Yousafzai et al. (2010), compared the prediction power of TPB to TAM, which revealed that TAM was able to predict the behavioural intention by 75% of variance, while TPB explained only 39% of variance to predict the behavioural intention to use Internet banking. Likewise, Shih and Fang (2004) argued that even supposing TPB was capable to sufficiently fit the observed data, the path coefficient analyses showed that the attitude had significant impact over the behavioural intention whereas individuals' behavioural intention was not significantly related with both PBC and subjective norm.

It must be noted that models such as TRA and TPB are not without criticism. Both TRA and TPB are criticised by Taylor and Todd (1995a). They state that both required certain behaviours to be displayed when individuals are motivated to perform them. However, this can be a problem when examining consumer adoption behaviour, in addition to the supposition that respondents share an identical belief structure when performing behaviour.

Armitage and Conner (2001) mentioned that despite of the advanced improvements of TPB to modify TRA by including PBC, such limitations have been raised due to the fact that the TBP excepted some important scopes such as personal, motivational and psychological scopes and related factors. As an examples of such related factors; moral obligation, self-identity, and habit are not comprehended by TPB, which could have crucial role in predicting the behavioural intention and actual behaviour (Bamberg et al., 2003; Armitage & Conner, 2001; Sparks et al., 1995; and Sparks and Shepphard, 1992).

Other examples of important factors they have not been encompassed in TPB (perceived risk, performance expectancy, perceived usefulness, perceived ease of use, intrinsic motivation, technology readiness,) which, sequentially, raised some concerns about the capability of TPB to provide clear understanding regarding the individual's behavioural intention and actual behaviour toward new innovations and technologies (Chen et al., 2009; Davis et al., 1992; Liao et al., 1999; Taylor and Todd, 1995a; Yousafzai et al., 2010; Venkatesh et al., 2012).

Furthermore, a meta-analysis consisted of 185 researchers revealed that TPB usually explains 39% and 27% of variance to predict individuals' intention and actual behaviour respectively which considered as a small percentage of variance (Armitage & Conner, 2001).

1.3 The Decomposed Theory of Planned Behaviour (DTPB)

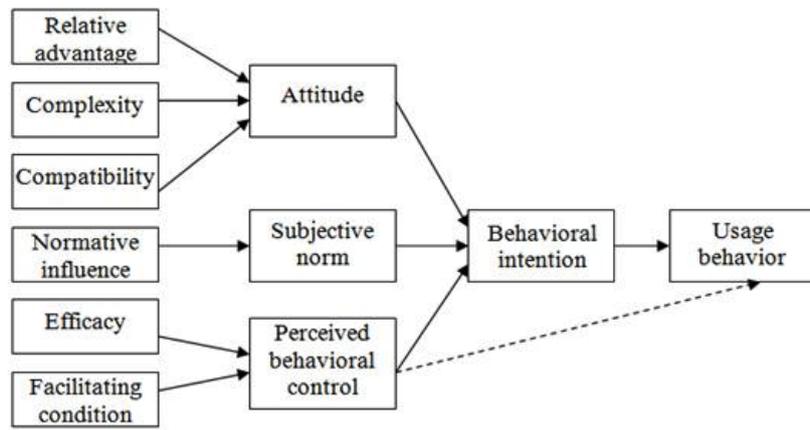
Taylor and Todd (1995a) anatomised the structure the TPB and specifically the part beliefs factors (behavioural beliefs, Normative beliefs and Control beliefs) to improve the explanation power of the TPB to predict customer's behavioural intention and actual behaviour towards a new system. Therefore, Taylor and Todd (1995a) introduced a decomposed model of TPB which is called DTPB as depicted in (Figure 3). Precisely, Taylor and Todd (1995a) itemised the behavioural beliefs into (relative advantage, complexity, and compatibility) and they hypothesised this new attitudinal belief dimension based on the innovation diffusion literature (Rogers, 1983).

With respect to normative beliefs, Taylor and Todd (1995a) suggested the normative influences to be the main factor to determine the normative belief over the subjective norms. Regarding to control beliefs, Taylor and Todd (1995a) classified this factor into: internal factors which is (self-efficacy) (Triandis, 1980) and external factors which is (facilitating conditions) (Bandura, 1982). Taylor and Todd's intention in this study was to take TRA, TPB and DTPB and examine their abilities to predict consumer behaviour and assess how appropriate each model was. They found that TRA and TPB were both capable, providing each model was used in its totality.

They were able to prove this using the structural equation model. However, they also found that whilst these two models were able to predict consumer behaviour, the decomposed model had advantages and was able to predict behaviour and explain the behaviour in a better way. As a result, DTPB was advocated as a better model if changes were required to marketing strategies or system designs by managers who wanted to change certain behaviours. Regarding to results of Taylor and Todd (1995a), DTPB shows better prediction power to user's adoption behaviour than TRA and TPB. Later TPB decomposed again by or disintegrated by Taylor and Todd (1995b) to create new model after combination of TPB and TAM.

It was coalesced due to the predictable nature of TPB and the constructs of TAM, which are perceived usefulness and ease of use. The model was developed by Taylor and Todd (1995a) and their intention was to break down or 'decompose' the concepts of TPB to include concepts from Diffusions of Innovation (DOI). Attitude, according to them, becomes decomposed to merge and include perceived usefulness, perceived ease of use and compatibility. They suggest that through decomposing TPB other components could be expanded. For example, included in the normative belief structure are the influences of peers and superiors, the control belief structure holds self-efficiency and the facilitating conditions of resources and technology as a core theme. The decomposition of TPB is shown in Figure 3.4.

Figure 3.3: Theory of Planned Behaviour with beliefs decomposed.

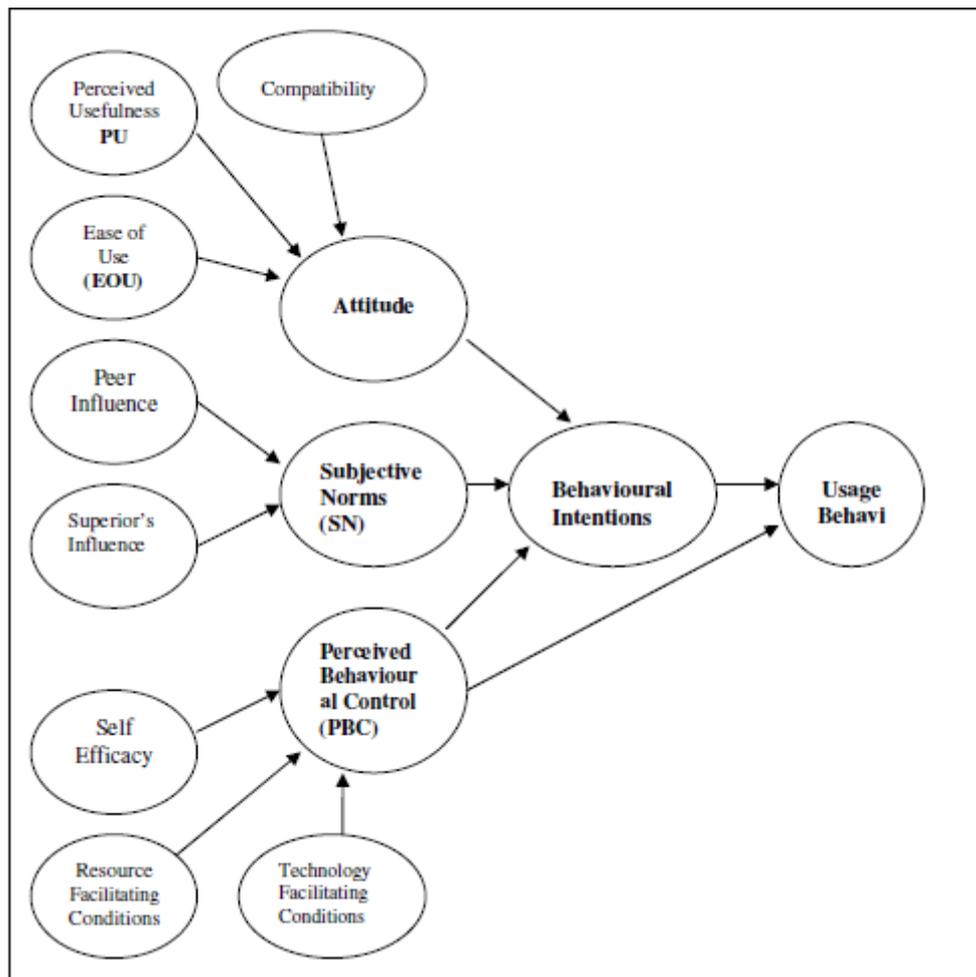


Source: Taylor and Todd (1995a)

Taylor and Todd (1995b) compiled a field study over twelve weeks with business school students. It was a comparative study concerned with the contribution of the models TAM, TPB and DTPB in relation to understanding IT usage (see Figure 6 for the decomposed version of TPB that Taylor & Todd used). In order to measure the attitude concepts of TPB they combined the DOI and TAM variables. They found with all models that measurements of constructs were similar; therefore, analysis reporting was compiled in identical formats for each model.

All three models were compatible for a comparative study as their ability to clarify IT usage was suitable with regards to statistical measurements that fitted the bill for assessing the data. However, DTPB had an advantage in terms of its ability to predict in comparison to TPB and TAM. Moreover, TPB had a better explanatory power than TAM in its original and decomposed forms when behavioural intention was measured. There were several factors that initiated Taylor and Todd (1995b) to come to this conclusion; firstly, the study and conclusion of decomposing SN to peer and supervisor influence was included through a number of theoretical based belief concepts, including PBC and the efficiency and resource features for this. Secondly in previous comparative studies shared constructs had not been measured in the same way across all three models.

Figure 3.4: Theory of Planned Behaviour decomposed.



Source: Taylor and Todd (1995b)

Due to the additions of DTPB the model is far more multifaceted and intricate than TPB, for instance. However, through the decomposition of the belief structure the BI model's power as an explanatory model increased. In the comparative study of DTPB and TAM both behaviour intention and the behaviour surrounding IT usage were able to be identified and explained due to the specific concepts within both models. Diagnostic value for managers was found by Taylor and Todd (1995b) to be better explained with the decomposed TPB model due to its belief structures being unidimensional. However, Taylor and Todd (1995b) criticised the DTPB as it is more complicated than TAM, which is comprised of eleven constructs comparing to Davis' (1989) model that consists of five constructs.

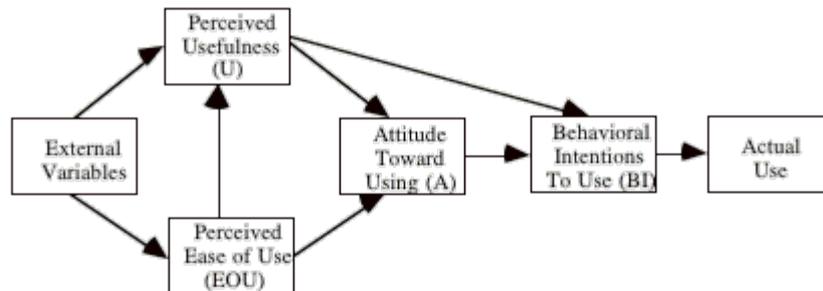
There are some of previous studies have used DTPB to explain the customers' behavioural intention and usage of such self-service technologies. For example, Shih and Fang (2004) reported in their study about the adoption of Internet banking that DTPB explained a 66% of variance in behavioural intention towards using such technology which is higher than the variance that given by both of TRA and TPB.

1.4 Technology Acceptance Model (TAM)

Davis et al. (1989) developed the Technology Acceptance Model, which was based on the Theory of Reasoned Action. It was developed in order to discover what influences cause people to accept or reject an information technology (Figure 3.3). Davis suggests the most significant individual beliefs about using an information technology are perceived usefulness and perceived ease of use. Perceived usefulness (PU) is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320).

The definition of perceived usefulness is based on the expectancy-value model underlying the Theory of Reasoned Action. Perceived ease of use (PEOU) is defined as “the degree to which a person believes that using a particular system would be free of effort” (p. 320). Accordingly, these two behavioural beliefs lead to individual behaviour intention (BI) and actual behaviour. He found that PU was the strongest predictor of an individual’s intention to use an information technology.

Figure 4: Technology Acceptance Model (TAM)



Source: Davis et al. (1989)

TAM does not include TRA’s subjective norms (SN) as a determinant of Behavioural Intention (BI). Figure 3.3 demonstrates the original theoretical conceptualisation of TAM, including the attitude construct. However, regarding to empirical evidence, the last version of TAM model exempted the attitude construct because it’s weak mediating effect between PEOU and behavioural intention and the relation between PU and BI seemed more significant (Davis et al., 1989). TAM hypothesises that PU is influenced by PEOU because, the ease of the use of particular technology makes it more useful (Davis et al., 1989). In accordance with TRA, TAM model proposes that the influence of external factors on BI is mediated by PU and PEOU.

Within this model the set of variables such as design characteristics, objective system, computer self-efficacy, user involvement in design, training, and the nature of the implementation process are all external variables (Davis, 1996). However, as TAM evolution progressed with new variables were emerged, for example: compatibility, computer anxiety, system quality, enjoyment, experience and computing support (Lee et al., 2003). These are the most referenced variables that affect PU, PEOU, BI and B.

The relationship between the four main variables and TAM is conjectured as using PU as a dependent variable that affects BI directly and also as an independent as it is anticipated by PEOU. The amount of time, how frequently and actual amounts of usage and diversity of usage are all used to measure actual Use or Behaviour.

TAM considered as one of the most used and acceptable models within the field of technology acceptance (Eriksson et al., 2005; Venkatesh et al., 2003; Davis and Venkatesh, 1996). By 2010, report published by Google scholar showed that 7,714 citations have been referred for the original TAM model (Bradley, 2012). As mentioned before there is a continual evolution on the TAM model over the last decade. Wixom and Todd (2005) has seen the evolution of TAM from its original status, and they explained how TAM has extended through three perspectives. Firstly, the extended model included features from other models; for example, SN and PBC from TPB. The second extension saw the introduction of additional or alternative beliefs.

Most of these derived from the diffusion of innovation theory and included ideas such as compatibility, trialability, or visibility. The third extension examined PEOU and PU and the external variables that affected them, such as demographic characteristics and personality traits.

This model has progressed among three main phases of development: adoption, validation and extension (Han, 2003). TAM being tested through some simple information systems or technologies such as Fax database systems, Word, Excel, Emails, voice mail, also it has been tested among such technologies that related to internet applications, for example: World Wide web (www) services, online services, E-libraries (Han, 2003).

Davis et al. (1989) compared the TRA with the TAM over two time periods: the first immediately after their introduction, and the second 14 days later. The study was with MBA students and word processors. The result was that the objectives of the users were explained by the TAM better than the TRA. The TAM has been validated by many studies, for example, Adams et al. (1992) extended the Davis's (1989) study through the two-factor model PU and PEOU. Two communication systems, email and voice mail, were examined in ten varying organisations. Study one had 118 users and in study two 73 students were monitored using Lotus1-2-3, WordPerfect, and Harvard Graphics systems.

Venkatesh (2000) worked on a recommended control and adjustment based model as another extension in order to investigate the causes of PEOU in relation to a particular system. His model recommended a set of anchors, including: emotion conceptualised as computer anxiety; intrinsic motivation conceptualised as computer playfulness; and control processes (internal and external) conceptualised as computer efficacy; and facilitating conditions. The model was tested over three months in three organisations using three measurements. The anchors influenced early PEOU; however, with increased experience individuals were seen to change their PEOU concerning the system. Sixty per cent of the variance in PEOU was explained to be as a result of the proposed model of causes of PEOU after the study.

This implied that system specific PEOU are mainly individual difference variables and characteristics of situations that get stronger with understanding. Three years later, in 2003, Venkatesh et al. developed a model that combined all eight models used to explain technology acceptance behaviour. They called the new model the Unified Theory of Acceptance and Use of Technology (UTAUT) and this is will be discussed later in this section.

However, PEOU e and PU individually does not have the ability to clearly explain the individual's intention and such actual behaviours to adopt the technology (Lee et al., 2011; Kim and Forsythe, 2009; Eriksson and Nilsson, 2007; Agrawal and Prasad, 1999; Legris et al., 2003; Lu et al., 2009; Schwarz and Chin, 2007). Hence, the TAM has been extended by adding new factors such as perceived risk (Curran and Meuter, 2005), trust (Eriksson et al., 2005) and quality of Internet connection, perceived enjoyment, privacy and security (Pikkarainen et al., 2004). Al-Somali et al. (2009) extended TAM model by including social influences, resistance to change, quality, trust, awareness, and self-efficacy.

Sun and Zhang (2006) looked at fifty-five different articles and determined two deficiencies in TAM studies: firstly, the explanatory power of the model and secondly the inconsistent relationship among constructs. The data they deduced from the articles highlighted susceptibility of TAM's explanatory power from two viewpoints. One was that sixty per cent of the data did not explain the explanatory power of the model (Sun & Zhang, 2003; Venkatesh et al., 2003), and the second concerned the amount of variations used to explain the different methods used.

The studies also failed to represent the workplace; field studies were cross-sectional and were those that took part in the experiment were mainly students (Sun & Zhang, 2003). From the starting point of the introduction of technology to actual usage opinions change, so these limitations within the studies highlighted the need for these types of technology acceptance findings to be a longitudinal process. TAM was shown to be a vigorous model in some studies whilst in others it was highlighted as being weak; as a result, variable patterns emerged from the studies. For instance, there were discrepancies on how opinion and behaviour intentions were affected by PEOU.

The type of users also affected the relationship between PEOU and PU and whilst this relationship was considered in most studies, the differences between users were ascribed as exceptional because the effect of PEOU on PU was less likely with the most experienced users. Limitations such as a single information system, one organisation or a certain demographic group, a singular study, and not amalgamating tasks were all cited in the meta-analysis completed by Lee et al. (2003). After reviewing the Tam's literature, it is obvious that this model tailored to predict the behavioural intention and the actual behaviour from sole dimension, which is the employee perspective, and excluded the other scopes such as customers and users of other technologies.

1.5 Diffusion of Innovation Theory (DOI)

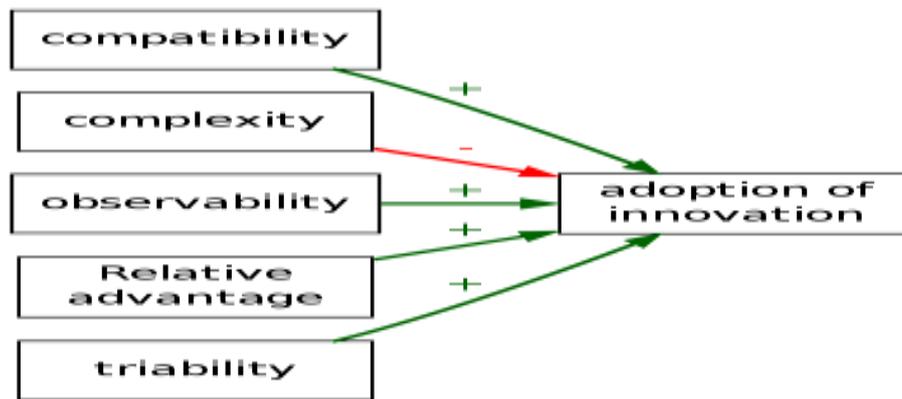
There was a need to understand how society accepts or does not accept innovation (Rogers, 2003), which inspired Rogers to establish the Diffusion of Innovation Theory (DOI) in 1962. This is considered one of the most important theories in the field of sociology and has been used within many innovations and inventions in different disciplines to evaluate their spread among the surrounded social system (Rogers, 2003). Rogers (2003, p.11) defined diffusion as "the process by which an innovation is communicated through certain channels over a time among members of the social system."

The adoption of a particular innovation is described as: "the process through which an organisation passes from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to implementation of the new idea" (Rogers 1983, p.21). Rogers (1995) also posited that the awareness of the innovation's features has an influence on the users' behavioural intention toward adopting the technology. According to Rogers (2003) oversimplification of previous research studies has led to incorrect analysis. He justifies this through stating that previous research has focussed on the differences between people, the users of innovations, as opposed to the differences between innovations.

According to Rogers (2003) there was a need for a classification structure of the perceived attributes to innovation that could be applied to all studies. However, he also noted and stressed the importance of the development of measures of perceived attributes to be individualised to each study as opposed to any prior investigations' scales of measurement. This would in turn affect the rate of innovation adoption, as instead of the perceived perceptions of an innovation belonging to experts; it would be an individual's perception of the attributes that would have influence on adoption.

Based on the DOI, there are five perceived attributes of an innovation hypothesized to predict the adoption of innovation, as explained in figure 3.6 (Rogers, 2003). According to Rogers, these attributes have the ability to explain 49 to 87 percent of variance in predicting the rate of adoption of innovations. The first of these attributes is relative advantage, which is the scale of perceived attributes of an innovation that displaces another. The second is compatibility, how an innovation is perceived to be well-matched with the values, experience and the needs of the prospective adopters. The third is complexity, how difficult an innovation is perceived to be to understand and use. Trialability is the fourth perceived attribute, in other words how can an innovation be experimented with on a trial basis before entering into full adoption. Finally, observability or how visible are the results of the innovation. These five attributes are interlinked whilst being individually distinct of each other.

Figure 5: Diffusion of innovation theory



Source: (Rogers, 2003).

The attributes discussed above have been central to much of both empirical and theoretical research through applying or examining the DOI and its validity to predict adoption in terms of technology acceptance (Oni and Papazafeiropoulou, 2012). For example, Tomatzy and Klein (1982) conducted a meta-analysis of 75 studies, they reviewed the characteristics of innovation and theories that were able to predict the adoption of innovations. In the articles they reviewed there were ten innovation attributes that appeared most frequently. The ten included Rogers' five but in addition were: cost, communicability, divisibility, profitability, and social approval. The study resulted in the suggestion that to clearly establish that perceived characteristics of an innovation are consistently related to innovation adoption and the implementation of any given innovation that measurement of various attributes had to be improved.

Karahanna et al. (1999) developed a theoretical framework that encompassed the DOI and other attitude-related theories to examine both beliefs and attitudes across pre/post adoption stages.

They provided empirical examination to explain the effects of some innovations' attributes on actual behaviour. They modified Roger's model by replacing the PU with relative advantage and PEOU with complexity. Another application of the DOI was in the model developed by Gerrard and Cunningham (2003), which combined the risk within the DOI to predict the adoption of Internet banking services by Singaporean banks' customers. In the same context, Liao et al. (1999) mixed some extracted constructs from the DOI and TPB to examine the adoption of Internet banking services in Hong Kong.

Despite of the adoption of applying the DOI to predict the acceptance of innovation in some literature, it also has been criticised in some quarters. For example, Wolfe (1994) claimed that DOI assumes that a single model is able to predict the adoption of diverse types of innovations among different kinds of individuals and contexts. Downs and Mohr (1976) debated that such important details as those related to the required cost and special facilities have been disregarded by the DOI. Additionally, Rogers (1976) criticised The DOI as disregarding social factors, such as how a social system could affect or foster the adoption of new innovations.

Despite the different disciplines that TAM and DOI came from there are similarities in the two theories, suggesting that they complement each other (Chen et al., 2002). The PU concept in TAM is considered to be the advantage attribute of an innovation. It is also considered that the complexity attribute has similarities with PEOU within TAM. Social cognitive theory (SCT) is discussed in the next section. SCT in this instance is reliant on concepts introduced by Rogers (2003) focussing on creating changes in individual behaviour.

1.6 The Social Cognitive Theory (SCT)

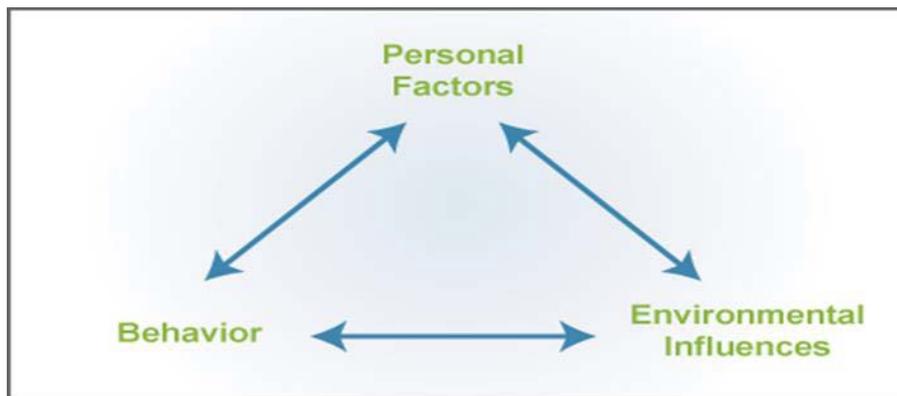
Social Learning Theory (SLT) developed in 1941 by Miller and Dollard is the basis of social cognitive theory (SCT), which is considered as the offspring of SLT. SLT has been modified over time and one such author of SLT is Albert Bandura, who introduced the concept of Vicarious

learning as a form of social learning. He is recognised as the first to lead on the development of cognitive SLT. Bandura renamed his variant of SLT as Social Cognitive Theory (SCT) (Brown, 1999).SCT assumes that the way individuals learn is influenced by their thoughts, feelings, and the environmental factors around them (Bandura et al., 1977). SCT focuses mainly on how social learning affects human behaviour and has been widely applied and examined in term of human behaviour by many studies (Bandura, 1986).Furthermore, SCT is often considered a very powerful theory of human behaviour (Beekens, 2011).

SCT has been developed based on ‘reciprocal determinism’, which means mutual interactions. SCT theorizesthere are three main factors: environmental factors, personal factors, and behaviour, as shown in Figure 3.7 (Bandura, 1986).In SCT Bandura introduced concepts such as reciprocal determinants, self-efficacy, as well as his idea that temporal variation (time lapse) could occur between cause and effect. He noted that there was analysis of learning through one’s own behaviour before Miller & Dollard’s 1941 study on behaviourism, and that finding a connection through reward and punishment systems as well as stimulus and response enabled an explanation mechanism.

The key features of SCT are as follows: Reciprocal Determinism states that human behaviour results from a triadic, dynamic, and reciprocal interaction of environment and also personal factors. Some influences are stronger than others, as argued by Bandura. He also claims that interaction differs between individuals and also is dependent on the situation (Pajares, 2002). Biological properties such as gender and ethnicity influence personal factors and behaviour; therefore, behaviour will differ between groups and individuals and is dependent on expectations, belief, self-perception and so on.

Figure 6: The social cognitive theory (SCT)



Source: (Bandura, 1986)

Which environmental influences are accessed is determined by behaviour and vice versa; therefore, the environment influences which behaviour is displayed and developed (Bandura, 1989). For instance, physical structures and social influences in an environment both play a part in developing expectations, beliefs and cognitive capabilities.

Another key feature of SCT is Vicarious Capacity. This involves learning through experience or studying others people’s learning ideas in order to develop beliefs about behaviours without needing to display them. This has many advantages, including time management and avoiding mistakes, as experience is gained through observation; therefore, there is no need for trial and error. New patterns of behaviour, cognitive competences and rules regarding new behaviours as well as self-evaluation and standards concerning judgements are all learning models, as stated by Bandura (1989).When it comes to studying individual behaviour SCT is considered a worthy model and is also validated (Igbaria & Iivari, 1995; Compeau & Higgins, 1995a).

Self-efficacy judgement has been researched in how it encourages or dissuades particular behaviours concerning adoption of technologies, especially in the IS/IT field. Compeau and Higgins (1995a) completed a pragmatic study to measure and validate the influence of computer self-efficacy. They explained that self-efficacy has three interdependent but separately distinctive dimensions. Firstly, magnitude, referring to the level of a task one is able to complete; for example, the higher the magnitude a person believes they have, the more complex a task can be completed.

The second dimension is strength. Self-efficiency strength concerns an individuals' judgement on their own efficiency; for instance, the higher the self-efficiency strength the more difficult the problems will be faced and solved. However, self-efficiency strength can lead to frustration and not being able to solve an issue. This gives an indication that perceptions of self-efficacy can limit individuals in certain situations whilst others will thrive. Therefore, different behaviours will be displayed. Self-efficacy and its factors were added to TAM by Igbaria & Iivari (1995) as affecting computer anxiety, TAM constructs (PEOU & PU), and usage of computer technology. The results concluded with other research showed high internal consistency of PEOU & PU measures. The results also reinforced SCT perspective of computing behaviour concerning beliefs and behaviours surrounding self-efficiency and supported Bandura's (1986) conjecture of experience as the most influential determinant of self-efficacy.

There are some The Connexions between SCT and DOI Theory, in reference to Rogers Diffusion of Innovation Theory a chapter on the integration of social cognitive theory and social diffusion theory was written by Bandura in 2006. He states: "Social cognitive theory distinguishes among three separable components in the social diffusion of innovation. This triadic model includes the determinants and mechanisms governing the acquisition of knowledge and skills concerning the innovation; adoption of that innovation in practice; and the social networks through which innovations are promulgated and supported" (Bandura 2006, p 119). The process of social diffusion is varying because, according to Bandura, how knowledge is gained is through advances in communication technologies. Ideas, values and behaviours are now globalised and electronic media has seen observational learning increase as a key tool in innovation diffusion, especially when it was in its infant stages.

1.7 The Model of PC Utilization (MPCU)

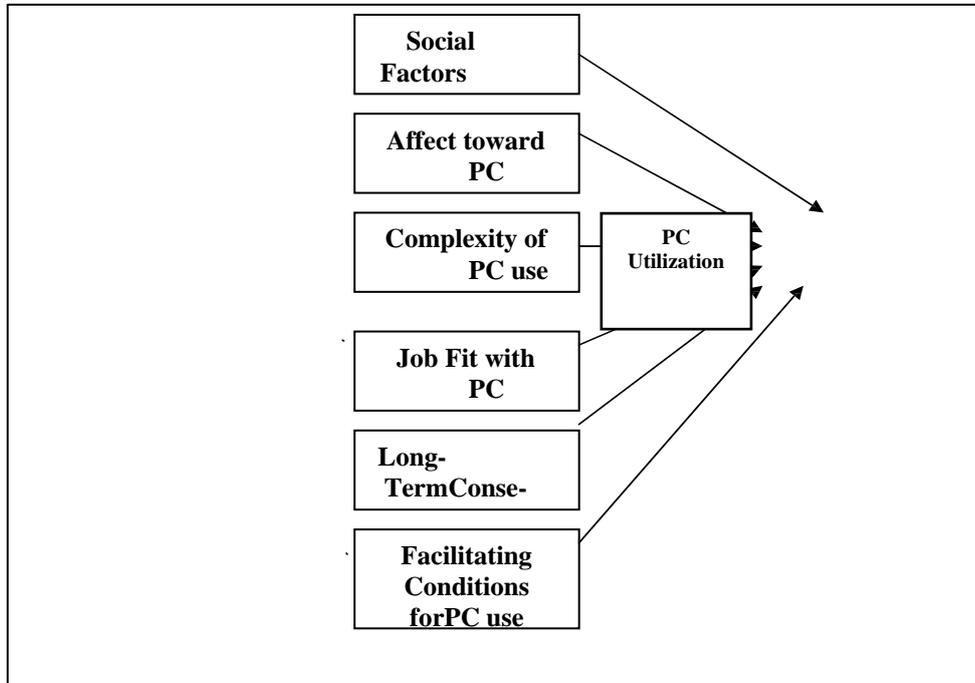
Triandis (1979) developed a framework to highlight variables that trigger behaviour. He was enthused to do so as there was a lack of agreement amongst disciplines. His framework was relevant for research in all cultures as it contained variables that were general and conceptual. He said that people were influenced by behaviour that had objective consequences stating that perceived consequences were affected by reinforcement twofold. Firstly, because a behaviour has consequences, it alters the perceived probabilities of the said behaviour and secondly the value of the probabilities alters. Within the framework habit, facilitating conditions and prior experience as well as cultural variables are also determinants that have an effect on behaviour and behavioural intentions.

Behaviour has consequences, some of which are only perceived by the individual. Triandis made a distinction between perceived and actual consequences stating the perceived are predictable outcomes whilst actual consequence result after a behaviour has been actioned and can be either desirable or undesirable. Triandis claims that the behaviour-consequence reinforcement sequence is susceptible to changes in what the perceived consequences are and the value they hold, with values being interrelated with a given situation and being open to interpretation with regards to consequence.

A person is more likely to connect with behaviour-consequence when consequence is unanticipated. Education, access to resources and complexity of culture are all aspects of the framework that aid the development of behaviour. Triandis (1979) stated that the determinants of behaviour are the attributes of ecology culture-society that determine the attributes of the individual and that attitudes and the values placed on behaviours change in respect of the consequences of a behaviour. Based on Triandis' theory of human behaviour, Thompson et al. (1991) developed a model to predict the actual behaviour to use personal computers. According to Thompson et al. (1991) make up this model as seen in figure 3.8 of six constructs which are: job-fit, social factors, complexity, facilitating conditions, affect towards use, and long-term consequences. Thompson et al.

(1991) theorised a direct relation between individual effect and usage of PC, he assumed that the individual's effect, feeling, or emotion has a direct impact on the usage of PC. Thompson et al. (1991) further proposed the facilitating conditions as a crucial factor to determine the actual usage, which means the required resources and facilities such as the infrastructure, technical support and training to achieve successful use of a particular system.

Figure 7: the model of PC Utilization MPCU



Source: Thompson et al. (1991)

Chang and Cheung (2001) proposed a model based upon Triandis' model targeting the users of internet (www). They replaced the usage with behavioural intention, as they believed that the behaviour is result of the intention.

1.8 The Motivational Model (MM)

Many of studies in the field of human behaviour consider motivational factors as main determinants among different contexts of individual behaviour (Davis et al., 1992; Vallerand, 1997). There are many theories based on motivation, Deci and Ryan (1985) Self-Determination Theory (SDT) posits that experience of choice is implicated in self-determination. Deci et al. (1991) asserted that STD was able to distinguish between intentional regulation and self-determination and that this set apart SDT from other theories. Actions are controlled, they claimed, when compelled by internal or external forces, whereas motivational actions are set apart as being self-determined as the individual endorses them. Which led to divide the motivational factors into two main classifications: intrinsic motivation and extrinsic motivation (Davis et al., 1992; Vallerand, 1997). Intrinsic motivation as defined by Vallerand (1997) is related to internal or intangible rewarding such as the feeling of pleasure or enjoyment, which affect the individuals' behaviour regardless of the expected outcomes of such performance.

In contrast, extrinsic motivation relates to tangential incentives or rewards that motivate the individuals to behave in order to gain prized outcomes such as time saving, and job efficiency (Davis et al., 1992). The difference between being intrinsically motivated and extrinsically motivated and the behaviours they create is that the first involves gaining satisfaction from engaging in a behaviour without any material gain, whereas extrinsically motivated behaviours are actioned as a means to an end, a necessity not through choice (Vallerand and Bissonnette, 1992). In terms of technology acceptance, Davis, Bagozzi and Warshaw (1992) tested the motivational model of technology acceptance. They found that extrinsic and intrinsic motivations were at the forefront of intentional behaviour regarding technology usage. The study was concerned with the use of computers in the

workplace. In this instance, the extrinsic motivation was that if the technology was perceived as being useful then it would reap financial rewards and the intrinsic motivation was the perceived gratification of using this technology irrespective of outcomes.

The results highlighted that perceptions in the first instance concerned job performance, whether using computers would enhance this and the second perception was the experience and the scale of enjoyment from using them. This highlighted that increasing enjoyment of using a computer system that was useful would be affective to acceptance (Davis et al., 1992). Davis et al. (1992) empirically reported that the predictive power of perceived usefulness and enjoyment to predict the behavioural intention was 62 percent and 75 percent of variance respectively. A later study compiled by Venkatsh, Speier and Moris (2002) developed an integrated model of technology acceptance through reanalysing data from the earlier research studies (Venkatesh 1999; Venkatesh and Speier, 1999). The integrated model took the fundamental ideas of technology acceptance and motivational models and examined them at length. This was done through empirically testing the new model with existing models to discover their explanatory power.

1.9 The Unified Theory of Acceptance and Use of Technology (UTAUT)

As mentioned before in this chapter, there are several models and theories applied in the context of acceptance of technologies and innovations to explain which are the main factors that affect the individual's behavioural intention and actual behaviour (Dwivedi et al., 2011; Venkatesh et al., 2003). The researchers in the field of technology acceptance are more likely to choose a favoured model or theory for study due to the range of choices, and overlook contributions afforded from alternative models as noted by Venkatesh et al. (2003).

Venkatesh and colleagues agreed that a fusion of models was required to attain a unified view of users' technology acceptance. They compared the eight principal models TRA, TPB, TAM, combined TAM - TPB, DOI, SCT, MM, and MPCU that have all been used to explain technology acceptance behaviour and as a result, five limitations of previous comparisons of models was derived from the study.

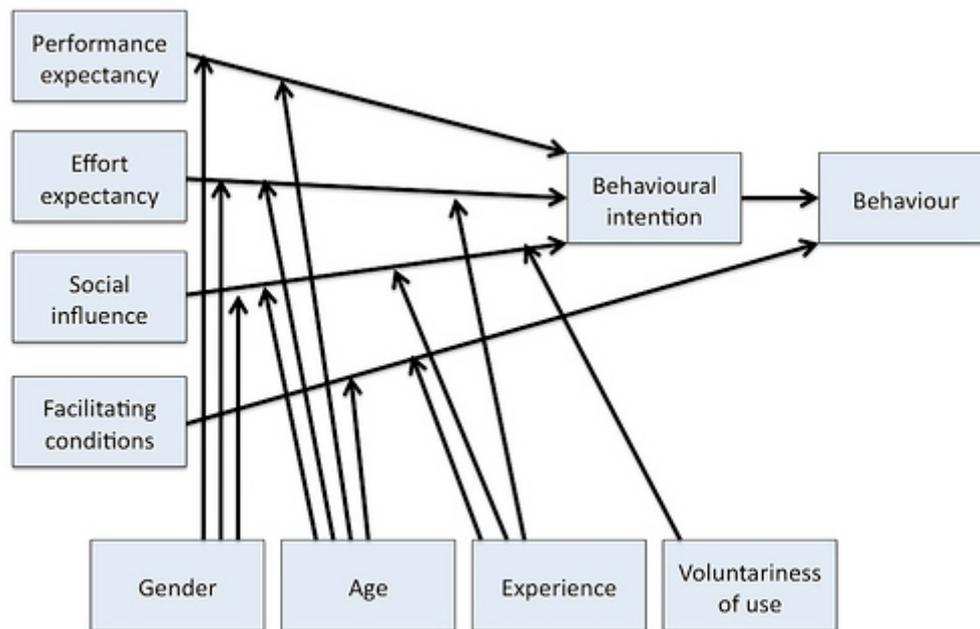
Firstly, the technologies that had been studied were not complex in nature but were simple and individual in nature and did not include sophisticated technology. Secondly, most of the studies had been completed with students as the sole contributors. A third limitation was that in the majority of studies the time of measurement had been generalised and completed long after acceptance or rejection of a technology, and therefore reactions were outdated. Fourthly, Cross-sectional measurement was prevalent, and the fifth limitation was that it was hard to generalise results as the majority of research had been completed in voluntary circumstance of usage rather than compulsory use.

Venkatesh et al. (2003) compared the eight models empirically in longitudinal field studies within four organisations where new technologies were introduced to individuals. Three different times were used for measurement and were post training; this was measured twice after implementation at the one month and three-month point, and usage behaviour was measured over the entire six-month period of implementation. Each of the eight models were then applied to the data that had been divided by two for compulsory and voluntary conditions. Moderating variables that included experience, voluntariness, age, and gender were studied as they had been expected due to prior research to alter usage decisions. After moderators had been included predictive validity increased across six of the eight models, with the exception of MM and SCT.

Venkatesh et al. (2003) reported their statistical findings after a longitudinal empirical study, it shows that the aforementioned eight models had the prediction power as 17 percent to 53 percent of variance to predict the behavioural intention to use the new systems. They found that the predictive power of these models could be enhanced by including some moderating variables through these models (Venkatesh et al., 2003). At that point, UTAUT was applied and examined, and empirically shown 70 percent of variance prediction power as empirically reported by Venkatesh et al. (2003). Venkatesh et al. (2003) proposed three main constructs (performance expectancy, effort expectancy and social influences) as shown in figure

3.8 that directly determine the behavioural intention and two other constructs influence the actual behaviour (usage), which are behavioural intention and facilitating conditions. The relationships between these constructs is shown in Figure 3.8.

Figure 8: The Unified Theory of Acceptance and Use of Technology



Source: Venkatesh et al. (2003)

Performance expectancy (PE) is defined as “the degree to which an individual believes that applying the technology will help him or her to attain gains in job performance” (Venkatesh et al., 2003, p. 447). Venkatesh et al. (2003) identified that this construct has been derived from other factors in related theories and models which are: perceived usefulness (TAM and C-TAM-TPB), outcome expectation (SCT), relative advantage (IDT), job fit (MPCU), and extrinsic motivation (MM). Performance expectancy was the most significant factor to affect the behavioural intention amongst any individual theory within different contexts (Venkatesh et al., 2003).

According Venkatesh et al. (2003, p.450) *Effort Expectancy* (EE) is defined as the “extent of ease connected with the use of system.” EE has been captured from other related factors from existing theories such as ease of use (Moore and Benbasat, 1991), perceived ease of use (Davis et al., 1989; Venkatesh and Davis, 2000) and complexity (Thompson et al., 1991). EE showed significant impact on the behavioural intention within either mandatory or voluntary contexts either at or at mandatory setting. However, Venkatesh et al. (2003) claimed that the role of this factor is limited by the time after the training-stage of the users.

Social influence defined as “the degree to which an individual perceives that others believe he or she should use the new system” (Venkatesh et al., 2003; p.451). Social influence is apprehended from subjective norm in the models of TRA, TAM2, TPB/DTPB and C-TAM-TPB, social factors in MPCU, and image in DOI. Worthwhile to mention that the social influence construct has significant impact on behavioural intention exclusively within mandatory context (Venkatesh et al., 2003).

Facilitating Conditions according to UTAUT is “the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003, p.453). The construct of facilitating conditions referred to other different factors: compatibility in DOI, perceived behavioural control in TPB, C-TAM, and, DTPB and facilitating conditions in MPCU. All of these constructs have same

influences on the behavioural intention within both of mandatory or voluntary contexts (Venkatesh et al., 2003). However, according to Venkatesh et al. (2003), the impact of facilitating conditions on the behavioural intention could be limited or insignificant after the training stage. Moreover, Ajzen (1985) and Taylor and Todd (1995a) assumed that facilitating may have direct effect on the actual usage behaviour.

It is worth to mention that there is an extension of the UTAUT which has been extended by Venkatesh et al. (2012) by adding three other constructs to the original model of UTAUT (hedonic motivation, price value and habit), this extension is called UTAUT2. Further details about the UTAUT2 later in this section.

1.9.1 Applicability of the UTAUT Model

The UTAUT model endeavoured to cope with the drawbacks of other models in technology acceptance. Some older technology acceptance models, such as TAM, did not include other important constructs because they sought after simplicity during the models' development (Benbasat & Barki, 2007). The development of the UTAUT model was premised on the similarities of the constructs from several existing models, which enhanced this model's ability to explain users' behaviours. This could not have been achieved individually by any older model. This trait of Comprehensiveness has led the UTAUT model to be considered by some researchers in the field of technology acceptance as the benchmark of most predictive models (Weerakkody et al., 2013).

Knutsen (2005) used a subdivision of the UTAUT in order to assess a new mobile service performance and its related factors in order to explain the effects of such factors on customer attitudes towards new mobile services. Effort expectancy, performance expectancy and age as an antecedent to the UTAUT constructs, plus the construct of the attitude, were part of the research design. Knutsen (2005) theorised that effort expectancy affected performance expectancy. Again, data was gained in different periods; the first was before the introduction of the trial version and the second after two weeks of the mobile service trial. The results substantiated the relationship that existed between effort expectancy and performance expectancy and attitude and the relationship of only effort expectancy and performance expectancy.

Effort expectancy and performance expectancy were shown to be strong determinants of attitude displayed concerning new mobile services. Moreover, an increase in age correlated to concerns regarding ease of use of new services. Age also affected effort expectancy in a negative capacity but it had a positive effect on attitude towards performance expectancy. This, according to Knutsen (2005), showed that older users of mobile services had higher expectations. The eight dominant models had influenced this model's structure due to the similarities they shared. Therefore, the power of UTAUT should not be underestimated simply because published studies utilising it are rare.

Li and Kishore (2006) studied the new measurement scale of the UTAUT in order to test for invariances. Their quest was to test whether the key constructs in the UTAUT model were invariant across different population subgroups. They chose web log system users as their group for research and the subgroups were split according to demographics, including user's gender, user's general computing knowledge, user's specific Web log-related knowledge, user's experience with Web logs, and user's usage frequency of Web logs. They theorised that UTAUT had four main constructs that would not vary across subgroups including gender, low and high computing general knowledge users, users with or without particular Web log knowledge/ experience, and users with low and high frequency use of Web logs.

There were three stages to the data analysis. The first split the data along the lines of demographics, with two balanced groups in each of the dimensions. The second stage involved measuring equivalent-item-factor loadings or measurement of tau-equivalence. This was measured under each dimension and across the two groups. Full equivalence under each dimension was tested and recognised as the third stage of the analysis. Different experience and knowledge amongst users resulted in the same interpretation of effort and performance expectancy. Social influence was not interpreted in the same way with users having either a high or low frequency of Web log usage. The scores of facilitating conditions with

varying levels of web log experience were also not interpreted in the same fashion from the perspective of statistical significance; however, they were compared for computing and Web log knowledge. This statistical significance is not indicative of a large difference in the score of these subgroups, as the authors argued that gender specific statistics showed that they were comparable when looking at effort expectancy and facilitating conditions.

UTAUT model needed to be either extended or modified in order to explain differences in adoption behaviour concerning mobile devices and services (Carlsson et al., 2006). The results they gained from the study did not support across the board all the cases within the original UTAUT and this is recognised by the authors. Therefore, they were justified in their initial thoughts that UTAUT was not a complete model to explain behaviours of intention and usage of mobile devices and services in a coordinated way.

Moreover, there is moderately a small number of related studies that have adopted and applied the UTAUT model to explain the acceptance and usage of such self-service technologies, particularly within the context of banking electronic solutions such as (Martins et al., 2014; Al-Qeisi & Abdallah, 2013; Riffai et al. 2012; Yu, 2012; AbuShanab et al., 2010). While some studies added external constructs to the UTAUT model such as Perceived risk, Website quality perceptions, Education level and output quality (Martins et al., 2014; Al-Qeisi & Abdallah, 2013; Wang & Shih, 2009; Riffai et al. 2012), others combined the UTAUT model with other models such as the theory of task technology fit (Zhou et al., 2010).

Alalwan et al. (2017) conducted a study based on the UTAUT2, targeting bank customers in Jordan who used Mobile banking services. After analysing the data collected from 334 distributed questionnaires, they reported that the behavioural intention construct was affected significantly and positively by performance expectancy, effort expectancy, hedonic motivation, price value, and trust. Al-Qeisi and Abdallah (2013) extended the UTAUT model by adding the external constructs (Website quality perceptions, education and income). Uniquely, this study focused on the Jordanian bank customers' actual usage of internet banking services rather than their behavioural intention. Another study within the Jordanian context applied by AbuShanab et al. (2010).

They modified the UTAUT model on purpose to explain the acceptance of internet banking by Jordanian bank customers. They added some external factors (self-efficacy, technology anxiety, perceived risk, internal locus of control, trust and innovativeness). AbuShanab et al. (2010) testified the modified model, which resulted in 48% of the variance to explain the intention to use internet banking comparing to 43% of variance to predict the intention of banks customers by the original model.

In the same manner, Riffai et al. (2012) modified the UTAUT model by encompassing other external variables (website design, trust, playfulness, output quality and awareness) to explain the adoption of online banking services by Omani banks customers. Their results showed that the adoption of online banking services was significantly affected by performance expectancy and effort expectancy but the social influences construct had a non-significant effect over the customers' intention to adopt such technology. By contrast, to modifying the UTAUT model, Zhou et al. (2010) combined the UTAUT model with the theory of task technology fit (TTF). They suggested new conceptual model that presented a mix of factors that extracted from both models, their results indicate that the proposed model provided prediction power of 57.5% of variance to adopt Mobile banking services, compared to explanation power of 45.7% and 43.3% percent of variance to UTAUT and TTF respectively.

Martins et al. (2014) formulated an extension of the UTAUT model by including the construct of perceived risk to examine the Portuguese banks customer's behavioural intention and actual usage of Internet banking services. The basic UTAUT model including constructs of (performance expectancy, effort expectancy and social influence) provided 56% of variance to predict the adoption of Portuguese customers toward Internet banking services. However, the extended model with construct of perceived risk showed 60% of variance to predict the customers' behavioural intention and 81% of variance to explain the customers' actual usage towards Internet banking services (Martins et al., 2014). Dwivedi et al. (2011)

provided another evidence to approve the UTAUT's validity. They conducted a meta-analysis of 43 previous studies that applied the UTAUT; the results show that the construct performance expectancy had the most significant effect on the behavioural intention. Additionally, Dwivedi et al. (2011) confirmed that the constructs effort expectancy, social influences and facilitating conditions were crucial factors to predict behavioural intention.

As mentioned before, due to the inclusiveness of the UTAUT model and its high prediction power, it has been applied and adopted by many researchers in the field of technology acceptance (Slade et al., 2014; Alryalat et al., 2012; AbuShanab et al., 2010). This wide utilisation of UTAUT among different kinds of innovations, users, countries and cultures support its validity, applicability and generalisability (Alalwan et al., 2017; Slade et al., 2014; Rana et al., 2013; Al-Qeisi and Abdallah, 2013; Alryalat et al., 2012; Venkatesh et al., 2012; Zhou et al., 2010).

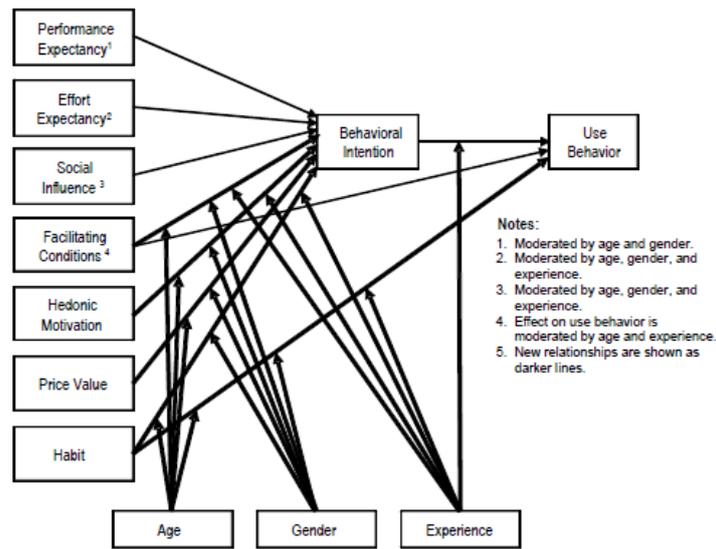
Despite these unique traits and the inclusiveness of the UTAUT model, there are some criticisms of some of its aspects. Primarily, the UTAUT model is applied to explain the adoption of technology from the perspective of employees, so there is some concerns about its applicability within other contexts, such as customers or students (Venkatesh et al., 2012). Additionally, even though the UTAUT authors reviewed the most common constructs from the eight dominant models in technology acceptance, they only selected the four most significant constructs (PE, EE, SI and FC) among 49 constructs that affect both behavioural intention and actual usage; therefore, they neglected the other factors (Venkatesh et al., 2012; AbuShanab et al. 2010). In addition, some studies have contradicted the claim for a high prediction power of the UTAUT model, as their results found this model to have poor prediction power (Chiu et al., 2010).

1.9.3 The Extended Unified Theory of Acceptance and Use of Technology (UTAUT2)

As mentioned before, UTAUT2 was an extension of the original UTAUT, extended by adding three external constructs (Hedonic motivation, Habit and Price value). Venkatesh et al. (2012) modified the UTAUT model with the purpose of validating this model from the perspectives of customers. They assumed that individual differences (age, gender and experience) would have moderating effects over the relations between the constructs and both behavioural intention and the actual usage of the mobile internet, as depicted in figure 3.10 (Venkatesh et al., 2012).

Price value means "consumer's cognitive trade-off between the perceived benefits of the application and the monetary cost for using it" (Venkatesh et al., 2012, p.161). Hedonic motivation is defined as the enjoyment or joy that is caused by using a particular technology (Venkatesh et al., 2012). This construct is captured from different factors such as enjoyment, playfulness, and joy, which are significant factors to determine the users' adoption of technology (Brown and Venkatesh, 2005; Van der Heijden 2004). According to Venkatesh et al. (2012, p.161) habit means "the extent to which people tend to perform behaviour automatically because of learning."

Figure 9: The extended Unified Theory of Acceptance and Use of Technology (UTAUT2)



Source: Venkatesh et al. (2012)

Venkatesh et al. (2012) reported their findings after two stages of online survey of 1,512 mobile internet users. The results supported strongly the predictive power of UTAUT2, which revealed 74% and 52% of variance in behavioural intention and actual usage respectively, while the UTAUT provided 56% in behavioural intention and 40 % in the actual usage of mobile internet (Venkatesh et al., 2012).

Morosan and DeFranco(2016)revisited the UTAUT2 model to establish a comprehensive model to explain the acceptance of near field communication (NFC) mobile payments. Based on 794 respondents comprising American hotel customers, they reported that performance expectancy was the strongest construct to predict behavioural intention; while other factors (habit, hedonic motivation, and social influence) had lower effects. In the same manner, Alalwan et al. (2017) agreed with Morosan and DeFranco(2016). They applied UTAUT2 targeting Jordanian bank customers who used Mobile banking services. After analysing the data that collected from 334 distributed questionnaires, they reported that the behavioural intention construct was affected significantly and positively by performance expectancy, effort expectancy, hedonic motivation, price value and trust.

Compared to previous technology acceptance models, Venkatesh et al. (2012) considered UTAUT2 as the most powerful model to explain behavioural intention. Empirically it scored the highest variance rate in behavioural intention (74%), which has never been accomplished by other models. On the other hand, there are some concerns about the generalisability of UTAUT2, as their study was conducted in Hong Kong, which has a high rate of mobile penetration and usage. It is therefore not comparable with this study as it is conducting in Jordan, which has a lower rate of mobile usage and penetration. Moreover, UTAUT2's sample was skewed, which is another concern about its generalisability, as the mean age of their study sample was 31; maybe it is inapplicable to older ages (Venkatesh et al., 2012).

UTAUT2 targeted mobile internet uses in general; they focused on both utilitarian (e.g. Business uses) and hedonic (e.g. mobile games apps) mobile uses. Nevertheless, this study focuses only and mainly on the utilitarian use of the mobile, in terms of performing banking services. Despite the high results of UTAUT2 regarding its ability to predict users' behavioural intention and actual behaviour to adopt technology, it does not match the objectives of this study, as the added three factors (habit, hedonic motivation and price value) are not within the scope of this study. Furthermore, the habit construct will not be useful to consider in this study. Jordan is a developing country, therefore mobile banking service can be considered in their early stages, and the adoption of such technology is still low (Al-Rfou, 2013).

Regarding the hedonic motivation construct, as mentioned before this study focuses mainly on mobile banking apps, which are clear example of the utilitarian use of the mobile device and therefore apart from the hedonic context. The construct of Price value is not considered in this study as the mobile banking apps are free to download from banks’ website or mobile stores, and the use of such apps does not require any prepaid subscription with the banking services suppliers. However, UTAUT2 is an extension of UTAUT, and it is a good example of how UTAUT could be applied within customers’ context (Venkatesh et al., 2012), which coincides with the main aim of this study that targets Jordanian bank customers.

Finally, this section has provided an overview of the most common technology acceptance models and their common constructs, as summarized below in table 1. Moreover, this section has explained the development and evolution of every model, noted some models’ extensions and modifications, and reported some empirical results from previous studies that applied and adopted such models.

Table 1: The common constructs among technology acceptance models

Technology acceptance model	Common constructs affecting behaviour (Intention and actual behaviour)
TRA	Attitude / subjective norms / perceptions
TPB	Attitude / subjective norms / perceived behavioural control
DTPB	Relative advantage / complexity / compatibility / normative influence / efficacy / facilitating conditions / Attitude / subjective norms / perceived behavioural control
TAM	Perceived usefulness / perceived ease of use / attitude
DOI	Innovation features / innovators characteristics
SCT	Personal factors / environmental influences
MPCU	Affect / individual beliefs / social factors / habit / facilitating conditions / complexity/ long-term consequences
MM	Intrinsic motivation / perceived benefits / external pressure
UTAUT	Performance expectancy / effort expectancy / social influence / facilitating conditions
UTAUT2	Performance expectancy / effort expectancy / social influence / facilitating conditions / habit / hedonic motivation / price value

Methodology

A review of relevant literature is an essential trait of any study. The effective review creates a solid foundation for advancing knowledge; it facilitates theory development, closes areas where overabundance of research exists, and uncovers areas where research is needed (Chiou, 2010). To identify scientific publications that aim to investigate the technology acceptance models, a literature review that synthesizes published work was conducted. This concept-centric review made a broad search for the relevant publications on the topic rather than limiting the search to specific years or specific journals and/or conferences (Chiou, 2010). The review follows trends, and thus, particular research approaches might have been more common during certain periods.

For the purposes of the review, the literature search was undertaken in a 3-month period. The following international online bibliographic databases were consulted:

- ISI Web of Knowledge
- EBSCO Host (consisting of Academic Search Complete and PsycINFO)
- ACM

- ERIC
- ISI Web of Science
- Science Direct
- Google Scholar

The search text used was (“Technology Acceptance Models” OR “Technology Acceptance”). Searches were limited to publications written in English and published in journals and conference proceedings, from 1976 onwards.

Conclusion

This paper reviewed the related literature of main models and theories that used in previous studies to study the adoption of innovations in different areas such as online banking, mobile banking, E-learning and E-health care systems. Despite of the increasing development of technology and its incorporation into users’ privacy and professional life, a decision regarding to adopt or reject it remains an open question. Thus, a well thought-of amount of research work dealing with the technology acceptance models was conducted among various disciplines.

The paper identified the main theories and models that employed to investigate and study the adoption of innovations such as TRA, TPB, TAM, UTAUT. Also, presented insights about the applicability and the limitations and criticisms about the most dominant theories and models in the field of technology acceptance.

Moreover, this study summarised the main factors that influence the adoption of innovations and mapped such factors with previous factors that derived from, which clarifies the origin of such factors and highlights the power of each factor in influencing the adoption of innovations and provided experimental results from previous studies in this regard,

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Influence of Exogenous Application of Proline On Some Physio-Biochemical Parameters of Maize (*Zea mays* L.) Under Drought Stress

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DOI: 10.29322/IJSRP.9.08.2019.p92117

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92117>

ABSTRACT

Background: In nature, the plants are exposed to various biotic and abiotic stress factors. In abiotic factor soil salinity, water deficit, heavy metal and extreme temperature are included are the major factors which directly inhibit growth and development of crop plants (Ali, M, H, & Athar, 2007). In these abiotic stresses, the drought/water deficit is major abiotic stress that limits biological yield (Ashraf & Foolad, 2007). Among abiotic stresses drought is a major detrimental factor all over the world.

Objective: The present study was designed to investigate the influence of seed priming with Proline under drought stress.

Material and Methodology: The seeds of two varieties of maize (SG 2002 F-Goi & Hay Corn) were grown in control and drought stress condition under the exogenous application of Proline as seed priming with varying regimes (0, 200 ppm, 400 ppm). Both varieties differ in terms of drought tolerance.

Results: The biomass production was reduced due to drought stress, but Proline enhanced the biomass production in terms of shoot and root fresh and dry organs at the 400 ppm as compared to other regimes. The chlorophyll "a", "b", "a/b" and "a+b" content was reduced under drought stress while 400ppm pre-soaked Proline enhanced the chlorophyll "a", "b", "a/b" and "a+b" content

in shoot organ of both varieties. Total Protein and amino acid content in leaf was greatly affected due to drought stress but seed primed with Proline @400ppm enhanced the production of total protein and amino acids in leaf organ of both varieties. SDS –PAGE Protein.

Conclusion: Profiling showed that 200ppm concentration of Proline was most effective in both varieties. Among both varieties the variety "Hay Corn" is most tolerant toward the drought stress

Keywords: Abiotic stress, Drought, Free amino acid, Proline, Proteins, Maize

1. INTRODUCTION

In nature, the plants are exposed to various biotic and abiotic stress factors. In abiotic factor soil salinity, water deficit, heavy metal and extreme temperature are included are the major factors which directly inhibit growth and development of crop plants (Ali, M, H, & Athar, 2007). In these abiotic stresses, the drought/water deficit is major abiotic stress that limits biological yield (Ashraf & Foolad, 2007) Drought stress causes the changes at anatomical, physiological, biochemical and molecular level in plants at all stages of life cycle (Ali, M, H, & Athar, 2007). All these metabolic processes are determined the plant health. Disturbance in one of these can affect the plant

growth and development. Drought or water deficit condition severely effects on seed germination and cell growth of plants. (Ali & Komatsu, 2006). The activity of meristematic cell division and other expansion of newly develop cell increases the growth of plant depends upon turgor pressure of plant cell. Under drought stress, growth is retarded in higher plant due to disturbance in water movement from xylem to the make longer cell ((Harris, D, Tripathi, R, & Joshi, A, 2011).

Drought stress reduced the shoot and root fresh weight (Neisiani, et al., 2009), reduced ion uptake like Potassium and Calcium enhanced the uptake of Sodium decreased the accumulation of protein and amino acids (CHAUM & Kirdmanee, 2010), decrease the chlorophyll content and causes the photo-oxidation of chlorophyll. Water deficit decrease the chlorophyll a, b, a/b and over-all chlorophyll (Jaleel, P, & G.M, 2008). Photosynthetic efficiency of plant decreases chlorophyll contents in water deficit condition. Drought change a variety of plant responses that ranges from cellular metabolism as result of this growth rates and crop yields are reduced.

To save the plant from the harms of drought or other stresses plant accumulate the low molecular weight enzymatic or non-enzymatic antioxidants. Superoxide dismutase, Peroxides, Catalase (CAT) and ascorbate peroxides (APX) are enzymatic antioxidants (CHAUM & Kirdmanee, 2010). While glutathione, and ascorbate and carotenoids are non-enzymatic antioxidants. These both enzymatic and non-enzymatic antioxidants work together in scavenger mechanism to ROS. The osmolyte may be sucrose, soluble carbohydrates, glycine betaine and other solutes. The drought tolerant plant may have increased level of these osmolytes. While their level decreases in sensitive plants (Anjum, et al., 2011).

Among these osmolytes the Proline which is water soluble amino acid is the most important in the protection of plant facing drought stress. Under drought stress, the Proline is first osmolytes that protect the plant from the injury to cell (Anjum, et al., 2011). So, to overcome the drought stress

condition, the exogenous application of Proline is a smart tool.

Proline could be turned as a signaling molecule to modify plant physiological functions in terms of osmotic adjustment, upgrade photosynthetic enhanced ion uptake (Abdelhamid, et al., 2013), enhanced antioxidant activity and reduce ROS production improve biological yield (Ali Q. F., 2013).and also effects on cell explosion or cell death and cause gene expression, that can be vital for plant rescue from osmotic stress. Proline accumulation was observed in many stress tolerant plants like maize, rice, wheat etc (Ashraf & Foolad , 2007).

Maize (*Zea mays* L.) is cereal crop belong to family *Poaceae* (Chen, Zhong, Fan, & Li, 2015). Maize is 3rd significant crop among cereals and it is consumed by man as food also forage for cattle and poultry ((Rahi, et al., 2013). Due to over population food demand is increasing with the passage of time (Muhammad, A, J. L, Meade, & Regmi, 2011),and this crop is gaining an imperative position in crop cultivation farming due to its high yield prospective, high nutritious worth, short growth period, consumption in industry to make corn silk, corn sugar, and corn flask. Thus, the present study was designed to find out the physiological, biochemical and molecular aspects of maize under drought stress treated with exogenous application of Proline (Reid, et al., 2015).

2. MATERIALS AND METHODS

The experiment was carried out in Botanical Garden of Bahauddin Zakariya University Multan. The experiment was arranged in Complete Randomized Design with four replicates. The pots were filled with soil. The seeds of two varieties of maize SG 2002 F-Goi and Hay corn were pre-soaked in 0ppm, 200ppm and 400ppm Proline. Plants of three weeks were treated with drought stress by skipping the irrigation. After a week of stress, the plants were harvested for further morphometric, physio- biochemical and proteomic profile.

2.1 Morphometric Attributes

2.1.1 Shoot and Root length

The shoot and root length was measured by using the tape-meter.

2.1.2 Fresh and dry weight of root and shoot

The fresh weight of root and shoot weight was calculated by using the electric balance. Then the plants root and shoot were kept in oven at 50°C for a week. After one week, the plants were completely dried. Then the weight of samples was done

2.2 Biochemical assays

2.2.1 Chlorophyll estimation

The chlorophyll was measured by the method of Arnon, Allen, and Whatley (1956). The leaf sample about 1g was ground into 3ml acetone, filtered and raised up to 10ml with acetone. The values were taken by using double beam spectrophotometer (U-Hitech 2900) at 663nm, 652nm and 645nm.

2.2.2 Proteins quantification

Proteins quantification was done following the procedure of Bradford (1976).

2.2.3 Total soluble proteins

The leaf samples about 200g was ground into sodium phosphate buffer having pH 6.8 in chill condition and centrifuged at 15000rpm. Supernatant was kept for further quantification of proteins. The 30µl supernatant was mixed in 1500µl Bradford reagent in dark condition. Then the reading was taken by using double beam spectrophotometer (U-Hitachi) at 595nm.

2.2.4 Total free amino acids

The 1ml supernatant was mixed with 1ml ninhydrin and 1ml pyridine. Then the mixture was heated in water bath for 30minutes at 100°C and raised up to 100ml by using distilled water. Then the read was taken in double beam spectrophotometer at 570nm.

2.3 Molecular investigations

2...3.1 Proteins profiling

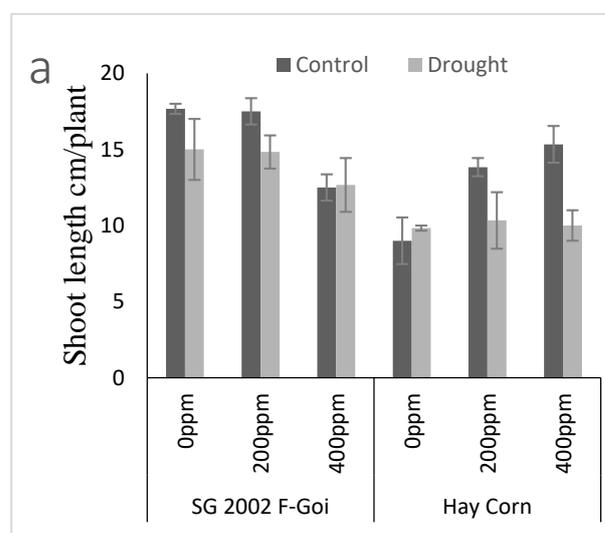
Sodium Dodecyl Sulfate Polyacrylamide Gel Electrophoresis (SDS-PAGE) was performed to resolve the proteins. It was performed by using the protocol of Laemmli (1970).

2.4 Statistical analysis

The analysis of variance (ANOVA) was done by using the SPSS software.

3. RESULTS

The analysis of variance for the shoot length had been shown in table 1. The significance results were observed when maize is subjected to pre-soaked Proline under drought stress. The maximum shoot length was recorded in SG 2002 F-Goi varieties in control condition without the pre-soaked with Proline. While the minimum shoot length was recorded in Hay corn in control condition as shown in figure 1(a). Under control condition 0ppm Proline pre-soaked, the variety Hay corn showed minimum shoot length than other variety. The analysis of variance of root length was shown in table 1. The analysis showed non-significance interaction between the drought stresses in different pre-soaked level of Proline. While the both two varieties showed the significance results with pre-soaked proline and without pre-soaked Proline in control condition. The Hay Corn in 0ppm Proline was showed highest root length.



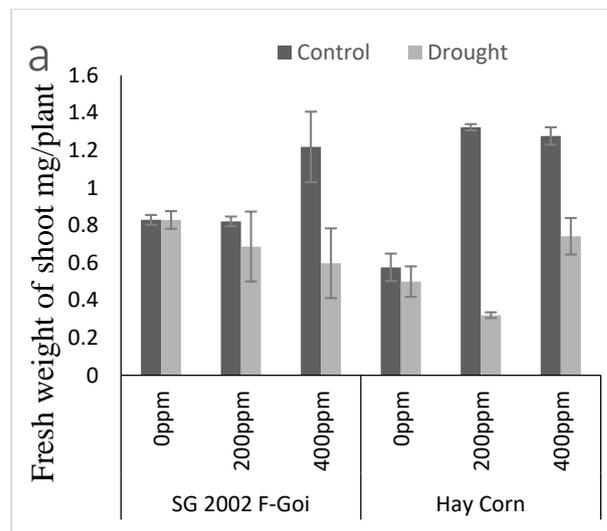
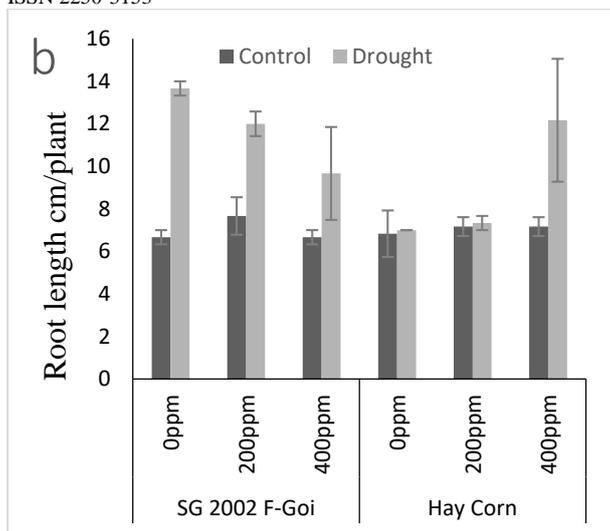
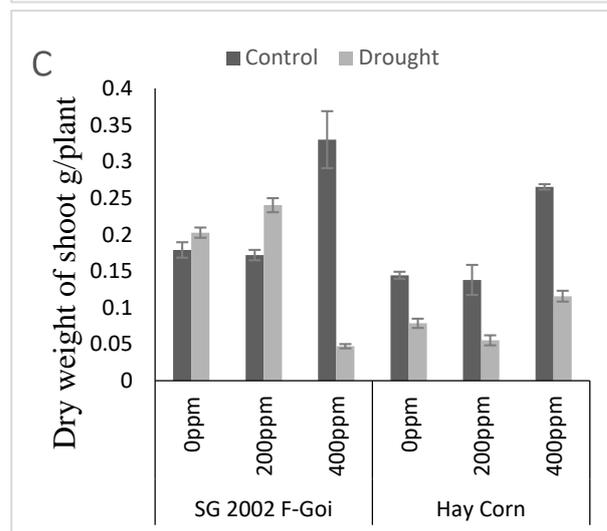
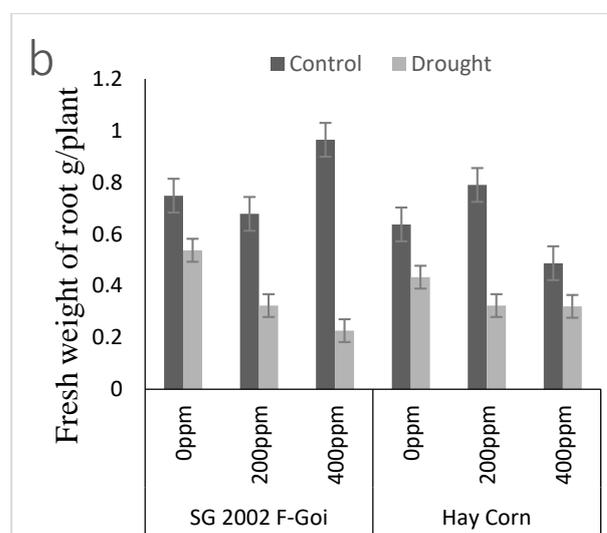


Figure 1: Shoot (a) and Root (b) length of maize varieties pre-soaked with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition.

The analysis of variance for fresh weight of shoot has been shown in table 1. The maximum fresh weight shoot was seen in Hay Corn with 200ppm and 400ppm Proline treatment in control condition and minimum with Proline 200ppm under drought (figure in 2(a)). The analysis of variance for the fresh weight of root has been shown in table 1. The fresh weight of root was decreased in both varieties in drought condition without and with pre-soaked Proline. The variety SG 2002 F-Goi was showed highest fresh weight of root in control condition with pre-soaked 400ppm Proline as shown in figure 2(b). The analysis of variance for the dry weight of shoot had been presented in table 1. From the table it has shown application of Proline shown significance enhancement of dry weight of shoot in 0 and 200ppm in SG 2002 F-Go under drought stress. The dry weight of shoot was decreased in pre-soaked in Hay Corn variety under drought condition as shown in figure 2(c).



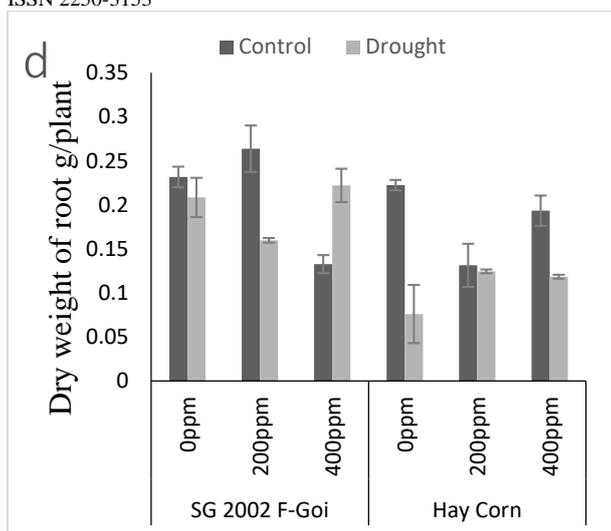
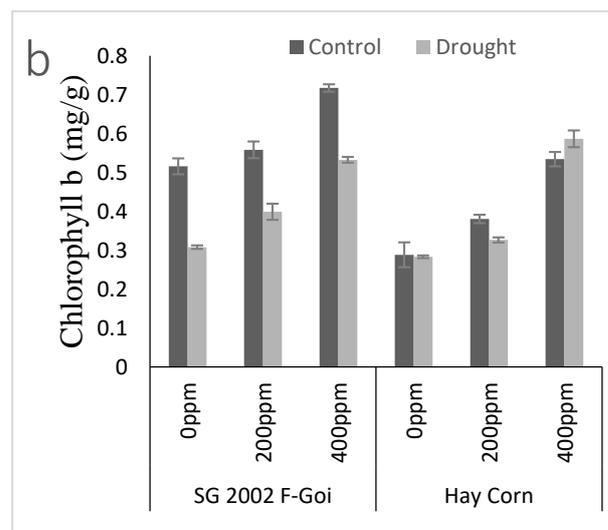
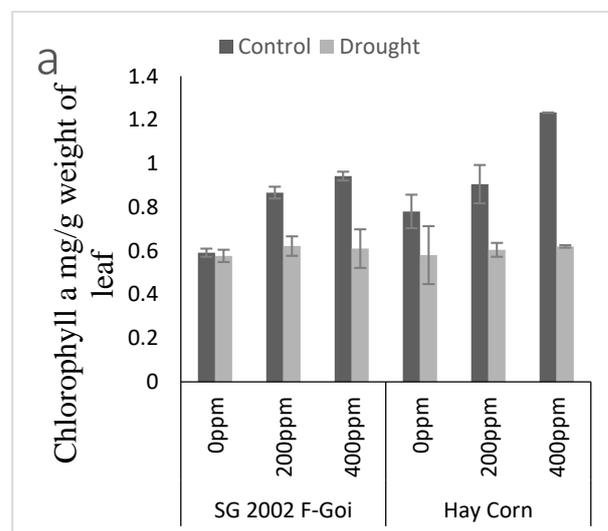


Figure 2: Fresh weight of shoot (a), Fresh weight of root (b), Dry weight of shoot (c) and Dry weight of root (d) of maize varieties pre- Soaked with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition.

From the table and figure it has been cleared that the drought has negative effect on the dry weight of root. The variety SG 2002 F-Goi was showed better performance under drought and control condition with and without pre-soaked Proline. In control condition with 200ppm pre-soaked Proline. The variety SG 2002 F-Goi was showed maximum dry weight of root in control condition with pre-soaked 200ppm Proline as shown in figure 2(d).

The chlorophyll a content was shown in table 1 and figure 3(a). From the figure it is cleared that chlorophyll a contents were reduce in drought stress as compared to control except 0ppm. Under control condition with pre-soaked with 400ppm showed highest chlorophyll contents. While under drought stress all pre-soaked with 0ppm, 200ppm and 400ppm was showed equal chlorophyll a contents. The chlorophyll b contents are presented in figure 3(b). From the figure it is cleared that the chlorophyll b contents were reduced in drought stress as compared to control condition in variety SG 2002 F-Goi. Under drought condition, the pre-soaked 400ppm was highest chlorophyll b contents in Hay corn variety. In variety SG 2002 F-Goi, the a/b was increased 0ppm under drought stress. Under drought stress, the a/b of chlorophyll

was decreased in all treatment of Proline The total chlorophyll contents were shown in figure 3(d) and table 1. Under control and drought condition pre-soaked 400ppm proline was showed highest chlorophyll contents. While under control and drought condition 0ppm was showed lowest chlorophyll contents.



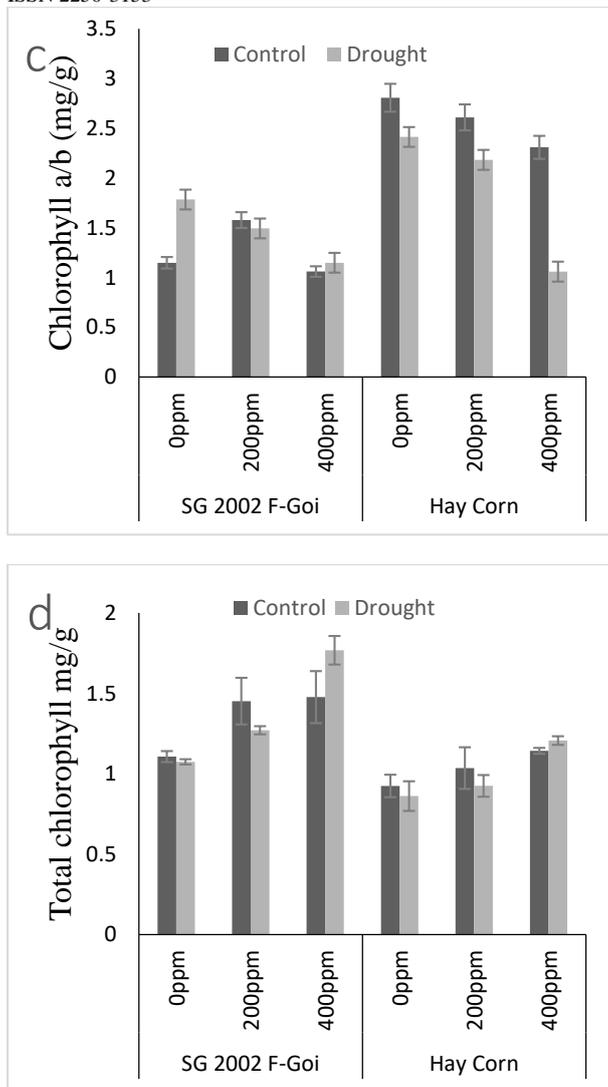


Figure 3. Chlorophyll a (a), b (b), a/b (c) and Total chlorophyll (c) contents of maize varieties pre- Soaked with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition

Table No. 1: Analysis of variance for shoot length, root length, fresh weight of shoot and root, Dry weight of shoot and root, Chlorophyll contents, total soluble proteins and total free amino acids

Source of Variance (SOV)	Shoot Length (cm/plant)	Root length (cm/plant)	Shoot Fresh Weight (g/plant)	Root Fresh Weight (g/plant)	Shoot Dry Weight (g/plant)	Root Dry Weight (g/plant)	Chlorophyll a (mg/g)	Chlorophyll b (mg/g)	Chlorophyll a/b (mg/g)	Total Chlorophyll (mg/g)	Total Soluble Proteins (mg/g)	Total Free Amino Acids (mg/g)
Varieties	25.729 ***	23.761 ***	0.446 ns	1.695 ns	57.517 ***	32.420 ***	6.917 *	14.730 ***	14.474 ***	0.012 ns	0.350 ns	0.918ns
Drought	9.357 **	4.614*	42.34***	32.789 ***	98.193 ***	18.525 ***	32.931 ***	7.736 *	1.110 ns	45.274 ***	16.332 ***	19.085 ***
Proline Priming	1.673 ns	0.138ns	6.991 **	0.713 ns	9.647 ***	1.1576 ns	5.351 *	19.303 ***	3.235 ns	21.441 ***	1.466 ns	9.138 **
Varieties * Drought	0.433 ns	4.976*	5.559 *	1.555 ns	4.737 *	9.461 **	7.062 *	7.410 *	3.980 ns	0.374 ns	2.324 ns	0.749ns
Varieties * Proline Priming	8.030 **	0.616ns	4.281 *	1.360 ns	16.360***	3.389 ns	2.329 ns	0.827 ns	0.516 ns	3.542 *	0.086 ns	6.043 **
Drought * Proline Priming	0.833 ns	4.875*	8.633 **	1.474 ns	67.406***	6.921 **	3.246 ns	0.149 ns	0.802 ns	2.162 ns	0.125 ns	1.756 ns
Varieties * Drought * Proline Priming	3.280 ns	3.783*	5.915 **	2.853 ns	27.528***	15.46***	1.848 ns	0.273 ns	0.421 ns	0.734 ns	0.060 ns	5.35*
Error	4.632	4.069	0.033	0.0350	6.080	9.573	0.018	0.009	0.461	0.023	701.354	2632026.9

The analysis of variance for the total soluble proteins has been presented in table 1. The both varieties showed non-significance results in control with and without pre-soaked Proline. These result also non-significance between two varieties under drought stress as shown in figure 4(a) and table 1. The analysis of variance for total free amino acids has been presented in table 1. From the table and figure, it has been shown that the both varieties in 0ppm and 200ppm showed non-significance results in control condition. The maximum value of total free amino acids has been recorded in SG 2002 F-Goi variety under drought stress pre-soaked with 400ppm Proline as shown in figure 4(b).

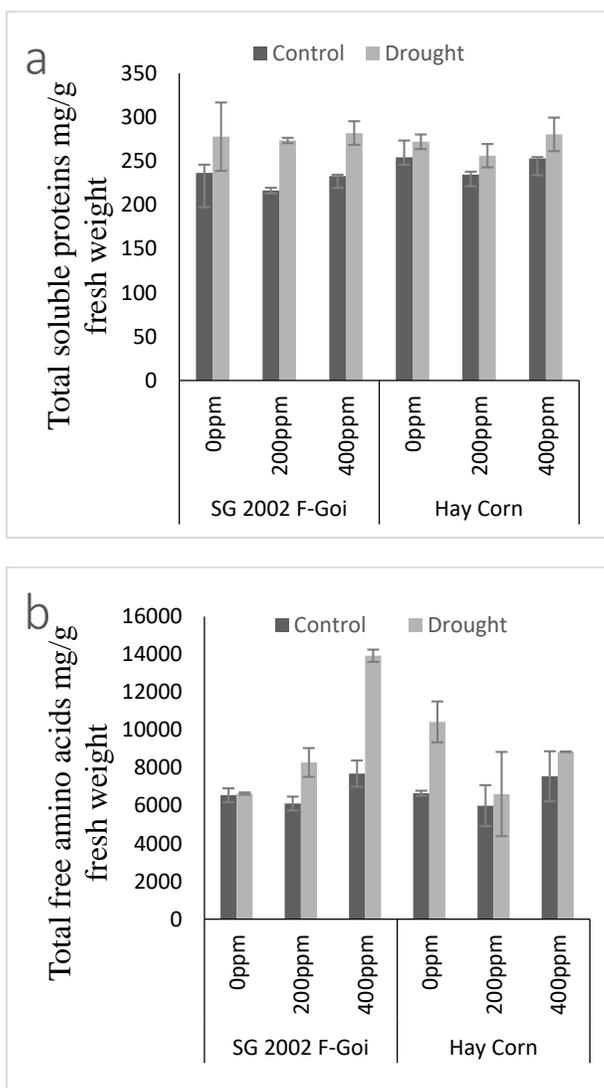


Figure 4. Total soluble proteins (a) and Total free amino acids (b) of maize varieties pre-soaked with <http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92117>

0ppm, 200ppm and 400ppm Proline grown under control and drought condition.

The figures 5 (A, B, C and D) showed the different banding pattern under reducing and non-reducing condition of maize varieties pre-soaked with Proline 0, 200 and 400 ppm concentration. Under reducing condition in both varieties, the bands are clearer and reflect the expression of proteins under drought and pre-soaked condition.

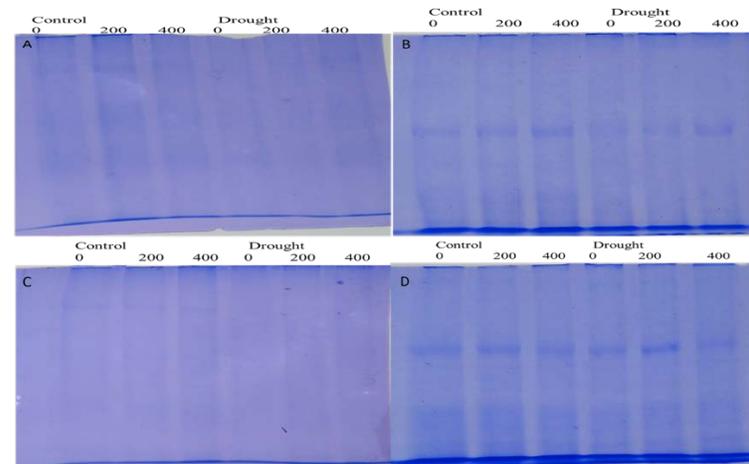


Figure 5. SDS-PAGE gel stain with Coomassie brilliant blue dye G-250 in non-reducing condition (A) and Reducing (B) of maize variety SG 2002 F-Goi while C and D non-reducing and reducing respectively for Hay corn maize variety with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition.





Figure 5: SG 2022 F-Goi maize variety pre-soaked with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition.



Figure 6: Hay Corn maize variety pre-soaked with 0ppm, 200ppm and 400ppm Proline grown under control and drought condition.

4. DISCUSSION

Drought is major abiotic stress that decreased the plant growth, development and yield of crop plant. Plant accumulates different osmolytes such as Proline. The exogenous application of Proline relief the plant under stress condition (Aldesuquy, et al., 2012).

Biomass production of Maize was decreased when it is subjected to drought in comparison to control condition and increased while in the plants treated with Proline concentrations. Same happened with root and shoot length. The reason for reduction in shoot and root length as well as reduction in their biomass like may be due to enhance in osmotic potential by cumulative salts, which centrals to dehydration, ionic imbalance in developing leaves that caused reduction in meristem activity and cell elongation. These results are similar to previous studies by (Kausar, A, M, & Niaz, 2014), (Harris, N, V, Tester, & M, 2010) and (Noreen, Athar, U, & Ashraf, 2013), exhibited reduction in biomass production by the imposition of salt in barley, wheat, pigeon pea and cotton. Under drought stress, the plant usually goes towards programmed cell death due to unavailability of water for a long time.

When exogenous application Proline is done on plants, this compatible solute usually ameliorate the consequences of drought stress by doing osmotic adjustment as in maize (Ali, et al., 2013). These results are similar to the findings of (Aldesuquy, et al., 2012). In the present study, the chlorophyll contents were decreased under drought stress and showed high graph in treatment with Proline. Stress avoids the plant to set off working of pigments like chlorophyll and causes the production of protein (Davison, P, Hunter, C, & Horton, P, 2002). Similar findings were observed in the chlorophyll contents of maize. Proline is a compatible solute and it enhances the chlorophyll content of crop plants as it maintains the integrity of light harvesting complex proteins which usually hold chlorophyll molecules. These results are compatible to (Cha-um, T. Samphumphuang, & C. Kirdmanee, 2013), who reported maintenance of chlorophyll content in rice under drought stress.

Drought stress has significance effect on proteins and amino acids. The current study indicates that the drought stress increased the total soluble proteins and total free amino acids. The pre-Soaked Proline varieties showed more proteins and amino acids under drought stress. These results are similar to previous studies. The increment in soluble protein by the application of Proline is because of de novo synthesis of proteins and amino acid for cell defence (Teixeira, M & Carvalho, I. S. d, 2009). Literature says that the proteins content improves in the plants facing stress and this increased amount of proteins tries to protect the plant from unadorned stress (Stich, B, et al., 2010). Under drought stress, proteins and amino acids content increase in crop plants to ameliorate the adverse effects of drought but Proline foliar application further causes increase in total soluble proteins and total free amino acids. These results are favorable with (Talat, et al., 2013), who reported increase in TSP and total free amino acids in wheat crop by foliar application of proline.

Protein Profiling is usually done for the quantification of the disintegration of proteins under different stresses. Thus clear band of increase in proteins are present by the exogenous application of Proline under drought stress. These results are compatible to (Moharramnejad, et al., 2015).

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Misconceptions on Employees' Motivation and Ways to Correct Them

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DOI: 10.29322/IJSRP.9.08.2019.p92118

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92118>

Abstract

The study of motivation and its implication to employees is a contemporary agendum in human resources management. Admittedly, there have been manifold misconceptions about employees' motivation. The misconceptions have been causing diverse sentiments among management scholars, practitioners and sometimes employees when trying to elucidate and apply the concept. Such misconceptions entails as to whether employees are intrinsically or extrinsically motivated, if some of employees are not at all motivated or all employees are motivated by single package and if money is the only center of motivation. The study assesses such misconceptions and suggests fashions of correcting them. The study used thirty two (32) respondents and data were collected through self-administered questionnaire method. The result of the study provides that, the discussed misconceptions retard organization's motivation efforts. Again, the study reasons that, motivation will be effective if measures it suggests will be complied by organizations.

Key words: *Misconception, Motivation*

1. Introduction

Motivation is an inner desire of an individual to accomplish something due to the diverse needs. It is the reasons underlying behavior and a continuous process (Guay *et al.*, 2010). This implies that fulfilling one need or desire does not mark the end rather mark the start point of another need thus creating a continuous chain. In any organization, an employee possesses own desired objective in which he/she tends to strive to achieve. Failure to that, leads to dissatisfaction but when one attains the planned objectives he/she becomes satisfied and thus motivated to stay longer with the organization (Kondalkar, 2007).

According to a study by Grant (2008), motivation imposes employees' outcomes for instance performance and productivity. The study established that, motivated employees are more oriented towards autonomy and are more self-driven in contrast to less motivated employees. Further, motivated employees are highly engaged and involved in their jobs and are more willing to take responsibilities (Kuvaas and Dysvik, 2009). These and other motivational studies stipulate the importance of employees' motivation in any organization.

However, the way of motivating employees has been subject to various perspectives. The question has been what package works well to employees and if there are some employees who can never be motivated at all. In this aspect, motivating employees find itself in the middle of one of the following conceptions; as to whether employees are only intrinsically or extrinsically motivated, if money is the only factor for motivation, if some employees can never be motivated at all and if employees are motivated by a single package (one size fits all).

These conceptions have been resulting into motivation misconceptions in trying to apply them and therefore retarding the efforts of organizations to motivate employees. The study assesses the mentioned misconceptions and at the end corrections are recommended for better employees' motivation practices.

2. Literature Review of Misconceptions on Motivation

There have been diverse arguments as far as motivation is concerned resulting in to critical misconceptions as provided below.

Misconception on extrinsic and intrinsic motivation

True worshipers of extrinsic motivation conception argue that, motivation consists of external factors that can necessitate employees' satisfaction and increase productivity. For that matter, they rely much on external packages/forces. They render that such factors are powerful to all organization employees and can influence their performance. In this scene, they worship factors such as salaries, job security, working conditions and quality of supervision. Hence, they assume that individuals are motivated extrinsically than intrinsically and forces mentioned satisfy employees (Amabile, 1993). However, this has been rated as misconception on motivation. The conception has been criticized by Herzberg (2003) in his Two-Factor Theory of Motivation where he rated such factors as dissatisfiers in a sense that they yield no motivation though their absence may dissatisfy employees. Additionally, such conception has been acted against by Morse (2003) in his work of "Chip health's intrinsic and extrinsic rewards" whereby the study concluded that, the bias exists in extrinsic motivation. In this aspect, Morse (2003) added that, some will be extrinsically motivated while others not.

Concerning intrinsic motivation, believers of this idea provide that, employees are mostly intrinsically motivated than extrinsic (Jones and George, 2003). They believe that, there are some inner factors within the mind of employees that act as a source of motivation to them. However, their belief results into misconception as not all employees are intrinsically motivated. This argument is supported by Koontz (1980) who opined that, motivation is a general term applying to the entire class of drives, desires, needs, wishes and similar forces.

Money and Motivation

Scholars and organizational practitioners have been conceiving motivation by relating it with money alone. Believers of this conception contend that, money is the main factor for enhancing motivation in organizations. They focus on attracting employees with good compensation packages and other financial benefits believing that, they will be motivated to struggle in achieving the organization goals (Shanks, 2007).

Albeit managers and organization practitioners accolade money as a substantial factor for motivation, those who conceive it as a misconception anticipate that, money motivates only to a point. For example, when compensation is not high enough or is considered to be inequitable, it becomes a de motivator. The assessment of this argument is supported by Frederick Herzberg (2003) in his Two Factor Theory of motivation where he grouped money among dissatisfiers. Also, it is supported by Hay Group study (1999), where 500,000 employees ranked fair pay and benefits as the least ten important motivating factors that keep them committed and staying with their companies. Drawing from such assessment they reason that money alone cannot motivate employees.

Some employees are not motivated at all

Again, there has been misconception that, some employees in organizations are not motivated at all. Believers of this misconception argue that, despite the application of several packages for motivating employees, some never get motivated at all. However, Manion (2005) believe that, everyone is motivated by something. Arguably, each employee has a possibility of being

motivated by a certain thing. The problem with managers is that, packages they use may not be direct towards the job. For that matter, managers must try to understand what motivate an employee in what job. This is because everyone has something that can motivate him or her.

One size fits all

Moreover, there is misconception about one way of rewarding and recognizing employees. In this misconception managers believes that, one size fits all employees in rewarding and recognizing them. The problem with this misconception is that, it refuses to acknowledge individual differences and group all employees together into a homogenous group. It is important to note that, individuals have different motives, and may act in different ways and be motivated by different aspects. Atchison (2003) provides that, to end this misconception, managers need to consider preferences when planning to motivate employees in order to improve effectiveness.

3. Methodology

3.1 The study area

The study was conducted at the Local Government Training Institute. Local Government Training Institute (LGTI) is a higher learning institution offering training, research and consultancy in local Government administration. The Institute is located in Dodoma city, Tanzania. The study collected data from four academic departments Institute which include; Department of Human Resources Management, Department of Local Government Administration and Management, Department of Accounts and Finance and Department of Community Development.

3.2 Data collection

The study used self-administered questionnaire method in the collection of data. Questionnaires were prepared and delivered to respondents who were given time to respond to the question asked. Respondents were randomly selected from each of the four academic departments of Local Government Training Institute. The list of employees found in each department was established comprising eighty (80) employees and each name on the list was assigned numbers such as 1, 2, 4, 5,,,,, N =32 (1...N) then selected randomly. This resulted into a total of thirty two (32) respondents that was used as a sample size.

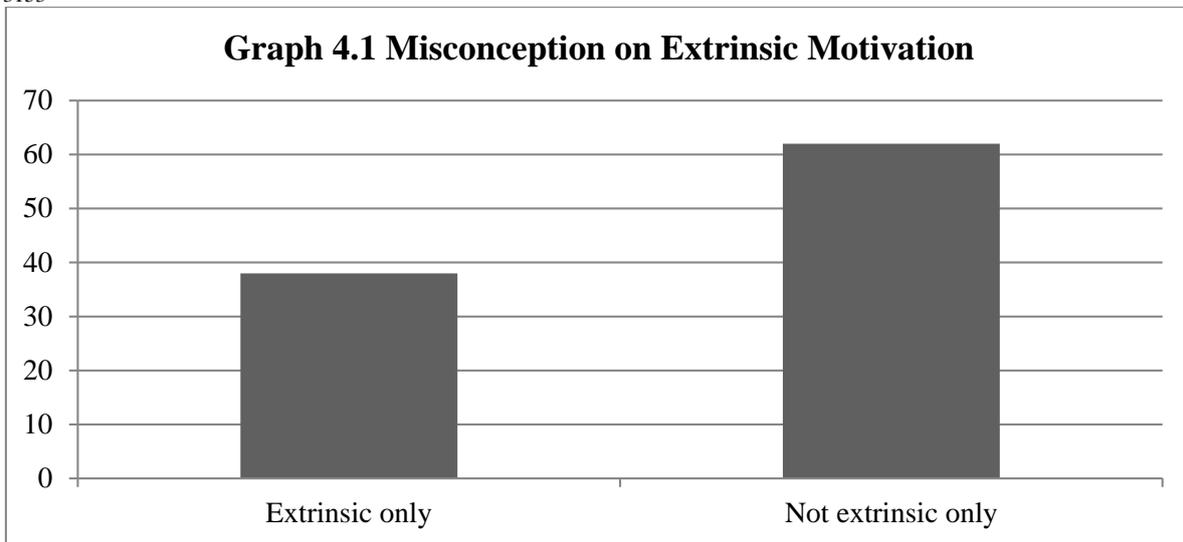
3.3 Data analysis and presentation

Collected data were cleaned, coded and summarized in a more understandable way. The data were analysed using the Statistical Packages for Social Sciences (SPSS) 20.0 computer program for windows as the study involved the collection of quantitative data. Graphs and tables were used to present the findings.

4. Results of the study

4.1 Misconception on Extrinsic Motivation

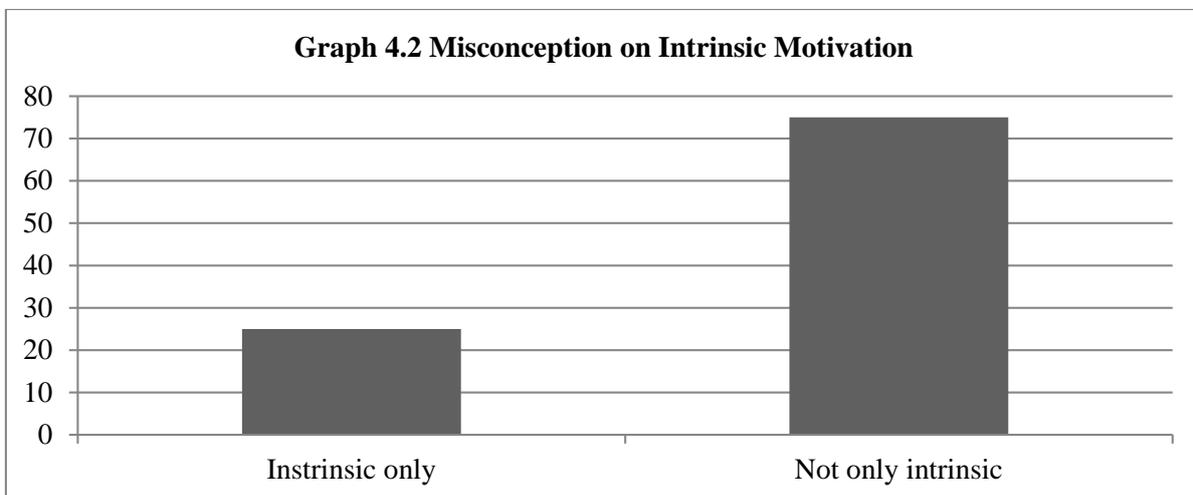
In this part, the aim was finding out if employees were extrinsically motivated only. Result of the findings revealed that twenty (20) respondents that is equivalent to 62% showed that employees are not motivated by extrinsic packages only and twelve (12) respondents that is equivalent to 38% revealed that extrinsic packages are the only packages that works in motivating employees. The result of the findings imply that majority of employees are not only motivated by extrinsic packages. The results are elaborated more in graph 4.1 below.



Source: Field Data (2019)

4.2 Misconception on Intrinsic Motivation

This part aimed to find out as to whether intrinsic motivation was the only source of motivating employees in the organization. The result of the findings revealed that twenty four (24) respondents that is equivalent 75% provided that intrinsic motivation was not the only source of motivating employees in the organization and eight (8) respondents that is equivalent to 25% revealed that intrinsic motivation was the only way of motivating employees in the organization. Thus, the result implies that, intrinsic motivation cannot be considered as the only source of motivation to employees therefore lacking complete relationship between employees motivation and intrinsic packages as graph 4.2 provides below.

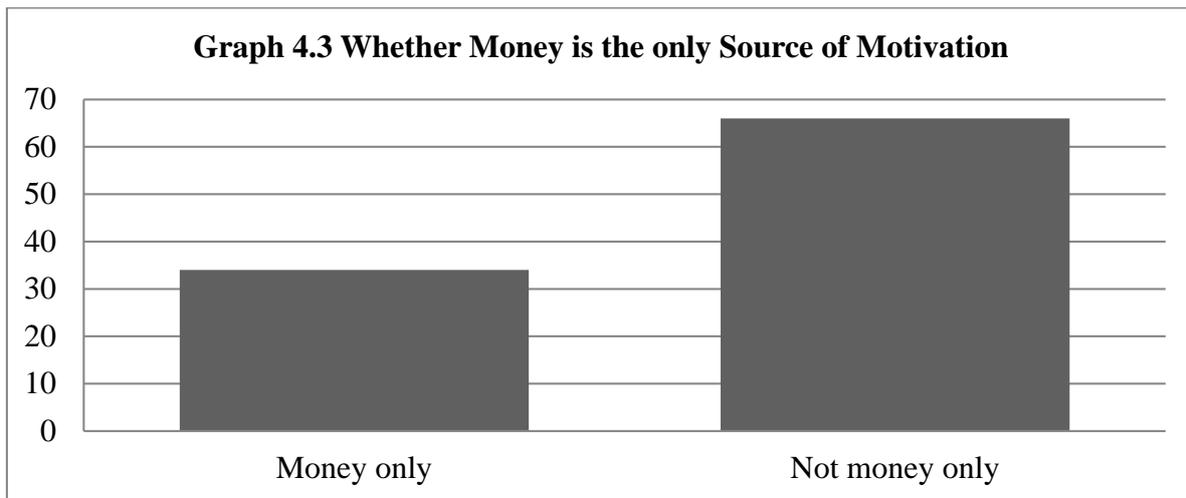


Source: Field Data (2019)

4.3 Whether Money is the only source of motivation

The aim of this part was to find out whether money was the only source of motivating employees in organizations. Respondents were asked to rate if money was the only way of motivating employees. The result of the findings revealed that twenty one (21) respondents that is equivalent to 66% provided that money was not the only source of motivating employees in organizations and eleven (11) respondents that is equivalent to 34% revealed that money was the only source of motivating employees in

organizations below. In this aspect, the result of the findings reveals that money is not the only considerate force of motivating employees in organizations as graph 4.3 shows.



Source: Field Data (2019)

However, respondents were asked to mention the other ways of motivating employees apart from money that they knew. Most of respondents mentioned recognition, achievement, involvement in organization decision making, organization dinner, shaking hands with supervisors, career advancement, employee’s birthday, employee appreciation day, employment milestone, project achievement and organization’s anniversary as other ways that can be used to motivate employees in organizations.

4.4 Whether there are employees who are not motivated at all

In this misconception, the aim was to find out if there are employees who are not motivated at all. The results of the findings revealed that thirty (30) respondents that is equivalent to 94% provided that it is not true that there are employees who are not motivated at all and two (2) respondents that is equivalent to 6% provided that they were not aware as if there were employees who are not motivated at all. The results of the findings imply that almost all employees are motivated by a certain package as table 4.4 provides below.

Table 4.4 Whether there are employees who are not motivated at all

Whether there are employees who not Motivated at all	Respondents	Percentage (%)
Not true	30	94%
Not aware	2	6%
Total	32	100%

Source: Field Data (2019)

4.5 Misconception on if all employees can be motivated by a single package (one size fit all)

The study aimed to find out as to whether all employees can be motivated by a single package. The results of the findings revealed that twenty six (26) respondents which is equivalent to 81% did not agree the fact that single package can motivate all employees compared to six (6) respondents that is equivalent to 19% who agreed that all employees can be motivated by a single package. The result of the findings implies that all employees cannot be motivated by a single package as table 4.5 shows below.

Table 4.2 Misconception on if all employees can be motivated by a single package

If all employees can be motivated by a single package	Respondents	Percentage
Agree	6	19%
Not agree	26	81%
Total	32	100%

Source: Field Data (2019)

5. Discussion of the findings

The discussion is centered on the results of the findings revealed above as far as misconceptions on motivation are concerned. The discussion aimed at correcting the following misconceptions; (a) whether employees are intrinsically or extrinsically motivated (b) if money is the only source of motivating employees (c) whether if there are employees who are not motivated at all and (d) if a single package can motivate all employees.

(a) Whether employees are intrinsically or extrinsically motivated

Management scholars have been in a big discussion on whether employees are intrinsically or extrinsically motivated. Some believes that intrinsic motivation is the only way that managers should focus to practice in motivating its workforce while others believe that extrinsic motivation including good salary, contingency pay, employees benefits are the main source of motivation. In this aspect, organizational managers have been focusing on what they believe on their side intrinsically or extrinsically to motivate employees.

Believers of intrinsic motivation praise that inner drivers will lead to motivation of employees and therefore they just focus on internal motivation. The result of the findings shows that 75% of respondents provided that, intrinsic motivation is not the only source of motivating employees. In other words, believing that only internal factors will lead to motivation is the wrong conception as far as motivation is concerned. That is to say, internal drivers such as recognition, appreciation, achievement or increased job responsibility cannot be relied upon as the only way of motivating employees in the organization.

The result of the findings is supported by Koontz (1980) who opine that, motivation is a general term applying to the entire class of drives, desires, needs, wishes and similar forces. The entire class of drives and other sources implies other sources than intrinsic forces.

Again, the study shows that, 62% of respondents provided that extrinsic motivation factors cannot be regarded as the only source of motivating employees in the organization. The extrinsic factors can include salary, company policies, leadership style and other contingent pays. That being the case, praising that the mentioned factors above and the related ones are the only factors that motivates employees is the wrong conception when relying to the study findings. That is to say, not all employees in the organization will be motivated by extrinsic forces because there are those who are intrinsically motivated.

The result of the findings is also supported by Morse (2003) who concluded that there is bias in extrinsic motivation hence such packages cannot be considered as main aspect for motivating employees. Again, Herzberg in his Two Factor Theory (2003) rated extrinsic factors that their presence does not motivate because it yields to dissatisfaction though their absence may dissatisfy employees.

In this aspect, relying only on intrinsic or extrinsic sources of motivation may jeopardize the achievement of motivation aims. Internal and external sources of motivation should run concurrently. They must be practiced at the same time if managers are to motivate employees fairly and equitably. Relying on one source can motivate some employees and demotivate others who do not believe in the particular source. Management practitioners need to consider using both sources in motivating employees in order to achieve organizational pre-determined objectives. However, despite the fact that both intrinsic and extrinsic sources must be used to motivate employees, managers must be keen to understand which source motivates who.

(b) If money is the only means of motivating employees

Believers of this misconception provide that, money is the soul of motivating employees in the organization. They believe that, employees are motivated by cash more than anything else. They praise attractive salary, financial benefits and contingent pays. That is to say they find and design any financial means to motivate employees.

However, the result of the findings revealed that 66% of respondents rated that money was not the only way of motivating employees in the organization. This entails that, not all employees can be motivated by money. Most organizations today are focusing on attracting, retaining and motivating employees using attractive financial packages however; submitting that money will motivate all employees is the wrong conception. The argument is supported by Hay Group studies (1999) who provided that employees used in their study mentioned pay (money) in the ten least motivating factors. Some employees are motivated by non-financial means such as recognition, shaking hands with supervisors, career advancement, employee's birthday, employee appreciation day, employment milestone, project achievement and organization's anniversary as respondents provided in this study.

Furthermore, submitting that money is the only means of motivating employees for better organizational performance is the wrong conception as some organization scholars believes that money does not motivate but their absence dissatisfies employees. Herzberg (2003) in his Two Factor Theory listed salary in a group of factors that does not satisfy employees in organization.

That being the case, money can motivate some employees in the organization but must not be relied as the only way of motivation. Therefore Managers need to rethink about how they treat money as the means of motivating employees.

(c) Whether if there are employees who are not motivated at all

Misconception on whether some employees are never motivated at all has been proven against by the results of the findings which have provided that each employee is motivated by a certain package. Large number of respondents in this study identified that each employee is motivated to a certain package. The results of the findings showed that 94% of respondents revealed so; this is supported by Manion (2005) who believes that, everyone is motivated by something.

The challenging task to managers is to identify each employee is motivated by what package. In this aspect, the study has resolved this misconception by proving that each employee is motivated by a certain package and therefore it is significant for managers to investigate what package motivate who for the aim of improving organizational productivity.

(d) Whether all employees are motivated by a single package

The result of the findings revealed that believing one size fits all is a wrong conception when it comes to employees' motivation as 81% of the respondents used in this study submitted that, single package cannot motivate all employees. The result is supported by Atchison (2003) who opines for managers to have a plan on motivating employees rather than focusing on as single package believing that it will yield to motivation for all.

In this aspect, management practitioners need to be aware and consider investigating employees to find out each is motivated by what package. This will help the organization in effectuating employee's performance as the size that fit each employee will be identified; thus motivation impacting the achievement of organization goals.

6. Conclusion

Admittedly, motivating employees is a contemporary agenda in management as employees today are very selective to the organization they join. Most of them join organizations that motivate and recognize them as an important resource. For an organization to become the best choice of employees, they need to be aware of important tips of motivating employees. No doubt those misconceptions discussed retards organization motivation efforts. All packages are important for employees' motivation and should be considered equally in application. Therefore, organizations should consider the result of the findings provided in this study for better application of motivation packages hence becoming the best employee's choice.

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Effect of Organizational factors on Job satisfaction of Midwives in the preventive care services in Matara, Sri Lanka

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DOI: 10.29322/IJSRP.9.08.2019.p92119

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92119>

Abstract- Job satisfaction is a multifaceted concept. Numerous organizational factors have been identified to determine the level of job satisfaction. Midwives attached to Medical Officer of Health's offices of Sri Lanka provide maternal and child health care services at ground level. This cross-sectional descriptive study was conducted in Matara district, Sri Lanka to assess the effect of organizational factors on job satisfaction on midwives in the preventive care services. Job satisfaction and satisfaction with selected eleven organizational factors was assessed through a self-administered structured validated questionnaire based on the short form of Minnesota Satisfaction Questionnaire. The questionnaire consisted of a five-point Likert scale. Midwives were satisfied with their job with a mean of 3.6161 (SD 0.60024). Considering the eleven organizational factors, midwives were satisfied with eight selected organizational factors. Yet midwives were not satisfied with workload, remuneration and transfer scheme. All the selected organizational factors were found to be determining the level of job satisfaction through multivariate analysis (R squared = .44, F (11, 253) = 17.191, P = .000). This study recommends to improve the identified organizational factors in view of increasing job satisfaction of midwives.

Index Terms- Midwives, Job Satisfaction, Organizational Factors, Preventive care

I. INTRODUCTION

Job satisfaction is a complex multifaceted concept. Vroom (1964, p.99) defines "job satisfaction as affective orientations on the part of individuals toward work roles which they are presently occupying" focusing on the role of the employee in the work place. Research reveal numerous organizational factors determining the level of job satisfaction such as organizational development, policies of compensation and benefit, promotion and career development, job security, working environment and condition, relationship with supervisor, work group, leadership styles and job characteristics (Haijuan et al ,2006; Luthans, 2005; Sageer et al 2012).

Public Health Midwives (PHMs) are the key service providers in Sri Lanka who deliver home-to-home Reproductive, Maternal, Newborn, Child, Adolescent and Youth Health (RMNCAYHP) services. Presence of this skilled grass root level worker has ensured the quality of maternal and child health services resulting a reduction in maternal mortality ratio from 2650 in 1935, to 33.8 per 100,000 live births in 2016. Further midwives have contributed to the fall of infant mortality rate from 263 in 1935 to 10 per 1,000 live births in 2016 (Ministry of Health, 2016).

Midwives are attached to 342 MOH areas in 25 districts of Sri Lanka. They receive a common training at different provincial training institutes. Following training, Ministry of Health (MoH) recruits midwives to hospitals to provide curative care or to a Medical Officer of Health's (MOH) office to provide preventive care. All midwives attached to a MOH has the same job role which is accepted nationally. Midwives are eligible for transfers each five year but the transfers are not implemented regularly.

The role of the midwives providing preventive care has widened in the recent past including the provision of services related to control of both communicable and non-communicable diseases and mental health related diseases at the ground level resulting a rise in the workload. Midwives in their workplace are exposed to stressful situations. Identification of the current level of job satisfaction and organizational determinants of job satisfaction of midwives attached to MOH offices is important for the management. This knowledge aid to raise the job satisfaction by modifying the identified organizational factors.

II. LITERATURE REVIEW

Job satisfaction of midwives has been assessed worldwide through different questionnaires. Short form of Minnesota Satisfaction Questionnaire (MSQ) is a validated tool which provides more specific information on the aspects of a job that an individual find rewarding (Weiss et al, 1977). International studies which assessed the job satisfaction of midwives with MSQ revealed mixed results where some are satisfied and some are not expressing its changing nature (Bodur, 2002; Kumar et al, 2014; Muhammadani, 2015; Skinner et al, 2007; Talasaz et al, 2014). Based on the organizational environment satisfaction with organizational factors have been varied in different studies (Gamini, 2008; Hampton & Peterson, 2012; Muhammadani, 2015; Talasaz et al, 2014).

Job satisfaction and its correlates among midwives attached to MOH offices was studied in Ratnapura district, Sri Lanka in 2008 where majority were neutral on job satisfaction (Gamini, 2008). Further midwives were not satisfied on remuneration and career development opportunities where as they were satisfied with the working environment, and support of supervisory officers (Gamini, 2008). Considering the impact of job satisfaction on the quality of health care services, assessing job satisfaction and its organizational determinants at least once in every six months has been recommended by Jahani (2010, cited in Talasaz et al, 2014).

Matara district has a population of 845000 living in both rural and urban settings whom were served through 253 midwives attached to 17 MOH areas (Ministry of Health, 2018). Each MOH area is composed of several PHM areas which is varying from 10-20. With the recent addition of job functions, role of a midwife attached to a MOH has changed considerably. Hence in view of identifying the level of job satisfaction and effects of organizational factors on job satisfaction among midwives in the preventive care services this study was conducted in Matara district of Sri Lanka.

III. METHODOLOGY

This descriptive cross-sectional study was conducted in 2016 among all 273 Public Health Midwives (PHMs) served in all MOH areas (17) in Matara district providing preventive health services. Midwives on maternity leave or long medical leave were excluded from the study. A modified, validated, pretested structured self-administered questionnaire with a five-point Likert scale response (Strongly agree, Agree, Neutral, Disagree and Strongly disagree) was developed based on short form of MSQ. Questionnaire assessed the demographic information, satisfaction with eleven organizational factors and satisfaction with job itself of midwives. Data was collected by the principal investigator visiting each MOH office following obtaining ethical and administrative approval.

Data was entered and analyzed in Statistical Package for the Social Science (SPSS) software (version 23). Demographics of the midwives, satisfaction with identified organizational factors and satisfaction with job itself was assessed. Further correlation was assessed among the satisfaction with organizational factors and job satisfaction.

IV. RESULTS

Among the eligible 261 midwives 253 responded to the questionnaire resulting a response rate of 96.9%. Hundred and eighty-nine (74.7%) midwives were 36 years or more and 228 (90.1%) of midwives were married. Most of them were residing in their own house (n=220, 87%). Majority had an experience of more than 10 years in the Ministry of Health (191, 75.49%). More than half of the midwives have been in the current station for more than 5 years in the current station (n=174, 68.77%).

Among Midwives, 173 (68.4%) had a serving population of 2501- 4500. Twenty-one (8.3%) midwives had a population more than 4500. Extent of area of the majority (n=131, 51.9%) was > 4 km² - 8 km². Only 16 (6.3%) midwives had an area larger than 16 km². There were 27 vacant posts. Among them 22 (81.5%) were vacant for a period less than 1 year and 5 (18.5%) for 1- 2 years. Medical Officer of Health (MOH) was available for all the midwives as a supervising officer (n=253, 100.0%) whereas only 198 (78.3%) were supervised by a Public Health Nursing Sister (PHNS). Supervising Public Health Midwives (SPHM) supervised 239 (94.5%) of midwives.

The mean value of job satisfaction was 3.6161 (SD 0.60024) hence, midwives were considered to satisfied with their job. Assessment of satisfaction with eleven selected organizational factors was illustrated in Table 1. Midwives were highly satisfied with their co-workers (M=3.9217, SD=0.63249). Midwives were not satisfied with the remuneration (M=2.5837, SD=0.82651) and transfer scheme (M=2.7727, SD= 1.03065). Workload (M= 2.4012, SD= 0.89621) is the least satisfied factor.

Table I: Distribution of mean and standard deviation of satisfaction of organizational factors

Organizational Factor	Mean	Standard Deviation
Working Condition	3.7688	0.70913
Supervision	3.8235	0.71487
Co worker	3.9217	0.63249
Workload	2.4012	0.89621
Autonomy	3.3439	0.66393
Training Received	3.5586	0.52260
Remuneration	2.5837	0.82651
Carrier development	3.2292	0.75908
Welfare	3.3992	0.92835
Transfer scheme	2.7727	1.03065
Leave	3.5850	0.75046

As the mean values of the organizational factors were normally distributed, Pearson correlations coefficients (r) were conducted to determine whether a relationship existed between the dependent variable job satisfaction and the selected eleven organizational independent variables which were statistically significant. Therefor a multiple regression analysis was conducted to evaluate the predictive values of the organizational factors on the midwives' job satisfaction. All analyses were conducted at the 0.05 significance level. Normal P-P plot of regression standardized residual revealed the normal distribution of data (Figure 1).

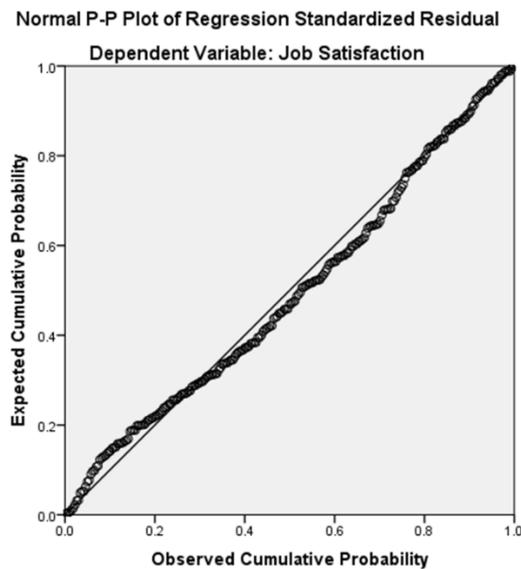


Figure 1: Regression Standardized Residual Plot

A model analysis was conducted including the eleven independent variables (Autonomy, Carrier development, Coworker, Leave, Remuneration, Supervision, Training Received, Transfer scheme, Welfare, Working condition and Workload) and the dependent variable. The linear combination of the 11 independent variables was significantly related to the dependent variable (job satisfaction), $R^2 = .44$, adjusted $R^2 = .414$, $F(11, 253) = 17.191$, $P = .000$ (Table 2).

Table II: Model summary between independent variables and dependent variable

Model Summary						
Model	R	R square	Adjusted R square	Std. Error of the Estimate		
1	0.663 ^a	0.440	0.414	0.45945		
ANOVA						
Sum of Squares	df	Mean Square	F	Sig.		
Regression		3.629	11	0.32990	17.191	0.000
Residual		0.211	241	0.00087		
Total		3.840	252			

A. Predictors:

(Independent variables) Autonomy, Carrier development, Coworker, Leave, Remuneration, Supervision, Training Received, Transfer scheme, Welfare, Working condition and Workload

B. Dependent Variable: Job satisfaction

The analysis revealed job satisfaction of midwives are affected by all selected organizational factors.

V. DISCUSSION

Midwives were satisfied with the job in contrast to the findings of Gamini (2008) where the majority of midwives were neither satisfied nor dissatisfied. Improvements in transport facilities provided, presence of fairly low vacant posts, small populations to be served and small extent of areas may have contributed to the findings.

Yet, midwives were not satisfied with the remuneration, transfer scheme and workload. Job role of a midwife attached to a MOH office has widened in the recent past which may have contributed to the rise in the workload. Further they do not receive extra duty payment compared to hospital midwives and do not receive an adequate travelling allowance. These factors may have contributed to the findings.

As the midwives are not satisfied with the current transfer scheme further research is needed to identify the reasons for the finding in view of modifying the current practice. Descriptive analysis of job role with the newly added job functions and recruitment of midwives for the vacant posts may improve the satisfaction with workload. Further revision of salary and allowances timely may enhance job satisfaction. Study concluded selected organizational factors were strongly correlated with job satisfaction hence, improvements in organizational factors may enhance job satisfaction.

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Nasofacial Anthropometric Study Among Nupe Ethnic Group, Nigeria.

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DOI: 10.29322/IJSRP.9.08.2019.p92120

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92120>

ABSTRACT

Anthropometry data of Nasofacial indices dimensions is vital in Nasofacial Surgery, Forensics Medicine and Diagnostic comprehension. This study is aimed at observing the variation of length and width of face and nose among Nupe Ethnic group of Katcha Local Government Area of Niger state. A cross sectional study was done on 400 colleges and secondary school students aged between 12-20years, using appropriate sampling method. The Nasal facial length and width were measured and recorded. The data were analyzed using SPSS/16.0 software. The mean value of Facial index for the male and female Nupe subjects showed 70.2 ± 0.61 and 69.1 ± 0.53 with mean Nasal index of 90.87 ± 0.42 and 90.3 ± 0.584 indicating the dominance of hypereuryprosopic face type and platyrrhine nose type. The difference in Facial and Nasal indices between male and female Nupe subjects was not statistically significant ($p > 0.05$). These measurements in healthy subjects are useful for dysmorphologist in the early identification of some dysmorphic syndromes like cleft lip associated with nose disorders; it will also be relevant in Forensic Medicine, Rhinoplasty Surgery and Physical Anthropology.

Keywords: Anthropometry, Nose, Face, Nupe Tribe, Nigeria

INTRODUCTION

Anthropometry comes from a Greek word "Anthropos" which means human and "metron" which means measure (Khan *et al.*, 2012). According to the WHO, the Anthropometry is an inexpensive and non invasive technique for assessing the size, proportions, and composition of the human body. Nasofacial Anthropometry is a specific component of the anthropometric field that focuses on the facial and nasal region which is also vital for sex determination, Forensics uses, quantifying nasofacial dysmorphology, Facial Surgery and diagnostic reconstruct congenital or post traumatic facial disfigurement successfully (Farcas *et al.*, 2005). The anthropometry of any part of the body varies between individuals among race. The face and nose are important physiognomic features in humans.

Face and nose developed from the frontonasal prominences, nasal prominences, maxillary and mandibular prominences. The final characteristics of the face depend on the changes in the proportion and position of these components (Kurnia, 2006).

The Growth and development in humans are affected by many factors such as geological, biological, geographical, racial, gender, and age factors (Jahanshahi *et al.*, 2008; Kurnia *et al.*, 2012). Cephalometry is an important aspect of physical anthropology in which measurements are useful in Forensic Medicine, Plastic Surgery and Treatment Planning (Heidari *et al.*, 2009; William *et al.*, 1995). The facial and nasal indices are among the most cephalometrics parameters useful in inter-racial classification and intra-racial categorization. The different categories of anatomical faces are;

Hypereuryprosopic (very broad, short face), Euryprosopic (broad, short face),

Mesoprosopic (average face), Leptoprosopic (tall, narrow face)

Hyperleptoprosopic (very tall, narrow face) (William *et al.*, 1995).

The white race have a narrow, long and high nose (Leptorrhine), the blacks have wide and fat nose (platyrrhine) and orientals have medium sized nose in between the first two (mesorrhine) (Jimoh *et al.*, 2011). The nose may be elevated by direct clinical measurement (morphometry) (Mutsvangwa *et al.*, 2011). Variables that determine the shape of the nose include race, tribe, environmental factors, and Clinical condition (Sinnatamby, 2006). With narrow nose being favored in cold and dry climates and broad noses in warmer, moister noses as consequence of natural involved in human evolution.

The different type of anatomical noses include; Hyperleptorrhine (excessively tall and narrow nose), Leptorrhine (tall and narrow), Mesorrhine (medium), Platyrrhine (excessively broad and flat nose) (Kurnia, 2006).

The knowledge of the absolute and the relative variability in the size and shape of the human body is crucial to study human growth, population variation, and medicological identification in forensics as well as in optimization of instrument such as respirators, gas and dust masks, and military helmets (Khan *et al.*, 2012). The standard proportion exists for American, Indians, Malaysians and many other populations but only few exists for Nigerians. Many people had carried out research on nasofacial indices in Igbo, Yoruba and Hausa ethnic group in Nigeria (Adamu, 2010 and Omotoso *et al.*, 2012). Bekwara, Andoni and Okrika ethnic groups of cross river state in Nigeria (Lukpata *et al.*, 2013 and Oladipo *et al.*, 2009). However, very little studies have been carried out, thus a research on Nupe Ethnic group in Nigeria.

MATERIAL AND METHODS

The instrument used for the measurement of nasal index and facial index was sliding vernier caliper, which has two set of arm that is the upper fixed arm and the lower moveable arm.

The sliding vernier caliper also has two reading scales. These are the scale division and the main division.

The sample size comprises of 400 subjects made up of randomly selected children and young adult (300 males and 100 females) of age range 12 – 20 years.

The measurements were taken with subjects sitting on a chair in relaxed mood and upright with head unsupported in an anatomical position.

A 12inch (0.003mm) fast display vernier caliper series ECOS5 (ID: 1111 - 103-20g) was used for the measurement of nasal height, nasal width, facial height and facial width.

Nasal height was measured by placing the upper fixed divider arm of the vernier caliper with accuracy of 0.01cm on the nasion superiorly and the lower arm on the sub nasal inferiorly, and then the readings were taken on the vernier scale and recorded.

Nasal width was measured as the distance between the external surfaces of one alar of the nose to the alar at right angle to the nasal height.

The nasal index was calculated as the ratio of nasal width to the nasal height multiplied by 100 i.e. Nasal index = $\frac{\text{Nasal width}}{\text{Nasal length}} \times 100$ (Oladipo *et al.*, 2009).

As for the face, the facial height was measured by placing the upper fixed arm of the vernier caliper with accuracy on the nasion superiorly and the lower moveable divider on the menton of the mandible and the readings were then read and recorded on the scale vernier caliper.

The facial width was measured as the distance between zygomatic bones (i.e. bizygomatic distance). Therefore, the readings were made on the scale vernier caliper and recorded appropriately.

Table A

Face type Facial index	
Hypereuryprosopic (very broad, short face)	≤78.9
Euryprosopic (broad, short face)	79.0–83.9
Mesoprosopic (normoprosopic: average face)	84.0–87.9
Leptoprosopic (tall, narrow face)	88.0–92.9
Hyperleptoprosopic (very tall, narrow face)	≥93.0
Nose type Nasal index	
Hyperleptorrhine (excessively tall and narrow)	≤54.9
Leptorrhine (tall and narrow)	55.0–69.9
Mesorrhine (medium)	70.0–84.9
Platyrrhine (broad and flat)	85.0–99.9
Hyperplatyrrhine (excessively broad and flat)	≥100.0

The facial index was calculated to be the ratio of the facial height to the facial width multiply by 100 i.e. facial index = $\frac{\text{facial length}}{\text{facial width}} \times 100$ (Romo and Abraham, 2003; Heidar *et al.*, 2004; William *et al.*, 1995). The necessary precaution was noted while using the instrument (Angokoha, 2006).

The data was further analyzed statistically to determine the mean, standard deviation and significance level (P – value.)

ANOVA TEST AND t – test were done for data analysis using SPSS/16.0 software to find the facial and nasal indices mean, and standard deviation for all parameters and P –value.

Inclusion and Exclusion Criteria

Individuals that are truly of Nupe Ethnic origin of both parents and grandparents were randomly selected and included. Subjects with mixed racial parentage were excluded. Individuals with facial trauma, septoplasty, craniofacial abnormalities, and other minor ethnics in Nupe such as Kupa and Gbagi were excluded.

RESULT

Table 1: Mean (\pm SD) of the length and width of face and nose of Nupe tribe aged 12 – 20 years.

Parameters	Mean \pm SD	Minimum	Maximum
AGE	15.73 \pm 2.64	12.00	20.00
NL	274 \pm 0.303	1.90	3.80
NW	248 \pm 0.0.28	1.80	3.70
NI	91 \pm 0.42	0.67	0.85
FL	873 \pm 0.77	7.10	12.80
FW	1252 \pm 0.78	9.60	14.80
FI	69 \pm 0.59	0.56	0.99

The result for age group 15 – 20 years represented in Table 1 showed the overall descriptive of the population.

Table 2: Sexual dimorphism in mean value of the nasal index.

Parameter	Sex	Means	t	P-Value
Nasal index	Male	90.9 \pm 0.653	0.167	0.683
	Female	90.3 \pm 0.584		

Table 2. Shows sexual difference was insignificant for Nasal index (P> 0.05).

Table 3: Sexual dimorphism in mean value of the facial index

Parameter	Sex	Mean \pm SD	t	P-Value
Facial index	Male	70.2 \pm 0.61	0.768	0.381
	Female	69.1 \pm 0.53		

Table 3. Shows sexual difference was insignificant for Facial index (P> 0.05).

DISCUSSION

The different tables above show the result of the study population

Table 1: shows the description of the study population with facial and nasal indices value represented as mean \pm SD (standard deviation), minimum and maximum values of the facial and nasal indices.

Table 2: shows a t- test statistical analyses of facial index by sex of general sample, i.e. sexual dimorphism between male and female with significant level (p>0.05). However, the difference in the facial index is not statistically significant. This implies that both male and female Nupe ethnic group of Katcha local government area of Niger state are having the same face type. And this is in contrary with the study of nasofacial indices in Hausa which is unpublished. The study reported that sexual dimorphism exists in Hausa Ethnic group in term of facial index with significant level (p<0.001) (Adamu, 2010).

This study is in accordance to the study of nasofacial indices among children of Southern Nigeria which showed that sexual dimorphism does not exist in term of facial index among children in southern Nigeria with male subjects having a mean facial index of 87.15 \pm 1.70 and mean female having a facial index of 86.25 \pm 1.70 (Omotoso *et al.*, 2012). Table 3: shows a t-test statistically analysis of nasal index by sex of the general sample i.e. sexual dimorphism between male and female with significant level (p>0.05). However, the difference in the facial index is not statistically significant. This indicates also that both male and female Nupe Ethnic group of Katcha Local Government has the same nose type. However, this study is in accordance to the work of Adamu (2010) which shows that sexual dimorphism does not exist in Hausa Ethnic group in term of nasal index. Moreover, this study is in comparable with the study of (Omotoso *et al.*, 2012) which demonstrates that mean nasal index difference between male and female subjects was statistically significant with male and female subjects having mean nasal value of 93.45 \pm 1.66 and 89.62 \pm 1.58 respectively.

CONCLUSION

This study found that the Nupe ethnic group had an overall mean facial index of 70.2 and an overall mean nasal index of 90.87 indicating the prevalence of Hypereuryprosopic face type and platyrrine nose type respectively.

ACKNOWLEDGMENT

We sincerely thank the Nupe Ethnic group of Katcha Local Government Area of Niger state who participated in the study especially the Local Government Council, and the district head for their support

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Change of Vegetation Cover in Malang District

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DOI: 10.29322/IJSRP.9.08.2019.p92121

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92121>

Abstract- Declining environmental quality has threatened the survival of humans and living things along with the rapid development. Development activities in all aspects of life carry the risk of pollution and environmental damage. This study aims to examine the vegetation cover conditions in Malang District, measure and describe changes in vegetation cover and identify management efforts, protect environmental rehabilitation and conservation recommendations and control environmental damage (land) that has been done. The location of the research is in Malang District. The basis of the regulation is the Minister of Forestry Decree No. 395 / menhut-II / 2011, SNI 7645: 2010. The tool used is a Landsat 8.0 Image. The amount of vegetation cover in 2016 was 64.46% while the area was not vibrating at 35.54%. The amount of vegetation cover in 2017 is 76.69% while the area is not vibrating at 23.31%. The amount of vegetation cover in 2018 is 65.79% while the area that is not vibrating is 34.21%. Conservation efforts and control of environmental damage (land) that have been carried out include: Realization of tree planting; Forest and Land Rehabilitation; Tree Planting Activities on Former Mine Land. Keywords: Vegetation Cover, Landsat Image, Conservation

Index Terms- Change of Vegetation Cover, Citra Landsat 8.0, Conservation, Malang District

I. INTRODUCTION

Declining environmental quality has threatened the survival of humans and living things along with the rapid development. Development activities in all aspects of life carry the risk of pollution and environmental damage. Law Number 32 of 2009 concerning Protection and Management of the Environment, mandates that environmental development control measures need to be carried out to maintain and improve environmental quality. Vegetation (from English: vegetation).

In ecology is the term for the whole plant community in a particular place, including both communal mixtures of the types of its constituent flora and the land cover formed. Vegetable land cover is an important part of people's lives in urban areas, an increase in the population of Malang District has an impact on the conversion of vegetated land functions into built-in areas so that it can be observed that the development of regional development has taken place rapidly and is expected to continue.

This development will bring spatial impacts in the form of changes in spatial utilization patterns, both planned and unplanned. Changes in vegetation cover play an important role in

the growth rate of Malang District which reaches 0.67% per year with a population density of 0.148 ha / soul, Malang District. Changes in vegetation cover that occurred in Malang District without the management of spatial patterns of a region caused damage to the environment and ecosystems in it, so that the impact on the sustainability of environmental functions, other sources also stated that social factors are the trigger for changes in vegetation cover.

This study is to examine changes in vegetation cover in 2016 - 2018 in Malang District, taking into account several types of land that are part of the type of agriculture and other vegetation. Changes in vegetation cover in Malang District using remote sensing methods using Landsat 8.0 images with repeated retrieval techniques for maximum and specific results, so that the data quality from the Normalized Difference Vegetation Index (NDVI) through the spectral concept using bands ($NDVI = (NIR - Red) / (NIR + Red)$), description: NDVI -1 (water) to +1 (dense vegetation) so as to produce the greenness of the color of a plant, this study produces extensive value data from each sub-district in Malang District and tabulation data becomes processing on the map which produces thematic maps and matrix data.

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II. LITERATURE

Land use reflects the extent to which business or human intervention in utilizing and managing the environment, data on land use / cover can be tapped from aerial photographs relatively easily, and changes can be known from multitemporal aerial photography. Aerial photo interpretation techniques included in remote sensing systems are science and art to obtain information about objects, regions or symptoms by analyzing data obtained using tools without direct contact with objects, regions, or symptoms studied (Lillesand and Kiefer, 1997).

In a framework, according to Dent (1981) in making classification of land use is divided into levels which are divided into groups as follow:

- a. Land cover/land use Order (cover type)
- b. Land cover/land use Cover Classes
- c. Land cover/land use Sub-Classes

d. *Land cover/land use Management Units (comparable to land utilization types).*

From this classification, Malingreu was changed to 6 categories as follows:

- a. *Land cover/land use Order e.g. vegetated area*
- b. *Land cover/land use Sub-Order e.g. cultivated area*
- c. *Land cover/land use Family e.g. permanently cultivated area*
- d. *Land cover/land use Class e.g. Wetland rice (sawah)*
- e. *Land cover/land use Sub-Class e.g. irrigated sawah*
- f. *Land Utilization Type e.g. continous rice*

III. RESEARCH METHODS

Changes in Vegetation Cover in Malang District is a type of quantitative research. In this study the description of vegetation cover conditions in Malang District was carried out, measurements of 2016 vegetation cover changes were carried out in 2017 and 2018 using remote sensing interpretation methods of Landsat 8.0 satellite images and identification of conservation efforts and control of land damage was carried out.

IV. METHOD OF COLLECTING DATA

The main activities carried out for the method of Changing Vegetation Cover in Malang District in data collection, are:

Data that must be collected includes:

1. Vegetation area management plan;
2. Plan for controlling the area of vegetation;
3. Current land use;
4. Activity data and potential for vegetation cover;
5. Environmental problem.

V. STUDY AREA

Malang District is located between 112o 17 ' , 10.90 "East Longitude and 112o 57', 00.00" East Longitude and between 7o 44 ' , 55.11 "South Latitude and 8o 26', 35.45" South Latitude. With an area of around 345578.72 Ha.

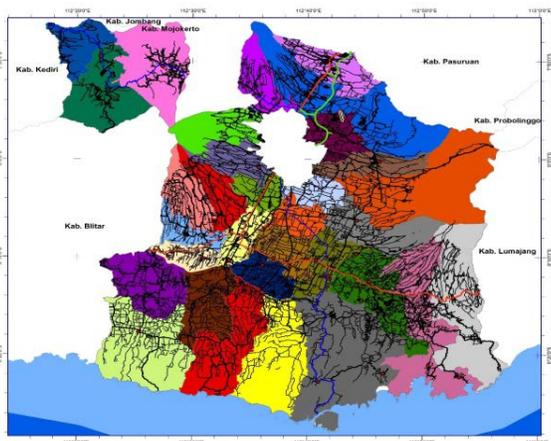


Figure 1. Map of Administration of Malang District

Administratively, Malang District is divided into 33 sub-districts, 12 sub-districts, 378 villages, 1,368 sub-villages, 3,183 neighborhood units and 14,869 neighborhood units. The central government is in Kepanjen Subdistrict as stipulated in Government Regulation (PP) Number 18 of 2008 concerning the Transfer of the Capital of Malang District from the Malang City Region to the Kepanjen City of Malang District.

VI. ANALISYS METHOD

The stages of analysis carried out are as follows:

1. Analysis of suitability and availability of vegetation in Malang District.
2. Analysis of the vegetation land cover map of Malang District in real time.
3. Map analysis of green open space.

One technique used for analysis of land cover changes is the interpretation of Landsat image data. Steps in analyzing Landsat image data for analysis of land cover changes using GIS applications, ArcMap. The band used in this study is Landsat 8.0, namely band 6,5,3.

Before image analysis, preprocessing must be done. The stages in preprocessing include :

1. Geometric Correction.

Geometric correction (retification) is a process of transformation from one grid system using a geometric transformation. Geometric correction is done because of the distortion that results from variations in satellite height, satellite rigidity, and speed (Lillesand & Kiefer 1990). The purpose of geometric correction is to improve the position of objects in the image due to the actual distortion of position on the face of the earth. Geometric correction using the GCP point. Geometric correction is done using the Google Earth Pro application.

2. Image cutting

Image cropping (image cutting) is done to separate the area that is the focus of the study of land cover analysis, namely Malang District, East Java Province, Indonesia.

3. Image sharpening

Image sharpening aims to improve the quality of visual images so that it simplifies the process of interpretation. Improving the visual quality of images can be seen from the spatial aspects and spectral aspects.

4. Image classification

Classification is a processing technique in images by grouping pixels into a number of classes, so that each class has unique and specific spatial patterns or distributions that reflect an object or useful information according to needs. The classification in this study was carried out unsupervised (not guided) for Landsat 8. In the non-guided classification, classification starts with checking statistics for all pixels and dividing them into classes whose numbers are determined.

VII. RESULT AND DISCUSSION

Analysis of Vegetation Cover in Malang District.

Analysis of changes in land cover can be done using remote sensing techniques. One of the techniques used to analyze land

cover changes is the interpretation of Landsat image data and can be classified according to SNI 7645-2010.

VIII. VEGETATION COVER

Vegetation Cover in Malang District 2016

The results of the 2016 vegetation cover analysis include land cover in accordance with Forestry Ministerial Decree No. 395 / MenHut-II / 2011 that other use areas (APL) are described in vegetated cover areas and are not vegetated, according to SNI 7645-2010 described in the classification code the object and toponym are 23 clustering, Malang District has a shrinkage by minimizing the meaning of vegetated and non-vegetated areas, so that it gets vegetated and non-vegetated areas along with their area.

Table 1. Classification of Vegetarian Areas and Non-Vegetarian 2016

Year	Classification	Area (Ha)
2016	All Areas	345578.72
	Cloud	46183.89
	Forest	163914.25
	Settlement	17115.50
	Shrub	58852.66
	Unused Land	57967.71
	Water Bodies	1544.70
	Vegetation Areas	222766.91
	Non Vegetated	122811.80

Source: Results of taking 2018 satellite imagery

Vegetable areas in Malang District dominate, among others: forests and shrubs, while non-vegetated areas in Malang District outside vegetated areas include: settlements, Unused land, clouds, water bodies, and water bodies. The results of the formation of 2 (two) areas of land in 2016 had a vegetation area, 163914.25 ha of forest, and 58852.66 hectares of bush. resulting in a vegetation area of 222766.91 hectares and non-vegetated areas of 122811.80 hectares.

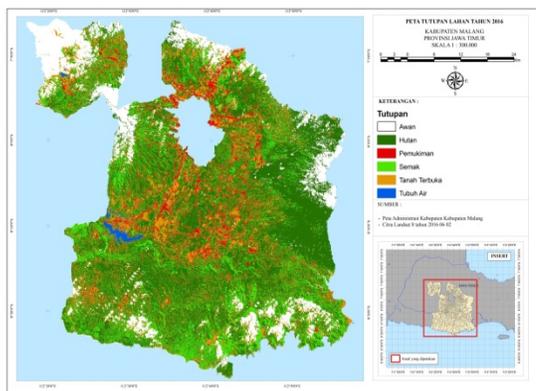


Figure 2. Map of Vegetation Cover in 2016

Vegetation Cover Malang District 2017

Vegetarian areas in Malang District dominate, among others: forests and shrubs, whereas non-vegetated areas of Malang District outside the vegetated areas include: settlements, Unused land, clouds, water bodies. The results of the establishment of 2 (two) areas of land in 2017 in the area of vegetation, forests of 180958.51Ha, and thickets of 84074.72Ha. resulting in a vegetated area of 265033.23Ha and a non-vegetated area of 80545.49Ha.

Table 2. Classification of Regional Vegetation and Non-Vegetarian 2017

Year	Classifications	Area (Ha)
2017	All Areas	345578.72
	Cloud	6772.35
	Forest	180958.51
	Settlement	29503.55
	Shrub	84074.72
	Unused Land	42806.21
	Water Bodies	1463.38
	Vegetation Areas	265033.23
	Non Vegetated	80545.49

Source: Results of taking 2018 satellite imagery

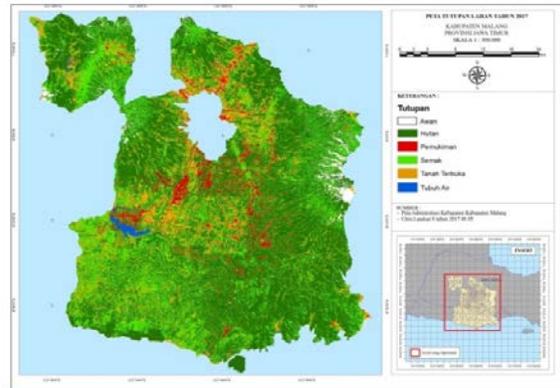


Figure 3. Map of 2017 Vegetation Cover

Vegetation Cover Malang District 2018

The vegetated area of Malang District dominates, among others, forests and thickets, whereas the non-vegetated regions of Malang District outside the vegetated areas include: settlements, Unused land, clouds, water bodies. The results of the establishment of 2 (two) areas of conflict in 2018 have an area of vegetation, forests of 103029.38 hectares, and thickets of 120786.37 hectares. resulting in a vegetation area of 223815.75Ha and a non-vegetated area of 118207.07Ha.

Table 3. Classification of Vegetarian and Non-Vegetarian Areas 2018

Year	Classifications	Area (Ha)
2018	All Area	345578.72
	Cloud	1850.23
	Forest	106585.28
	Settlement	17819.79
	Shrub	120786.37
	Unused Land	97452.95
	Water Bodies	1084.10
	Vegetation Area	227371.65
	Non Vegetated	118207.07

Source: Results of taking 2018 satellite imagery

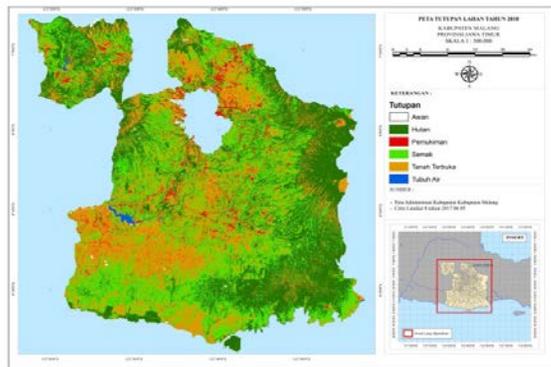


Figure 4. Map of the Vegetation Cover in 2018

Retrieving the latest data via landsat satellite images 8.0 using ArGIS software was obtained in 2016, 2017 and 2018 on the December 2018 observation, monitoring carried out as much as 10x interval from 25 calendar days to produce optimal results of data obtained and to minimize the level of cloud cover less than 10%, the results of the data are managed and in the cloud based on clustering and include the results of vegetated areas in dark green in the forest and shrubby light green.

Change in Land Cover Data for 2016 to 2018

The mapping results (realtime) using Landsat 8.0 Satellite changes in vegetation cover in the data area in getting the pattern of taking the last 3 (three) years, namely: 2016, 2017 and 2018, taking in the last 3 years maximized to see changes - changes to vegetation cover in Malang District, this aims to see the level of small-scale efforts of its annual actions on efforts to control land damage to control programs for environmental damage.

Table 4. Data table for the last 3 years Vegetation Cover

Year	Classifications	Area (Ha)	Percantage
2016	Vegetation Area	222766.91	64.46%
	Non Vegetated	122811.80	35.54%
2017	Vegetation Area	265033.23	76.69%
	Non Vegetated	80545.49	23.31%
2018	Vegetation Area	227371.65	65.79%
	Non Vegetated	118207.07	34.21%

Source: Results of Analysis of Lansat 8.0 image mapping in 2018

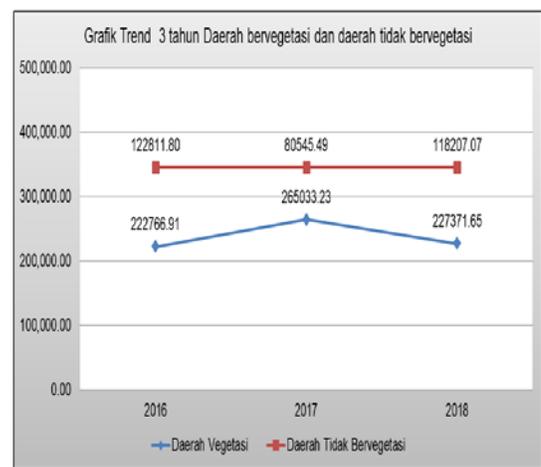


Figure 5. Graph of changes in 3 years of vegetation and non-vegetated areas

The pattern of the yield of the vegetated area in the last 3 (three) years resulted in changes in data increasing and decreasing at the end of 2018, the conclusion of the difference in yields was 4604.73 Ha or 1.33%. Unused Land, water body, and clouds).

The area data of 4604.73 Ha or 1.33% is the result of reduced vegetation cover in Malang District due to the increase in the value of non-vegetated areas changing back to non-vegetated areas, 2016 towards 2017 at +12388.05 Ha with the calculation of area in 2016 value of 17115.50 Ha minus area in 2017 29503.55Ha the condition is seen to have increased or increased settlements in Malang District, but in 2017 the value of 29503.55Ha towards the year 2018 with a value of 17819.79Ha has a decrease in land area of -11683.76Ha.

In addition to clustering settlements that have a large influence on the lack of vegetation cover, clustering on Unused Land has a significant impact on the amount of open area, changes in vegetation cover addressed at the beginning of 2016 Unused Land has an area value of 57967Ha (16.77%) and in 2017 42806.21Ha (12.39%), there is a decrease of 15161.50Ha or 3.38% in Unused Land, it is very possible that the rapid development development is directly proportional to the loss of vegetation cover, in addition to development, the mining industry sector becomes Unused Land to produce data decline vegetation

cover in Malang District in 2018, economic growth of the community by opening new land to plant production crops and the existence of unpredictable old disasters that occur within the last 1 (one) year in disaster risk areas, among others: disasters landslide, banjir, and kerringan create Unused Land for degradation which causes damage to the land.

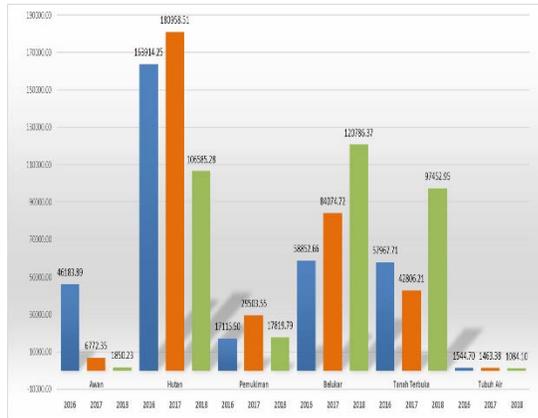


Figure 6. Graph of Changes in Vegetation Cover per year based on Clustering

Recommendation

Based on the results of the analysis of changes in vegetation cover in Malang District, efforts have been made to increase the addition of the area of vegetation cover within the framework of recommendations, namely aimed at efforts to increase vegetation cover / land quality and environmental sustainability.

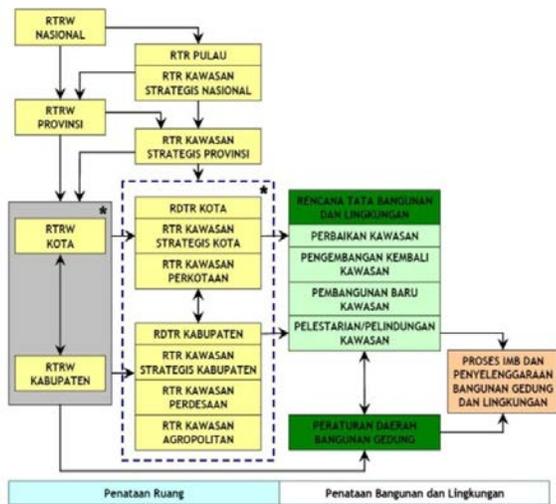


Figure 7. Concept of Environmental Management Efforts

Green Open Space Management and Development Aspect

Adding Green Open Space in accordance with Minister of Public Works Regulation No. 05 / PRT / M / 2008 concerning Guidelines for Provision of Green Open Space in Urban Areas.

Formulation

- Encouraging the public to manage private space to open green space;

- Optimizing government-owned land and building as an ideal green space model;
- Establish private green open spaces in multi-storey buildings and areas that are dense with hanging gardens, vertical gardens and plant pots.
- To increase the existence of public spaces, especially RTH in urban areas, it is necessary to do several things, especially those related to the provision of legal instruments, NSPM, and encourage the war of society and business

Policy and Regulation

Aspect

Resist the rate of land conversion

Formulation

- Restore the function of river banks as rainwater catchment areas by planting vegetation stands
- Institutionally, the problem of open green space is also related to the absence of adequate legislation regarding green open space, as well as technical guidelines for the implementation of green open space so that the existence of green open space is still marginal.
- Sub-optimization of the availability of green space is related to the fact that there is still insufficient proportion of the area allocated for open space.

City Forest Management and Development

Aspect

Tree planting

Formulation

- Prioritize local tree species or endemic species in the framework of germplasm conservation while minimizing tree species towards scarcity and extinction
- Adapted to local ecological conditions.
- Availability of seeds (plants are easy to obtain), local types and inexpensive prices Types of trees that are not easily fallen, and are not susceptible to pests and diseases
- Does not require intensive care
- Not invasive
- Not competitive with other plants
- Not competitive with other plants
- Can produce oxygen and can absorb pollutants according to location
- Do not endanger the community or animals
- Attract a lot of wildlife

Community and Private Empowerment

Aspect

- Increase awareness and environmental education to the community
- Involve the private sector in managing the management of CSR (Corporate Social Responsibility) funds

Formulation

- Incorporating environmental curricula into all levels of education. It is expected that from an early age, students have behaved in an environmentally sustainable manner;

- Involving the community in managing the environment especially plants and trees. Community groups need to be actively involved in supervising and preserving nature
- Establish a CSR Forum at the District / City level that is strengthened by Regional Regulations. This forum consists of regional apparatus organizations, the private sector, NGOs and the community;
- Conduct routine coordination to discuss the development of environmental management programs;
- Develop an action plan for massive and structured environmental management.

- The data reference obtained from the Regional Government Organization is not part of the area calculation stated in the analysis results, but the data has been counted in it when taking Landsat 8.0 satellite images.

Management of Forest Areas

Aspect

Programs

Formulation

- Social forestry is the main focus program of the Republic of Indonesia Ministry of Environment and Forestry (KLHK)
- Supervision in illegal logging
- Maintain conservation of Conservation in all aspects of flora and fauna.

IX. CONCLUSION

- Control of damage to Unused Land identified is greater in 2017 and 2018 due to the growth rate of development in the industrial and residential sectors, control is carried out with programs to rehabilitate conservation areas, examining land and reforestation in protected and conservation forest areas;
- The use of Landsat 8.0 image has a zoom capability of 1: 250,000 scale, but the lack of justification for the use of colors is based on certain regulations, both SNI and government regulations so that color rendering on the map is based on the author's knowledge to be easily criticized;
- Landsat 8.0 has not been able to show images or layers to obtain data overlays from the three years of changes in Vegetation Cover in Malang District, but can display area data and calculate the difference from the changes in the matrix;
- Beginning in 2016 Unused Land has an area value of 57967 (16.77%) Ha and in 2017 42806.21Ha (12.39%), a decrease of 15161.50Ha or 3.38%;

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Knowledge and Attitudes of Undergraduate University Students about Sexual Transmitted Diseases at University of Kufa

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DOI: 10.29322/IJSRP.9.08.2019.p92122

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92122>

Abstract- Background: Sexually Transmitted Diseases are considered the most serious problems on health of community. It occurs not only in poor countries but also in rich countries, STDs are among the top five diseases causing loss of healthy life foundations for young and make them looking for health care services continuously. **Aim of the study:** To evaluate the level of Knowledge and Attitudes of undergraduate university students towards STDs. **Methodology:** A descriptive cross-sectional study was applied on (450) students at University of Kufa from 27th December 2018 until 11th July 2019. The validity of the questionnaire was determined by the experts, the reliability of questionnaire was determined by Cronbach's Alpha test while the questionnaire was used in a self-filling method by the participants. **Results:** The overall Knowledge of students was poor while the great majority of students have a positive attitude toward STDs. **Conclusions:** The study concluded that due to the absence of this subject in curricula and weakness in the media and government health programs, as well as negative impact of customs and traditions lead to decrease in level of knowledge about sexually transmitted diseases among students. **Recommendations:** The study recommended that conducting seminars and instructive programs for university students on sexually transmitted diseases, especially for humanities and scientific colleges.

Index Terms- Knowledge, Attitude, Undergraduate University Students, Sexually Transmitted Diseases.

I. INTRODUCTION

Young person starts to replace sexual imaginations with sexual experience and expand sexual life ,therefore they are the most vulnerable to exposure to difficulties of undefended sex such as sexually transmitted diseases, unintended pregnancies and HIV. Every year, more than half of all sexually transmitted diseases threaten the life of young people according to universal statistics (Folasayo *et al.*, 2017) .

STDs are a group of infections that are transmitted mainly through unprotected sex, In addition, it can be transmitted by another way from mother to fetus, the tattoo , blood and needles, it is classified as curable and non-treatable diseases (OG *et al.* ,2018) .

STDs pose a serious threat to the general health of males and females in all countries, whether rich or poor, so there is a rapid spread of the disease due to several factors, including social, economic and demographic of many countries of the world (De Waure *et al.*, 2015).

According to WHO estimate that more than 1 million people infected every day with sexually transmitted diseases. It causes negative problems on human health from somatic problems until infertility , malignant tumors , complications of the mother and child and loss of life, in addition to a large financial burden , the United States alone spend more than tens of billions dollars annually on the STDs (Von Rosen *et al.*, 2018).

More than thirty type of bacterial, viruses and parasites cause STDs can be classified into curable diseases that transmitted by bacteria in general such as gonorrhea, syphilis, chlamydia, and trichomoniasis on the other side are incurable diseases that cannot be completely cured , It is considered expensive but can preventable include HIV, genital herpes, HPV and hepatitis B (Subbarao and Akhilesh, 2017) .

Weak knowledge , attitude and dangerous applications about sexually transmitted diseases in the youth phase are an international phenomenon widespread and this gets us to wonder and worry about this occurrence. Previous studies reflect the difference in sexual behaviors and misunderstanding as a result of adherence to beliefs and cultures from one area to another (Ruikar, 2013).

In developing countries, most previous studies focused on assessing the knowledge on HIV while are very low regard to of knowledge about sexually transmitted diseases that are necessary in the treatment and prevention of these diseases, especially to meet the need of society to help when the symptoms occur (Amu and Adegun, 2015).

Most of the information available in Islamic countries is focused on AIDS, so there is a lack of studies on sexually transmitted diseases. Most accurate information about prevalence and incidence comes from developed countries (El-Tholoth *et.al.*, 2018).

Objectives of the Study:

1-To evaluate level of Knowledge and Attitudes of undergraduate university students towards sexual transmitted diseases.

2- To find out the relationship between the level of knowledge and attitudes towards sexual transmitted diseases and their socio-demographic characteristic of (age, gender, residency, marital status, monthly income, educational level of father and mother ,occupation of father and mother , living place, family type and sources of previous information about STDs).

II. METHODOLOGY

Study Design: Descriptive design a cross-sectional study are implemented to achieve the objective of study for the period from 27th December 2018 until, 11th July 2019.

Ethical Consideration: The students were informed about the nature of the research and its future benefits for the community and they agreed to participate as a sample for research. Promised to maintain the confidentiality of the student's identity and disclose its information and not to be named by filling the questionnaire through the self-administrated .

Setting of the Study: The study was conducted in (15) faculties at University of Kufa.

The Sampling : The sample selected was 450 students from different faculties in University of Kufa for the study. a probability sampling technique (cluster sample) used through dividing KUFA University to three classifications (Health faculties, Scientific faculties & Humanistic faculties) then 5 faculties from each classification was selected randomly and 30 student in 4th grade from each faculty without representation to its proportional (disproportional allocation).

Instrument of the Study : The questionnaire was divided into three main parts (socio-demographic information, questions on knowledge about Sexually Transmitted Diseases and questions to determine student's attitudes regarding Sexually Transmitted Diseases).

Study Validity: To validate the questionnaire use method of face validity (Panel of Experts) which have more than 10 years of experience at their jobs field. It was designed and presented to (22) experts in community health .

Reliability: The reliability of questionnaire was determined during the completion of the pilot study by Cronbach's Alpha coefficient test, the test was conducted on all questions of

knowledge and attitude. The result of test showed acceptable reliability depending on the value of the Cronbach's Alpha which was (0.901) for knowledge scale and (0.731) for attitude scale.

The Statistical Analysis:

The data of (450) students were examined by use the Statistical Package of Social Sciences program (SPSS) version 23 , 2015. for statistical analysis.

Scoring:

1. Knowledge Scores:

Each item of the knowledge questions has three responses, yes, no, don't know, the responses of participants were categorized either, correct, incorrect or uncertain. The scores were 3 points for accurate answer, 2 points for uncertain answer and 1 point for incorrect answer, The evaluation of the knowledge then categorized according to mean of score into three categories :

1 – 1.66 **Poor Knowledge**

1.67 – 2.33 **Fair Knowledge**

2.34 – 3 **Good Knowledge**

2. Attitude Scores:

Each item of the Attitude questions had three responses, Agree, undecided, Disagree , therefore, according to the ideal answers for each questions, the responses of participants categorized either, correct, incorrect. The evaluation of the Attitude then categorized according to mean of score into two categories :

MS. ≥ 2 **Positive Attitude**

MS. < 2 **Negative Attitude**

Limitation of the study:

This study faces some difficult during its process:

- 1- Administrative routine in government institutions in order to obtain approval of sample collection.
- 2- Withdrawal number of female participation in the study due to their embarrassment.
- 3- It was not so easy to reach subjects because they believed that STDs are considered stigma and socially unacceptable.
- 4- Limited studies related STDs in Iraq .

III. RESULTS :

Table 1 : Study Sample Demographic Data

Demographic Data	Rating And Intervals	Frequency	Percent
Age (Years)	21 - 23	371	82.4
	24 - 26	68	15.1
	27 and more	11	2.4
	Mean \pm SD	22.47 \pm 1.50	
Gender	Male	309	68.7
	Female	141	31.3
Residence	Urban	352	78.2
	Rural	98	21.8
Marital status	Single	360	80.0
	Married	85	18.9
	Divorced	4	0.9
	Separated	1	0.2
Economic status	Not Enough	65	14.4
	Some Enough	174	38.7
	Enough	211	46.9
With whom do you live	Friend	20	4.4
	Family	362	80.4
	Internal Department	68	15.1
Family type	Nuclear Family	212	47.1
	Extended Family	208	46.2
	Single Parent Family	30	6.7
father Education	Illiterate	30	6.7
	Able to Read and Write	63	14.0
	Primary School Graduate	68	15.1
	Intermediate School Graduate	63	14.0
	Preparatory School Graduate	35	7.8
	Institute Graduate	74	16.4
	College Graduate	98	21.8
	Post Graduate	19	4.2
Mother Education	Illiterate	67	14.9
	Able to Read and Write	87	19.3
	Primary School Graduate	91	20.2
	Intermediate School Graduate	63	14.0
	Preparatory School Graduate	43	9.6
	Institute Graduate	46	10.2
	College Graduate	52	11.6
	Post Graduate	1	0.2
Father Occupation	Employee	172	38.2
	Free works	151	33.6
	Retired	66	14.7
	Unemployed	61	13.6

Continue Table 1

Mother Occupation	Employee	77	17.1
	Free works	11	2.4
	Retired	16	3.6
	Housewife	346	76.9
Classification of Colleges	Health Colleges	150	33.3
	Scientific Colleges	150	33.3
	Humanistic Colleges	150	33.3
	Total	450	100.0

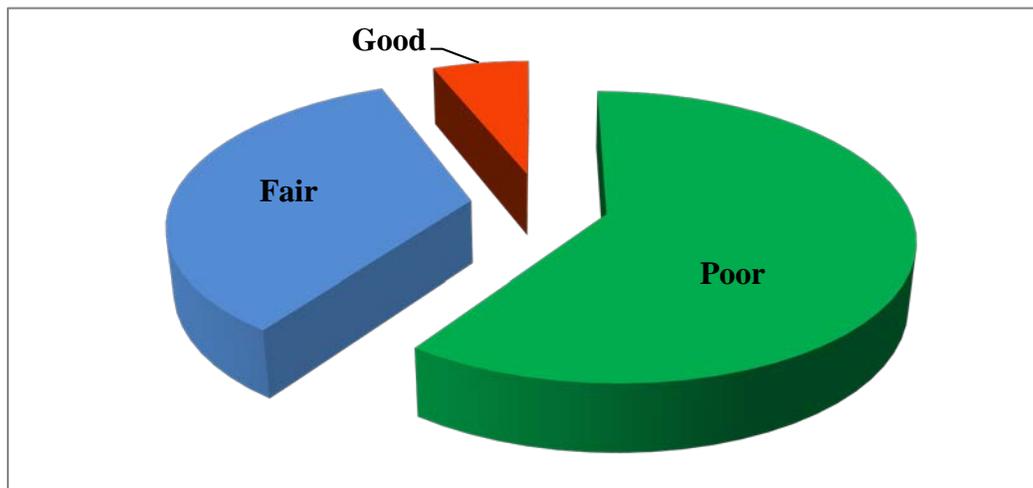


Table (4.1) shows that a total of 450 participants are from undergraduate university students . It was (82.4) % for ages (21 – 23) , males were the dominant represented (68.7%) compared to females (31.3%). A majority of the participants (78.2%) were urban residents and (80%) of participants are single . Concerning economic status the study results show that the highest percentage of the study sample (46.9%) are within Enough . Regarding to the living situation, the study results show that the majority of the study sample (80.4%) are living with their families. Regarding to family type (47.1%) of them from nuclear families. Concerning the Father's education the study indicates (21.8%) of them graduated from College, While mother's education (20.2%)of them graduated from primary school. Concerning the Father's occupation, the study indicates (38.2%) of them Employee, in regarding to mother's occupation (76.9%) of them housewife. In the case of colleges the percentage was equal (150) students for each classification .

Table 2 : Overall Student's Knowledge about STDs

Levels knowledge of	Frequency	Percent	Mean Score	Overall Assessment
Poor	274	60.9	1.66	Poor
Fair	149	33.1		
Good	27	6.0		
Total	450	100.0		

Good (mean of 2.34 - 3), Fair (mean score 1.67-2.33), (mean of score 1-cut off point (0.66)

table shows that the overall level of the Knowledge of students about STDs Poor see figure 1

Figure 1: Distribution of participant according to overall knowledge about STDs

Table 3 : Overall Student's Attitude about STDs .
(Mean of score < 2 Negative , Mean of score ≥ 2 Positive) .

This table reveals that overall assessment of students attitude about STDs is positive.

Table 4 : Association between student's Knowledge about STDs and their demographic data

<i>Levels of Attitude</i>	<i>Frequency</i>	<i>Percent</i>	<i>Mean Score</i>	<i>Overall Attitude</i>
Negative	94	16.9	2.28	Positive
Positive	356	83.1		
Total	450	100.0		

Socio-demographic Data	Rating and interval	Overall knowledge			Value X²	DF.	P.value
		poor	fair	good			
Age (years)	21 - 23	228	118	25	4.09	4	0.39 NS.
	24 - 26	40	27	1			
	27 +	6	4	1			
Gender	Male	198	103	8	20.78	2	0.001 HS.
	Female	76	46	19			
Residence	Urban	209	117	26	5.79	2	0.05 S.
	Rural	65	32	1			
Marital Status	Single	213	116	23	9.24	6	0.16 NS.
	Married	57	30	4			
	Divorced	4	0	0			
	Separated	0	3	0			
Economic Status	Not Enough	44	19	2	5.51	4	0.23 NS.
	Some Enough	108	59	7			
	Enough	112	71	18			
With whom do you live	Friend	7	12	1	9.28	4	0.054 NS.
	Family	229	110	23			
	Internal department	38	27	3			
Family type	Nuclear Family	132	62	18	8.44	4	0.07 NS.
	Extended Family	125	77	6			
	Single Parent	17	10	3			
Father Education	Illiterate	16	13	1	37.04	14	0.001 HS.
	Able to Read and Write	44	19	0			
	Primary School Graduate	44	24	0			
	Intermediate School Graduate	43	17	3			
	Preparatory School Graduate	22	12	1			
	Institute Graduate	43	26	5			
	College Graduate	55	27	16			
	Post Graduate	7	11	1			
Mother Education	Illiterate	37	27	3	41.85	14	0.001 HS.
	Able to Read and Write	58	28	1			
	Primary School Graduate	65	25	1			
	Intermediate School Graduate	37	21	5			
	Preparatory School Graduate	28	13	2			

	Institute Graduate	24	16	6			
	College Graduate	25	19	8			
	Post Graduate	0	0	1			
Father Occupation	Employee	113	46	13	13.33	6	0.058 NS.
	Free works	92	48	11			
	Retired	33	32	1			
	Unemployed	36	23	2			
Mother Occupation	Employee	31	32	14	41.72	6	0.001 HS.
	Free works	11	0	0			
	Retired	7	9	0			
	Housewife	225	108	13			
Classification of colleges	Health Colleges	26	97	27	194	4	0.001 HS.
	Scientific Colleges	130	20	0			
	Humanistic Colleges	118	32	0			

P-value (probability value) , DF. (degree of freedom) , NS: Non-Significant at $P > 0.05$; S: Significant at $P < 0.05$; HS: Highly Significant at $P < 0.01$; X^2 :Chi- Square ; p -value : probability value .

Table (4) showed that the association between overall knowledge of participants with their socio-demographic characteristics . it had been found that a highly significant associated with (Gender , Father and mother education , Mother occupation and Classification of colleges) , also there is a significant association with Residence while the remaining factor has no significant association .

Table 5: Association between student's Attitude about STDs and demographic data

Socio-demographic Data	Rating and interval	Overall Attitude		X^2 Value	DF	P. value
		Negative (n= 94)	Positive (n=356)			
Age (years)	21 - 23	61	310	0.92	2	0.63 NS.
	24 - 26	12	56			
	27+	3	8			
Gender	Male	53	256	0.04	1	0.82 NS.
	Female	23	118			
Residence	Urban	56	296	1.10	1	0.29 NS.
	Rural	20	78			
Marital Status	Single	64	296	1.53	3	0.67 NS.
	Married	11	74			
	Divorced	1	3			
	Separated	0	1			
Economic Status	Not Enough	13	52	2.01	2	0.36 NS.
	Some Enough	24	150			
	Enough	39	172			
With whom do you live	Friend	0	20	7.38	2	0.06 NS
	Family	69	293			
	Internal department	7	61			
Family type	Nuclear Family	30	182	4.26	2	0.11 NS.
	Extended Family	43	165			
	Single Parent	3	27			
	Illiterate	3	27		7	

Father Education	Able to Read and Write	19	44	13.39		0.06 NS.
	Primary School Graduate	15	53			
	Intermediate School Graduate	7	56			
	Preparatory School Graduate	6	29			
	Institute Graduate	11	63			
	College Graduate	13	85			
	Post Graduate	2	17			
Mother Education	Illiterate	12	55	4.42	7	0.73 NS.
	Able to Read and Write	13	74			
	Primary School Graduate	14	77			
	Intermediate School Graduate	16	47			
	Preparatory School Graduate	7	36			
	Institute Graduate	7	39			
	College Graduate	7	45			
	Post Graduate	0	1			
Father Occupation	Employee	31	141	1.71	3	0.63 NS.
	Free works	28	123			
	Retired	8	58			
	Unemployed	9	52			
Mother Occupation	Employee	5	72	18.96	3	0.001 HS.
	Free works	6	5			
	Retired	1	15			
	Housewife	64	282			
Classification of colleges	Health Colleges	8	142	27.48	2	0.001 HS.
	Scientific Colleges	26	124			
	Humanistic Colleges	42	108			

P-value (probability value) , DF. (degree of freedom) , NS: Non-Significant at P> 0.05; S: Significant at P<0.05; HS: Highly Significant at P<0.01 ; X²: Chi- Square ; p-value : probability value .

Table (5) showed that the association between overall Attitude of participants with their socio-demographic characteristics . it had been found that non-significant association with most variables, except with (Mother Occupation and Classification of colleges) where a significant association had been found .

IV. DISCUSSION :

Socio-demographic Characteristics Related to the Study sample (table 1) : The present results indicate that the most of study samples are within ages (21 – 23) year old(82.4). This result is supported by (Al Naggar and Al Jashamy, 2011) who reported that (21 – 23) is dominated age group in their study. Regarding gender, more than two third of study samples are males (68.7%) . This result agree with (Al Naggar and Al Jashamy, 2011) who mention that nearly two third of study sample was male. Concerning residency area, more than three quarters of the participants are from urban area (78.2%). This result is in the same line with (Demis *et al.*, 2017) they revealed that three quarters of the participants are urban residents (75.6 %). With regard to marital status, the study results show that the majority of study sample are single (80%). This result is supported by (Al- Malki, 2014 ; Fonte *et al.* , 2018) who found that the majority of study sample was single (94%). According to economic status, the study results indicate that less than half of the study subjects are within enough level (46.9%). Regarding living situation and family type

, most of students are living with their families(80.4%) and less than half of them from nuclear families. This result in the same line with (Demis *et al.*, 2017). They indicated that less than three quarters of the participants are living with family, the study indicates that less than quarter of them with college graduation. This result is supported by (Mohamed and Ahmed, 2018) who reported that university level is dominate Father's education in this study. Regarding mother's education, the study result shows that less than quarter of study sample, their mothers graduated from primary school. This result agrees with (Megersa *et al.*, 2017) who revealed that one third of study findings are primary school level dominate mother's education (33%). Relative to the father's occupation, almost more than one-third of their fathers are employees. this result comes along with (Demis *et al.*, 2017) They found that more than half of the students had their fathers employed while the mother's occupation indicates that majority of their mothers are housewives. This result is agreement with (Mohamed and Ahmed, 2018). The study found that the majority of students were their mother's housewives. Concerning faculties classification, the results of our study showed that equal distribution for each classification of faculties including health, scientific and humanistic classifications. These findings are supported by (Fonte *et al.* , 2018) whose findings contain three colleges including Nursing , Law and Engineering colleges.

Student's overall knowledge about STDs (table 2) :

The current results indicate that slightly two third of students have poor knowledge about STDs. The current results can be

interpreted by the lack of coverage of the curricula on the issues related to awareness of these diseases, in addition to the failure of prevention programs in the health institutions and lack of focus by the media and cultural customs. These results are supported by (Fonte *et al.* 2018) who indicated that the majority of participants had low level of knowledge.

Student's Overall Attitude about STDs (table 3):

The current results indicate that most of students (83.1%) have positive attitude while less than quarter of them (16.9%) have negative attitude about STDs . The current results can be explained by the level of cultural and educational development of most students who produce acceptable behaviors and perceptions towards this phenomenon. This result comes along with (Demis *et al.*, 2017) who found that most of study sample with positive attitude about STDs.

Associations between Student's overall Knowledge about STDs and their Socio-demographic Characteristics (tables 4)

The study results show that a significant association between student's overall knowledge and (gender, residence, father and mother education , mother occupation and classification of faculties) while the remaining factors had a non-significant association. These results agree with (Folasayo *et al.*, 2017) their results showed that there is an association between knowledge about sexually transmitted diseases and (gender, residence and type of college) while (Demis *et al.*, 2017) all of them stated that there are associations between knowledge about sexually transmitted diseases and (fathers education , mothers education and mothers job).

Associations between Student's overall Attitude about STDs and their Socio-demographic Characteristics : (tables 5)

The study results show that there is a non-significant association between overall attitude and most of socio-demographic variables, except with (mother occupation and classification of colleges) there is a significant association. This result disagrees with (Mahmoud and Ahmed, 2018 ; Folasayo *et al.*, 2017) they indicated that there is no association between student's attitude about STDs with their mother occupation and classification of faculties.

V. CONCLUSIONS

As a result of the weakness of the curriculum, lack of media concentration, weak governmental health programs, and the negative impact of cultural backgrounds leading to deficit of knowledge among students.

VI. RECOMMENDATIONS

Conducting seminars and instructive programs for university students on sexually transmitted diseases especially for humanities and scientific colleges, Increasing the cooperation between the Ministry of Higher Education & scientific research and the Ministry of Education with the Ministry of Health in order to develop a curriculum to cover this important phenomenon in

society, Encouraging the creation of advertisements through the mass media to raise awareness about sexually transmitted diseases and their risks to young people, especially when traveling abroad and Conducting a further national studies with a wide range of sample.

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Associated Factors that Hinder Early Detection of Breast Cancer among Women at Oncology Center of AL-Najaf city

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DOI: 10.29322/IJSRP.9.08.2019.p92123
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92123>

Abstract: Breast cancer is the most common type of cancer among women in the world. This is the second leading cause of cancer deaths in women many cells grow at the same time. but the body is keen to be the number of proliferating cells corresponds to the number of cells which dies. cancer occurs when cells grow and multiply rapidly larger than natural the world health organization and the international agency for research on the cancer report, at least, can prevent a quarter of all cancers and can treat 3/4 with current knowledge and technology. **Methodology:** A descriptive design / survey study is used through the present study in order to: assess factors that hinder early detection of breast cancer among women, and to identify the association between socio-demographic characteristic and women knowledge about ways of early detection and causes for delay in seeking medical help. The period of the study is from 1st November 2018 to 19th July 2019. A Non-Probability (Purposive Sample) of (150) women with third and more stage of breast cancer (advanced breast cancer) . The data are collected through the utilization of the developed questionnaire by using an interview technique after the estimation of the validity and reliability of the study instrument. **Results:** The findings of the present study indicate that the overall assessment of women's knowledge about ways of early detection is moderate. Moreover, the correlation between overall women's knowledge about ways of early detection and their demographic data, it shows that overall .women's knowledge have significant positive correlation with each of age, family history of breast cancer and level of education .In addition, the result also indicates that the correlation between causes for delay in seeking medical intervention and women demographic data, It shows that there is a significant positive correlation with each of residence and family history of breast cancer and most patients delayed in seeking medicine because of lack of awareness and financial problems. **Concludes:** The study concludes that the general assessment is moderate knowledge about early detection of breast cancer among women, and found the significant relationship between family history and residence with knowledge of patient while there is no correlation with other demographic data. **Recommends:** The study recommends that further studies should be carried out to improve and explore effective methods to improve knowledge of women with breast cancer and the importance of the early detection and seeking help.

Key word: Breast Cancer, Women, Oncology

1.1. Introduction

Breast cancer is one of the most common cancers among women in both developed and developing countries It is the most common cancer in women aged 40–60 years and the second most common cancer in women aged 30–40 years, (**Jazayeri et al., 2015**). Breast cancer continues to be a serious problem worldwide It is one of the leading causes of death in women who are thirty years of age and older It also continues to present unfavorable prognosis in women who are forty years or younger (**khudair, 2010**). The American cancer society estimated that, in 2012 approximately the American 226.870 women would be diagnosed with 39.510 deaths women are not only being diagnosed with breast cancer in the later stages of the disease but also a higher proportion of younger women in their thirties and forties are clinically presenting with breast cancer (**American Cancer Society, 2016**). Breast cancer is the most common type of cancer seen among women in the world. it is the second leading cause of cancer death in women, World Health Organization and International Agency for Research on Cancer report that, at least, 1/4 of all cancers can be prevented and 3/4 can be treated with existing knowledge, technology, and interventions based on screening in the next 20 years. While some cancers seen in under-developed countries offer poor prognosis, some cancers, seen in developed countries (prostate, breast, colorectal) have high survival rates in spite of high incidence rates This result is related to early diagnosis and screening programs in developed countries (**Aksoy et al., 2015**). The international agency for cancer research and globocan 2008 indicate that Qatar has the third highest incidence and mortality rates in the Gulf Cooperation Council (GCC) (**Mitsuk, 2016**). The global goal of breast cancer assessment is to improve survival in women who are at high risk and to reduction costs and problem in women at low risk (**Wang et al., 2015**).

Objectives of the study:

1. To assess factors that hinder early detection of breast cancer among women.

2. To identify the association between socio-demographic characteristic and women knowledge about ways of early detection and causes for delay in seeking medical help.

Methodology:

A descriptive design / survey study was conducted with analytic utility in order to achieve the stated objectives. During the period from 1st November 2018 to 19th July 2019. The study was conducted at Middle Euphrates Oncology Center in AL-Najaf AL-Ashraf City, Iraq a total of the (150) with advance breast cancer.

Instrument of the Study

By reviewing related literature and studies the questionnaire was prepared and modified depending on previous studies (Ismail et al, 2013; khudair, 2010). The instrument of the Study is a questionnaire. After reviewing literature and previous studies related associated factors that hinder early detection of breast cancer f Used modified on an original instrument which that constructed previously by Medical Instrument. It was divided into three main parts (part one contained demographic information, part two included questions related to women s knowledge about ways of early detection Breast Self-Examination and part three included questions that determine causes for not doing Mammogram and Clinical breast. Examination the total number of questions for this tool was 19questions (questions related to the demographic are 9, questions on the knowledge are7and questions related to causes are 3).

The Statistical Analysis

Data of studied sample were entered and analyzed using the statistical package for social sciences (SPSS) version 25. Descriptive statistics presented as mean, standard deviation, frequencies and percentages.

Results

Table (4.1) Statistical distribution of study sample (women) by their socio-demographic data

Items	Sub-groups	Study group Total = 150	
		Frequency	Percentage
Age / Years	30-41	44	29.3
	42-53	62	41.3
	54-65	39	26.0
	66-77	5	3.3
		150	
Marital Status	Married	83	55.3
	Single	46	30.7
	Widowed	15	10.0
	Divorced	6	4
		150	
Residency	Rural	79	52.7
	Urban	71	47.3
		150	

Smoking	Yes	54	36.0
	No	96	64.0
		150	
Using Contraceptive	Yes	45	29.5
	No	105	70.5
		150	
Family History of Breast Cancer	Yes	52	34.7
	No	98	65.3
		150	
Levels of Education	illiterate	53	35.6
	Primary	19	12.8
	Secondary	32	21.5
	College	23	15.4
	Postgraduate	23	14.8
		150	
Occupational Status	House wife	118	78.7
	Employee	25	16.7
	Free work	7	4.6
		150	

Items	MS	RS (%)	Assessment
Overall Knowledge	11.98	32.97	Moderate

Table (4.1) shows statistical distribution of study sample (women) by their socio-demographic data, it explains that the highest percentage of the women's subgroup are women with ages between (42-52) years old (41.3%), married women (55.3%), those who live rural residents (52.7%), those who do not smoke (64%), those who do not use contraceptive methods (70.5%), those with no family history of breast cancer (65.3%), those are illiterate (35.6%), those who are house wife (78.7%).

Discussion:

Discussion of the administrators' socio-demographics.

Table (4.1) shows that the total sample of the present study was 150 patients with age ranging from (42 -53 years). Our study results can be interpreted by that age is considered as a being of menopausal age so women may be more exposed to breast cancer due to hormonal disturbance. Another study conducted by **Maghous et al.,(2016); Malvia et al.,(2017); Hartneet(2016)** who stated that the uppermost occurrence of breast cancer was identified in women between the 41 to 60 years of age. This result agrees with **Naghbi et al.,(2013) ; Angahar (2017)** the risk of breast cancer in women increases with age progressing (≥ 50 years) and body weight. Another study conducted by **Al Alwan, (2015)**. Who found that the highest incidence of breast cancer was identified in women between the 44 to 65 years of age? Regarding to residency area more than half of our sample (52.7%) living rural area. In similar way **Das et al., (2012)** in Eastern Ethiopia who found that study participants resident in rural more than urban. Concerning to marital status, (55.3) were married. This result can be interpreted by there is a matching in age with marital status and occupation as a characteristics of our community. Such result supported by **Seabra et al.,(2016)** who observed that married woman was more. In similar to study that conducted by **(Masoudiyekta et al., 2018; Donnelly et al., 2014)** who stated that the majority of participants were married. Concerning educational level, about one third of woman 35.6% was uneducated and illiterate. This higher percentage of women with such level of education may lead them disoriented toward phenomena of breast cancer. This result agrees with **(Naghbi et al., 2013)** study revealed that majority of the population had no read and write education. In respect to occupational status, majority of women in this study were housewives (78.7%) such result reflects the characteristics of sample that are involved in the current study and matching their level of education. This result is similar to **Donnelly in (2012)** who found that high percentage of sample was unemployed. Concerning the family history of breast cancer, history of smoking, using contraceptive pills the present result indicated that more than two third of sample (65.3%), (64%), (70.5%) were with no family history of breast cancer, smoking, using contraceptive pills respectively. This result agrees with **Nemenqani (2014); Oladimeji et al.,(2015)** who found the majority of sample with negative family history of breast cancer.

Conclusions:

1-The study concludes that women have had satisfied level of knowledge regarding early detection of breast cancer, that knowledge acquired by women due to accumulation of family history experiences.

2-fear from diagnosis breast cancer experiences by women and financial problem are a major causes for hindering detection of breast cancer in its first and second stages.

Recommendations:

1- All women should be oriented to adopt preventive measures that include healthy life style, (physical fitness) be breast aware, maintaining healthy body weight, bearing children at earlier age and breast feeding for longer duration.

2-National screening to general female population at average risk by using mammography.

3- National screening for moderate and high risk women with family history and high risk life style

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Political and Mass Media Literacy the 2019 Elections

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DOI: 10.29322/IJSRP.9.08.2019.p92124

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92124>

Abstract- Political literacy activities occur in organizational life more and more we find it especially approaching the democratic party in Indonesia. Lively in 2018 towards 2019, Indonesia became a trending topic on the issues of political news in the 2019 presidential election, especially on the third axis of Jokowi, Jokowi's opponents ahead of the 2019 Presidential Election as well as the issue of Vice-Presidential Candidates who will accompany Jokowi in the 2019 Presidential Election in reporting at the station Kompas television. Nowadays, television is a medium that still chosen by the public as a place of information believed to have the ability to carry out the production, reproduction and distribution of knowledge significantly. The process was an attempt to proclaim information about the Vice-Presidential Candidates in the 2019 Elections and there was an effort to provide political literacy to the public about the 2019 vice-presidential candidates. Tanoesoedibjo (Chairperson of the Perindo Party), Airlangga Hartanto (Chairperson of the Golkar Party), Gatot Nurmantyo (Former TNI Commander), Muhammad Romahurmuzy (PPP Chairperson) in the SAPA Indonesia Pagi Kompas Television program. It is therefore expected that this research can provide political literacy as well as an understanding of reporting the names that are being echoed to become a vice-presidential candidate in the 2019 presidential election based on survey results and public opinion that has been reported in television station news.

Index Terms- Political literacy, television station, democratic party, Indonesia

I. INTRODUCTION

Indonesia is a democracy. Meriam Budiardjo (2010) proposed five democratic criteria, namely; equal suffrage in determining binding collective decisions; effective participation, namely equal opportunities for all citizens in the collective decision making process; disclosure of the truth, namely the existence of equal opportunities for everyone to provide an assessment of the course of political and governmental processes; final control of the agenda, namely the existence of exclusive power for the community to determine the agenda that must and should not be decided through government; and the involvement of the community in relation to law (Afdal Makkuraga Putra, 2017: 55 - 68).

Democracy is always identified with the Election of President and Vice President which will be a grand performance to be carried out by each candidate who stretches from each political party. Now, in 2018 before 2019, Indonesia is being

heated up with political issues concerning the third axis of Joko Widodo and Joko Widodo's arch-rivals ahead of the 2019 Presidential Election and the issue of the Vice-Presidential Candidates who will assist him in the Presidential Election later. Political parties are a critical force for modernization in all contemporary societies with certain modernization patterns adopted by each society, often determined by their parties (After, David E., 1987). Kita can observe changes in the number of political parties starting from the era of freedom of reform and re-opening of political parties and suddenly the number of political parties has increased sharply in accordance with the level of diversity found in Indonesia's plural society. In the 1999 election there were 48 political parties, in the 2004 election there were 24 political parties, in the 2009 elections there were 38 national political parties and 6 local political parties (Aceh), in the 2014 election there were 12 national political parties and 3 local political parties (Aceh), and the 2019 elections there were 16 national political parties and 4 local political parties that participated in the general election contestation.

Table 1 The Number Of Political Parties From Election To Election In The Reformation Era

Election	Number Of National Political Parties	Local Political Party
1999 Election	48 Political Parties	There is no
2004 Election	24 Political Parties	There is no
2009 Election	38 Political Parties	6 Political Parties
2014 Election	12 Political Parties	3 Political Parties
2019 Election	16 Political Parties	4 Political Parties

Data processed by the author

If referring to the data above, Indonesia uses a multi-party system. With multi-party political parties, political parties must have serial numbers to be known by the public. The drawing and assignment of serial numbers are led by KPU commissioners, and witnessed by the Indonesian Election Supervisory Board (Bawaslu), representatives of the Election Organizer Honorary Council (DKPP), election participants, and the media. The political dynamics are getting hotter. Some television media reported the development of general elections ahead of the legislative and presidential elections in 2019.

In the 2019 elections, political parties received sharp criticism from the public. The existence of political parties in the reform era is not directly proportional to the function they carry.

That is, the existence of political parties as a pillar of democracy that will fight for the aspirations and interests of the people is inversely proportional. The existing political parties disappointed the people. They are not optimally fighting for the aspirations and interests of the people, but instead are more dominant in fighting for parties, groups, and personal interests.

But in reality, the number of television stations that preached about the initial process of the 2019 election democratic party began, did not make people believe in political parties that will fight in the election. One of them, Kompas TV is a television station that provides news about the Vice-Presidential Candidate in the 2019 Presidential Election.

From the contents of the news there are names of Vice Presidents who have been pocketed by Mr. Joko Widodo ahead of the upcoming 2019 Presidential Election referring to the KOMPAS TV frame, including: Muhaimin Iskandar (Chair of the National Awakening Party), Hary Tanoesoedibjo (Chairperson of the Perindo Party), Airlangga Hartanto (General Chairperson of the Golkar Party), Gatot Nurmantyo (Former Commander of the TNI), Muhammad Romahurmuzy (General Chairperson of PPP) (SAPA INDONESIA PAGI KOMPAS TV Program, April 2, 2019 07.40 AM accessed at <https://www.youtube.com/watch?reload=9&v=bKIWV4lyisM&feature=youtu.be>).

Referring to the Survey Institute and Political Consultant DENNY JA conducted a monitoring study of the CAPRES and CAWAPRES Ideal Couples in the 2019 Election. In July 2018, the results of monitoring of Jokowi's Ideal Vice President to be Strong in Parliament include Airlangga Hartanto (General Chairperson of the Golkar Party) of 35.7 %, Muhaimin Iskandar (PKB General Chairperson) by 21.5%, Romahurmuzy (PPP Chairperson) by 16.0%. In addition, the Indonesian Survey Institute DENNY JA in July 2018 conducted a monitoring study on the Ideal Vice President for Economic Growth (Professional Vice President), among others Sri Mulyani at 32.5%, Susi Pudjiastuti at 24.5%, Chairul Tanjung at 17.0% (LSI DENNY JA: 2018).

In the legal, police and military apparatus sector, Jokowi's ideal vice president is Tito Karnavian at 32.6%, Moeldoko at 29.0%, Wiranto at 25.7%. In the Religious Figures sector, the influence of Jokowi's Ideal Vice President included KH. Ma'ruf Amin at 21.0%, Din Syamsuddin at 17.2%, Mr. Guru Bajang at 12.3%, Mahfud MD at 9.5%. Not only that, in the monitoring research it was mentioned that Jokowi's Vice Judge Expert Judgment pursued five names, among others. Airlangga Hartanto, Mahfud MD, Tirto Karnavian, Moeldoko, and Sri Mulyani (LSI DENNY JA: 2018).

The mass media has a role as the fourth pillar of democracy after the executive, legislative and judiciary. Although outside the formal political system, the existence of the press has a strategic position in mass information, education to the public as well as a means of social control. Therefore, freedom of the press is one measure of the quality of democracy in a country. The warm conversation in the community is inseparable from the function of the mass media itself, which is the provider and conveyor of information about various kinds of events, events, realities and many other things that happen in the community (Mc. Quail 1994). From this information, the public find out the truth about the issue ahead of the 2019 Presidential Elections such as Opponents of Joko Widodo in the 2019 Presidential Election, Third Axis 2019

to the Vice-Presidential Candidates who will accompany Joko Widodo in the 2019 Presidential Election.

Mass media is media that has an important role or position, especially in the context of the information age as it is now. Mass media institutions are believed to have the ability to organize the production, reproduction and distribution of knowledge significantly as a series of symbols that provide a depiction of reality "there" and experience in life can be transformed by the mass media in the public environment so that it can be accessed by members of the public. The mass media provides this information massively through its reporting. So that refers to Jurgen Habermas's essay in 1962 entitled "The Structural Transformation of the Public Sphere" (Jurgen Habermas, 1993). Habermas sees social areas that are free of censorship and domination. So that our social life forms free public opinion about social, political and economic issues. Now generation X and Generation Y are involved in public sphere conversations that are discussing the profile of Candidate Vice President Candidate in charge of Joko Widodo in the 2019 Presidential Election and support from the profile figure of the vice presidential candidate who will accompany Joko Widodo in the 2019 Presidential Election. from the role of the mass media in its reporting of the phenomenon leading up to the 2019 election democratic party.

The warm conversation about the party of democracy will never end. Especially in the Presidential and Vice-Presidential Elections in the 2019 Elections. The role of the mass media has now begun to cone in political reporting and the direction of support for each political party. Not only that, the current media coverage is rife in the political, economic, social and cultural coverage. As the news becomes an important issue and becomes strategic as well as information material for phenomena that occur in the community environment both nationally and internationally.

In this study there are formulations of problems that are the main focus in the discussion, among others (1) How is Kompas TV's efforts in reporting information about the Candidates for Vice President in the 2019 Elections? (2) What are the efforts made by Kompas TV in providing political literacy to the public? The purpose of this research is to find out Kompas TV's efforts in reporting information about the Vice-Presidential Candidates in the 2019 Election and to find out Kompas TV's efforts in providing political literacy to the public ahead of the 2019 Election.

II. LITERATURE REVIEW

POLITICAL LITERATION

The democratic party in Indonesia is very much needed political literacy to the public in order to provide a good understanding of the democratic party. The political literacy described by Bernard Crick explains in "Essays on Citizenship", interpreted as a collection of knowledge, skills and behavior to be developed together, each one conditioning the other two (Bernard Crick: 2000, p. 60). The basic theory of political literacy is a practical understanding of concepts taken from everyday life. If interpreted to understand about the main political issues, what are the main beliefs of the contentants how their tendencies affect you and me (Andi Faisal Bakti, et al. 2013: 117).

Political literacy is one of the knots of the political power of citizenship. Procedural democracy has in fact presented many residues for the existence and independence of political residues

for the existence and independence of political residues in the form of institutional design and paradoxical types of executive power, constituency in legislative power, cartelization and the practice of collusive democracy and opposing media political distortion. The substance of the power of political literacy lies in the critical and empowering political participation of citizens in relation to the main concepts of politics that will have an impact on people's lives. Political literacy is not merely a normative concept but a mix of knowledge, skills and political attitudes (Ponco Budi Sulisty, Widayat Azhfar, Dio Lazuardi. 2017: 69-76).

Bernard Crick (2000: 61) says there is some knowledge that must be remembered and it makes people literate, among others (1). Basic information, about who leads and holds power, where the money comes from, how the institute plays a role., (2) How to be actively involved using knowledge and understanding issues., (3) How to predict effective ways of resolving issues., (4) How to recognize how well the policy objectives have been reached and the issues have been fixed., (5) How to understand the opinions of others and justify them for their actions.

Political Literacy Actions

It is time for political literacy to focus on action. This can be done with four approaches, among others (Gun-Gun Heryanto, 2011: 193-194): First, citizens are encouraged to have the ability to define the need for political information (defining the need of political information). Second, establishing a search strategy (initiating the search strategy), is an investigative strategy of the entire political process. Third, the movement of communicating information (communicating the information). This is very related to the role of the media in the publication process. It is better for the media to create a strong association such as a press network to oversee and at the same time become a force in the mainstream which is a counterweight. Fourth, evaluating the product of the final political process (evaluating the political campaign process), which is related to a comprehensive evaluation at each level of the election campaign. The people here have the right to evaluate and provide recommendations whether the candidate is suitable or not. With the act of political literacy can provide knowledge and understanding of the political conditions in Indonesia, both in the perspective of voter psychology, government and mass media in reporting the stage of democracy.

The Concept of Mass Media

The role of mass media in various aspects of the social life of modern society is increasingly greater. This is evident in efforts to use mass media to accelerate the process of social change in developing countries, or its use for political campaigns, advertence and propaganda (Henry Subiakto and Rachmah Ida, 2012: 92). Mass media is a type of media that is shown to a number of distributed, heterogeneous, and anatomic audiences so that the same message can be received simultaneously and for a moment (Gun Gun Heryanto, 2011: 238).

During the New Order era, the mass media underwent an extraordinary process of liberalization. The process of developing media liberalization is very unique. The existence of New Order Ototarianism is ammunition to strengthen the issue of democracy. The struggle for freedom of the press and freedom of expression found habitat in the context of political resistance to the coercive apparatus and New Order ideological apparatus.

The mass media and society are in the same fate as victims of the New Order politics. The media is assumed to be a lamb among the wolf named the state (Ahmad Faisol and Irawan Saptono, 2010: 25). In the perspective of Antonio Gramsci's hegemonian or Jurgen Habermas's public space model of the Neo Marxist tradition that the mass media play a role in the program against political authorities. There is political liberalization as well as economic liberalization. The overthrow of an authoritarian regime is followed by the penetration of global investment. The mass media is an economic entity that can tempt the public. In the perspective of classical press freedom, Rousseau concerns the function of the fourth pillar, in which mass media as an entity is dealing with political authority and ignores other forces such as the market.

Media Function and Media Strength

Mass media is a type of media aimed at a number of scattered, heterogeneous and anonymous audiences so that the same role can be accepted simultaneously and for a moment. The word "can" be very rational because as Alexis S said, Tan the communicator in the mass media is a social organization that is able to produce messages and send them simultaneously to a large number of communities that are spatially separated (Alexis S. Tan, 1981: 56).

With a relatively broad long-term and at the same time able to play a role in propaganda. In line with the opinion of Cassata and Asante quoted by Jalaluddin Rakhmat if the flow of mass communication is only controlled by the communicator, the situation can support effective persuasion. Conversely, if the audience can regulate the flow of information, the communication situation will encourage effective learning (Jalaluddin Rakhmat, 1994: 56).

The current information age mass media institutions such as television and newspapers are believed to have the ability to organize the production, reproduction and distribution of knowledge significantly. A series of symbols that give meaning to the reality of "being" and experiences in life can be transformed by the mass media in the public sphere. So that it can be accessed by members of the public at large. During its development, many parties were involved in utilizing mass media as instruments of their interests such as the state, market, interest group, pressure group and others.

The special feature of the mass media refers to Dennis Mc. Quail (1987: 40), among others: First, produce and distribute "knowledge" in the form of information, views, and culture. The effort is a response to collective social needs and individual demands. Second, it provides a channel to connect certain people with others from the sender to the recipient and from the audience to other audience members. Third, the media organizes most of its activities in the public sphere. Fourth, the participation of members of the public in the institution is essentially voluntary without any social obligations or obligations. Fifth, media institutions are associated with the market industry because of their dependence on employee benefits, technology and financing needs. This is a demand that often directs the mass media to further highlight its commercial aspects. Sixth, the media itself does not have power but this institution is always associated with state power because of the continued use of the media.

The mass media works to convey information that can form, maintain, or define an image. The reality displayed by the media is the reality that has been selected or often people say as second hand reality (secondhand reality). Television and newspapers choose certain figures or news by ruling out characters in other news. Often, audiences tend to obtain information based solely on something reported by the mass media. Finally, forming an image of our social environment based on the second reality displayed by the mass media.

III. RESEARCH METHODS.

This research uses a qualitative research method with a case study research approach in the context of this research. It will discuss Kompas TV's efforts in reporting information about the Vice-Presidential Candidates ahead of the 2019 Election and Kompas TV's efforts in providing political literacy to audiences about the Vice-Presidential Candidates leading up to the 2019 Election. Case studies in this research describe everything that happens in the field, to then be analyzed in order to achieve the research objectives.

This research method is used because the researchers initially traced information from various sources in the form of informants, news, place of events, which have information related in this study. Data collection is done through in-depth interviews with selected speakers and documentation studies. The paradigm used in this study is the constructivism paradigm. Where researchers see the basis for thinking someone can determine the direction and purpose and a series of basic beliefs that guide a person's actions. The object of this research is the Preaching of Presidential Candidates in the 2019 Election and the efforts of the mass media in providing political literacy to the public.

Analysis and Discussion

Seeing the phenomenon of the 2014 news about the Presidential Candidates and Vice Presidential Candidates became a central issue in the 2014 Election. Where the opposition and coalition strongholds became one to introduce each other the candidates for President and Vice President 2014 who became the dynamics that became a war of media opinion in various television media. therefore there must be an effort that must be done by the television media in order to provide political literacy in media framing especially ahead of the 2019 election event later.

Efforts of Kompas TV in Reporting Information on Presidential Candidates and Vice Presidential Candidates in the 2019 Elections

Ahead of the democracy event in Indonesia in 2019, the mass media coverage of politics will be increasingly diverse, especially in the political media coverage on television. Where the mass media in their coverage prepares expert second opinions that are not experts so that the survey is submitted to the public as a social responsibility that becomes the authority of the news coverage of each television station. In this case Kompas TV prepares political observer Gun Gun Heryanto (Political Analyst at UIN Syarif Hidayatullah Jakarta) as a guest speaker and Willy Aditya as Chairperson of the Nasdem Party DPP. In Kompas TV's coverage, the presence of Jokowi's Vice-Presidential Candidate is a hot topic to be discussed besides news

about Jokowi's big opponents in the 2019 General Election. In discussing figures, the resonance is usually already there. Starting from the recapitulation of political parties that constellation in the 2019 elections to the injury time registration of presidential candidates and vice presidential candidates in the 2019 elections. There is an effort to make the names that have been echoed in the public domain. On one hand it is not just a matter of echoing the names, but there must already be names that must have a cemetery with Jokowi so that they can be considered by Jokowi as a Presidential Candidate in the 2019 Election. These names are Muhaimin Iskandar (Chair of the National Awakening Party), Hary Tanoesoedibjo (General Chairperson of the Perindo Party), Airlangga Hartanto (General Chairperson of the Golkar Party), Gatot Nurmantyo (Former TNI Commander), Muhammad Romahurmuzy (PPP Chairperson) (SAPA INDONESIA PAGI KOMPAS TV Program, accessed on <https://www.youtube.com/watch?reload=9&v=bKIWV4lyisM&feature=youtu.be>).

These names appear not solely to be supported by the winning team of each candidate but there is a voter trend in the community. Voter trends should not be considered trivial in the context of a democratic party, but the context of voter trends can occur during injury time which is able to provide a situation for the market in the potential niche of voters. This phenomenon, then can be a factor of surprise and it never happened during the 2012 DKI Election. Whereas in the candidacy of the determination of candidates in the 2012 DKI Jakarta Election is very dynamic and unexpected or outside the public reason. The figures who fought in the Jakarta Election included (1) Fauzi Bowo and Nachrowi Ramli, a candidate pair from the Democratic Party; (2.) Hendarji Supandji and Ahmad Riza Patria candidate pairs from the independent pathway; (3.) Joko Widodo and Basuki Tjahaja Purnama, a candidate pair from PDIP and Gerindra; (4.) Hidayat Nurwahid and Didik J Rachbini, candidate pairs from PKS and PAN; (5.) Faisal Basri and Biem Benyamin, pairs of candidates from the independent channel; and (6.) Alex Noerdin and Nono Sampono, a candidate pair from Golkar, PPP and PDS. Based on the candidate pair number in the 2012 DKI Jakarta Regional Election (viva, <https://www.viva.co.id/indepth/fokus/313440-6-pasang-calon-gubernur-wakwak-gubernur-dki>, accessed on the 1st July 2018 at 10:17 PM).

At that time, people could not imagine Jokowi could advance in the middle of a party process that was often hegemonic in the process of candidacy. Suddenly surfacing and being nominated in the 2012 Jakarta Election candidacy process, all of this is very likely to occur in the 2019 Election. In terms of reading the political map in Indonesia, do not be linear, meant in the context of Jokowi's companion vice presidential candidate pair in the 2019 Election. Because some variables might emerge that are very possible to open maps and random patterns that I mention are still possible until the registration process of the pair of candidates for president and vice president on August 4, 2018. The phenomenon of the meaning of the issue, especially in the context of the news about the Vice-Presidential Candidates in the 2019 Election, then many journalists are trapped in political news framing, not editors, but other parties in this case are influenced by the dynamics of public space that generates opinions about the names echoed by the audience for the vice presidential pair. in the 2019 elections later.

Referring to the study of political communication there is no intentional actor action in packaging an issue that will be made public. The existence of a deliberate activity, there must be a series of communication activities that affect the political environment which in fact has been designed to be one way to become a public opinion that can show everything in a way that demonstrators are covered in a report itself.

The existence of the media debate is not substantive but gave birth to public opinion that is the current news media framing. In an effort to consolidate themselves from these names, reading political maps is important for now. Not merely meeting figures but the value of the political landscape which Muhaimin Iskandar later demonstrated to meet with Jokowi, Hari Tanoesoedibjo met with Jokowi who later declared him to be a coalition team in the 2019 election.

Dramaturki's concept refers to Goffman's view of dramaturgy inspired by the thoughts of French sociologist Emile Durkheim and British Anthropologist A.R. Redcliffe-Brown. The strengths that Goffman has as a theorist are seeing themselves (self) with central thinking analyzing human behavior as a theatrical metaphor, which is divided into a front stage, a back stage where people act as managing actors impression (impression management) so that the audience was impressed at the display being shown (Tuti Bahfiarti, 2011: 16). In this case, see how the matter of reading the movements of other parties in determining the strategy in the placement of presidential candidates and candidates for vice president 2019 later. In this case, there is still time to look at Prabowo's positioning in the 2019 elections. Where to see from the strategy carried out by Prabowo today is the momentum to consolidate the process of internal consolidation. The most strategic thing right now is to form a winning strategy such as the SEKBER (Joint Secretariat) of the winning team. In this case in the case of winning the second Jokowi in the 2019 elections, it must be downgraded from macro to mezo to micro through SEKBER (Joint Secretariat). This task is carried out by 52% of the parties supporting Pak Jokowi, while there are still 27% of the three parties namely PAN, then there is a Democratic party, there is a PKB and there is still 20.1% if we examine this into the last 3 axis, namely the PKS party and the Gerindra Party (Gun Gun Heryanto, accessed at <https://youtu.be/bKIWV4lyisM> on April 3, 2018 at 18.37 WIB).

Although there have been a number of names included, such as Muhaimin Iskandar (Chair of the National Awakening Party), Hary Tanoesoedibjo (Chair of the Perindo Party), Airlangga Hartanto (Chair of the Golkar Party), Gatot Nurmantyo (Former TNI Commander), Muhammad Romahurmuzy (Chair of the PPP Party) (KOMPAS TV Indonesia Sapa Morning Program, Accessed at <https://www.youtube.com/watch?reload=9&v=bKIWV4lyisM&feature=youtu.be> on April 3, 2018 at 18.37 WIB).

But until injury time on August 4, 2018, there has not been a single name that has been set by Jokowi as a Vice-Presidential Candidate who will assist him in the 2019 Election. The position is referred to as ZOPA (Possible Aggement Zone), which in this case still forms an area that still remains allow the name of anyone, especially from the sotelist to conical to the name of running mate (Gun Heryanto, accessed at <https://youtu.be/bKIWV4lyisM> on April 3, 2018 at 18.37 WIB). From this report, Kompas TV

presented information on the attempt to narrow down the names of Jokowi's assistant vice president in the 2019 Election. In this case, one name had already been pursued to be declared before August 4, 2018.

Efforts by Kompas TV in Providing Political Literacy to the Public

In the political literacy of the 2019 Election became a separate trend in the presentation of news by the Kompas TV television station about the Vice-Presidential Candidates in the 2019 Elections. Referring Bernard Crick (2000: 60) explained in "Essays on Citizenship", interpreted as a collection of knowledge, skills and behavior to develop together, each of which conditions the other two. In this case, the participation of Indonesian citizens (WNI) in the general election is one manifestation of their responsibilities in the life of the nation and state. Not only that, the participation of Indonesian citizens is a form of political literacy in exercising their voting rights.

Indonesia does not recognize the obligation to vote (compulsory votes) as adopted by Australia. Therefore, choosing is a right and not an obligation as a citizen. Those who are entitled to vote are citizens of the Republic of Indonesia who are 17 years of age or older or who have or have been married (see Law Number 42 of 2008). However, Indonesia still applies restrictions, because not all citizens who are aged 17 years or older or have / have been married, can automatically use their voting rights. There are restrictions that are regulated in Law Number 8 Year 12 regarding General Elections of Members of the House of Representatives, Regional House of Representatives, and Regional House of Representatives here in after abbreviated to the 2014 Pileg. These restrictions are expressly stated in Article 149 which states that eligible voters Participate in the voting at the TPS includes: (a) voters registered on the permanent voter list at the relevant TPS; (b) voters registered on an additional voter list; and (c) voters not registered on the final voter list and additional voter lists. Presidential and Vice President Elections which are referred to as the 2014 Presidential Election, the provisions are not exactly the same as referred to in Law Number 42 Year 2008 concerning Election of President 111 and Vice President Article 111 that Voters who are entitled to vote at the TPS include: (a) voters registered on the Final Voters Register at the relevant TPS; and (b) Voters registered in the Additional Election List. There are no stipulations on the voters who are not registered on the Permanent Voter List and Additional Voter List, whether or not they can use their voting rights. The governing provisions are carried out by the General Election Commission (KPU).

In political literacy in reporting television stations in the voter approach is highly studied. Where voters in Indonesia there are four voter typology approaches, including Sociological, Rational Psychological and Marketing (Adman Nursal, 2004: 54-73). Kompas TV coverage in the sociological approach can be seen between civic political models such as Primordialism being used as Political Treatment. In this case, in the reporting of Kompas TV in the SAPA INDONESIA PAGI program, it was conveyed that several names of figures such as Muhaimin Iskandar said that he was the Candidate for Vice President in 2019 as Jokowi's companion. Because he has the support of the Grassroots Network (JANGKAR) Cak Imin Banten which is a Primordial base.

Because often a sociological approach such as primordial is very dangerous for the future because of identity politics and then exploited in the future which causes the paradox to emerge called Mental Bigot (this group is right and the other groups are wrong). Then when it is exploited by the presence of figures who make community groupings so as to form a stronger movement then there are ingroups, outgroups and the very dangerous entry of tribes, races, religions and certain groups that form identity politics in the political struggle in the 2019 Presidential Election later. Referring to the voters in the 2019 presidential election later in the psychological approach can be described in this report is the participation of several CSO leaders, party leaders, political party organizations and others, which illustrates that he identified that he was one of the cadres of the political party and caused there are my choices in the 2019 presidential election later. For example, in the Kompas TV news coverage, Hary Tanoesoedibjo is the General Chairperson of the Perindo Party, where the Perindo party is a political party that has a constellation in the 2019 elections. Because Hary Tanoesoedibjo received support from the party to move forward to become a vice presidential candidate in 2019. He identified that cadres of the Perindo party participated in selecting him in the 2019 Presidential Election when accompanying Jokowi to become the Vice-Presidential Candidate in the 2019 Presidential Election.

The Rational side of Ekosentris and the consideration of useful opinions from the news media on television stations affect the existence of individual voters in the 2019 elections later. Or from the news, it is seen that there are incentives that look to the future or see prospects in the future when the names of these figures accompany Jokowi in the 2019 Presidential Election. In seeing rational ecosystems, it is very important to convey them in political literacy in order to open up insights to identify the needs of the Indonesian people to leaders will come to provide programs that provide education, informative and useful for the benefit of being able to be informed to the public.

Therefore, political literacy in the institutionalization of mass media, especially in media coverage of television stations, is important for us to study. Media as a channel of information to audiences that are able to provide information to the public.

IV. CONCLUSION

Political literacy on television news media coverage of the Vice-Presidential Candidates in the 2019 Election is an important thing to do. A number of efforts carried out by the KPU ranging from verification of a number of political parties that escaped and became participants of the 2019 election, the dialectical process of political party leaders to brainstorm names that appear to be Jokowi's companions in the 2019 elections later to package Jokowi's heavy opponents in the 2019 Presidential Election. The efforts made by the mass media in carrying out their coverage ranging from making an expert second opinion in the reporting so that Gun Gun Heryanto (Political Analyst of UIN Syarif Hidayatullah Jakarta) as a guest speaker and Willy Aditya as Chairperson of the Nasdem Party DPP so that the results of the survey and the results of the media coverage to the public as social political responsibility for reporting authority. The phenomenon of interpreting the issue, which then many journalists are trapped in precisely political news framing is not an editor but another

party. In this case, it opens up the phenomena that are present in society about the names that have been echoed to become Jokowi's companions in the 2019 presidential election later. The names that have been echoed include: Muhaimin Iskandar (Chair of the National Awakening Party), Hary Tanoesoedibjo (Chair of the Perindo Party), Airlangga Hartanto (Chair of the Golkar Party), Gatot Nurmantyo (Former TNI Commander), Muhammad Romahurmuzy (Chair of the Perindo Party), Airlangga Hartanto (Chair of the Golkar Party), Gatot Nurmantyo (Former TNI Commander), Muhammad Romahurmuzy PPP.

The names are not only echoed but there must be chemistry to Jokowi so that they enter the realm of the declaration which will be submitted on August 4, 2018. The effort made by Kompas TV is an event to socialize and give literacy awareness to the names that come to accompany Jokowi become a Vice-Presidential Candidate in the 2019 Elections later. Not only the media but the Survey Institute and Political Consultants conducted monitoring research on the Ideal Pair of CAPRES and CAWAPRES in the 2019 General Election. Among them the Indonesian Survey Institute DENNY JA in July 2018, the results of monitoring research on the Ideal Jokowi Vice President in Parliament, among others Airlangga Hartanto (General Chairman of the Golkar Party) by 35.7%, Muhaimin Iskandar (General Chair of the PKB) by 21.5%, Romahurmuzy (General Chair of the PPP) by 16.0%. In addition, the Indonesian Survey Institute DENNY JA in July 2018 conducted a monitoring study on the Ideal Vice President for Economic Growth (Professional Vice President), among others, Sri Mulyani at 32.5%, Susi Pudjiastuti at 24.5%, Chairul Tanjung at 17.0%. In the legal, police and military apparatus sector, Jokowi's ideal vice president is Tito Karnavian at 32.6%, Moeldoko at 29.0%, Wiranto at 25.7%. In the Religious Figures sector, the influence of Jokowi's Ideal Vice President included KH. Ma'ruf Amin at 21.0%, Din Syamsuddin at 17.2%, Mr. Guru Bajang at 12.3%, Mahfud MD at 9.5%. Not only that, in the monitoring research it was mentioned that Jokowi's Vice Judge Expert Judgment pursued five names, among others. Airlangga Hartanto, Mahfud MD, Tirta Karnavian, Moeldoko, and Sri Mulyani.

In this case, political litigation education conducted by television stations already has authority in reporting and has socio-political responsibilities so as to be able to provide political literacy to the public in order to provide important information about Indonesian leaders in the future.

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Heavy Metal Levels of Soil Samples Collected From a Major Industrial Area in Abeokuta, Southwestern Nigeria

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DOI: 10.29322/IJSRP.9.08.2019.p92125

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92125>

Abstract- Industrialization has propagated the incidence of heavy metal contamination in the environment, and several life-threatening diseases which people suffer from today culminate from the impact of this group of metals. The extent of certain industrial activities on soil quality in terms of heavy metals must therefore be investigated. This study aims to examine the levels of five metals (Cd, Zn, Cu, Cr, and Pb) in soil samples collected from industrial area of Abeokuta, Southwestern Nigeria. Soil samples were obtained from five different industrial sites known for the following activities: metal oxide production, ceramics production, mattress manufacturing, galvanizing, and paint production. These industries were coded Site A, Site B, Site C, Site D, and Site E, respectively. Two control samples coded Control 1 and Control 2 were obtained from locations in the city distant from major pollution sources. The concentrations of heavy metals in the samples were determined using Atomic Absorption Spectrometer (AAS) after digestion using acid mixture. The range of mean concentrations of each metal in test samples were between (12.40 - 17.20 mg /kg) Cr, (N.D - 2.00 mg/kg) Cd, (19.80 - 285.80 mg/kg) Pb, (9.65 - 69.90 mg/kg) Cu, and (174.70 - 2500.40 mg/kg) Zn. The trend shows that Zn>Pb>Cu>Cr>Cd. Mean levels of Cr were significantly below the World Health Organization (WHO) recommended limit. Except in Site A and Site D, mean levels of Cd were below the set limit. Pb recorded mean levels far above the set limit in Site A, Site B and Site D. Cu levels were above set limit in Site A and Site D; mean levels of Zn were above the set limit. The values of all metals in test samples were significantly higher than those in control samples suggesting possible mobility of metals from industrial sites to residential areas through leaching and runoffs.

Keywords- Contamination, Heavy metals, Industrial sites, Soil.

I. INTRODUCTION

Among the most common environmental pollutants are a group of metals known as heavy metals whose detrimental effects on the health of plants, animals and humans cannot be overemphasized. Although their occurrence in soils originates from natural and anthropogenic sources, industrialization coupled with urbanization has enormously influenced their widespread.

Heavy metals, when present in soils, can inhibit the biodegradation of organic contaminants, posing a great risk and hazards to biota [9][12][13]. Since soil on its own has the capacity to immobilize introduced chemicals, these toxicants accumulate over time in it, and are released into the streams, rivers and seas [7][10]. They end up through the food chain in man- via accumulation in marine organisms and plant uptake- thereby causing various toxicological manifestations [4][7].

Literature indicates that certain industrial activities including metallurgy and paint production contribute to high concentrations of these metals in soil, and prevalent metals found at contaminated sites include lead (Pb), arsenic (As), chromium (Cr), zinc (Zn), cadmium (Cd), copper (Cu), and mercury (Hg) [4][15]. Much work has been done on heavy metal pollution problems in Nigeria but no work currently exists on examining heavy metal levels in an industrial area with an array of industries in the same geography distinctively focused on the manufacture of different chemicals or products. This study is aimed at determining the levels of five (5) trace metals namely cadmium, copper, zinc, lead, and chromium in soil samples collected from an industrial area in Abeokuta, Southwestern Nigeria. Examining the levels of these metals will serve as a reference for future studies, and ultimately inform the authorities in environmental management on the risk of exposure of the inhabitants to these toxic metals.

II. EXPERIMENTAL SECTION

A. Sampling sites and Sample collection

The study area is located within latitude 6°N and 8°N and longitude 2.5°E and 5°E. Soil samples were obtained randomly from five locations within the vicinity of each industrial site in Abeokuta, Ogun State, Nigeria. Two (2) control soil samples were taken from locations within the city distant from sources of major pollution. At each sampling point, the topsoil layer was scraped off while portions of soil were scooped within a depth of 5 - 15 cm using a plastic spoon. The collected portions were subsequently combined to give a composite of each individual sample. The soil samples were labeled accordingly and stored in a polythene bag. Table 1 shows the sampling details.

Table 1: Sample Information

Code	Site
Site A	Metal-oxide manufacturing industry
Site B	Ceramics manufacturing industry
Site C	Mattress manufacturing industry
Site D	Galvanizing industry
Site E	Paint manufacturing industry
Control 1	Control
Control 2	Control

B. Sample Preparation

The samples were oven dried at 105°C for three hours and left to cool at room temperature before crushing using mortar and pestle, then sieved with a 0.02 mm sieve mesh, and stored in polythene bag. 5g of each sample was weighed and put into pre-washed and oven dried standard flask, digested and labeled appropriately.

C. Sample Digestion

Each soil sample was transferred into 250 ml standard flask, and diluted with 50 ml of 2M HNO₃, and then heated in the sand bath for about 3 hours at a temperature of 90°C to 100°C. The digested solution was evaporated to near dryness, and allowed to cool at room temperature. It was then filtered into standard flask, and diluted to 100 ml with distilled water, and shaken vigorously. Subsequently, it was poured into 120 ml plastic bottle prior to aspiration into the Atomic Absorption Spectrophotometer (Perkin Elmer) to determine the metals. Settings and operational conditions were followed with respect to the manufacturer's guidelines.

D. Quality Control

Duplicate samples were analyzed to check for precision of the instrument and method used. The standard calibration curves for all five parameters were obtained using a series of varying concentrations. All calibration curves were linear with correlation coefficients close to 1.

III. RESULTS AND DISCUSSION

Average concentration of metals in soil samples collected from each site was evaluated. The results are presented in Table 2, and graphically illustrated and distinguished in Figures 1 - 5. Cr ranged from 12.20 mg/kg to 17.20 mg/kg, Cd ranged from nil to 2.00 mg/kg, Pb ranged from 19.80 mg/kg to 783.30 mg/kg, Cu ranged from 13.70 mg/kg to 69.90 mg/kg, Zn ranged from 174.70 mg/kg to 2500.40 mg/kg. For Control 1 and Control 2, mean concentrations were 14.30 mg/kg and 15.70 mg/kg for Cr, nil and 0.20 mg/kg for Cd, 36.70 mg/kg and 15.10 mg/kg for Pb, 9.65 mg/kg and 8.50 mg/kg for Cu, 181.10 mg/kg and 62.30 mg/kg for Zn, respectively. World agencies including World Health Organization (WHO), European Regulatory Standards (EURS) and United States

Environmental Protection Agency (USEPA) have set limits for heavy metals. The maximum permissible limit by WHO for soil samples are: chromium 100 mg/kg; cadmium 0.8 mg/kg; copper 36 mg/kg, zinc 50 mg/kg, and lead 85 mg/kg [14]. In an assessment of heavy metals around major industrial areas in Northwestern Nigeria, values of Pb recorded were in the range 273.10 mg/kg to 523.00 mg/kg; Cd in the range 0.10 mg/kg to 0.70 mg/kg; and Cr in the range 21.10 mg/kg to 92.70 mg/kg. A similar research carried out by Adesuyi et al. (2015) recorded mean levels of: Zn as 141.06 mg/kg which is below the levels recorded from test samples in this study; Cu as 131.70 mg/kg which is higher than values obtained from test samples in this study; Pb as 59.80 mg/kg which is significantly lower than mean levels obtained from Site A, Site B and Site D; and Cd as 0.27 mg/kg which is only lower than the value obtained for Site A (2.00 mg/kg). Another study by Iyaka and Kakulu (2012) observed mean level of Cu in soils of an industrial area in Bida, Niger State to be 467 mg/kg while 181 mg/kg was recorded for both Zn and Pb.

Table 2: Mean Concentrations of Heavy Metals in Soil Samples Collected

Parameters (mg/kg)	Cr	Cd	Pb	Cu	Zn
Site A	12.4	2	285.8	39.4	2500.4
Site B	12.2	N.D	115.2	13.7	271.7
Site C	15	0.2	51.4	15.3	293.4
Site D	15.5	1	783.3	69.9	2375.5
Site E	17.2	N.D	19.8	17.8	174.7
Control 1	14.3	N.D	36.7	9.65	181.1
Control 2	15.7	0.2	15.1	8.5	62.3

N.D: Not detected

Table 3: WHO Maximum Permissible Limits of Heavy Metals in Soil

Heavy metals	Cr	Cd	Pb	Cu	Zn
mg/kg	100	0.8	85	36	50

Source: WHO (1996)

A. Chromium

The mean levels of chromium were significantly below the maximum permissible limit set by WHO (Figure 1). Chromium has varying oxidation state of +2 to +6; the trivalent state is the most stable. Although, this stable chromium has been reported to be an essential nutrient, when inhaled, ingested or interacted with at a high level, it poses deleterious effects on human health [17]. These effects include skin irritation, headache, dizziness, nausea, kidney damage, blood disorder and stunned mental faculty. In all the collected soil samples, concentration of chromium was recorded below the maximum permissible limit set by WHO. Chronic exposure to cadmium engenders dysfunction of the body systems [11].

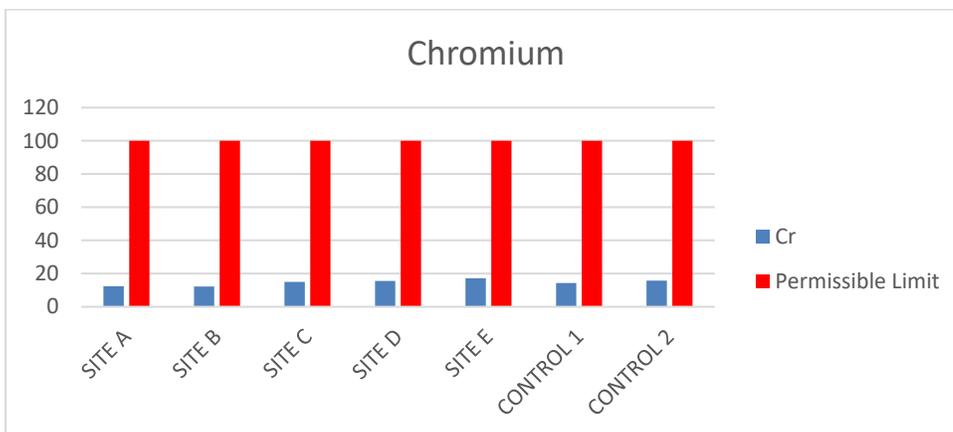


Figure 1: Mean levels of Cr in Soils Samples Collected in Comparison with WHO Maximum Permissible Limit

B. Cadmium

Cadmium exists and persists in environment as result of anthropogenic activities not limited to metal ore combustion and incineration [3][6]. Except in Site A and Site D, concentration of cadmium was recorded below the maximum permissible limit set by WHO in each soil sample collected (Figure 2). Metallurgical operations are carried out in Sites A and D, hence the result. Cadmium was not detected in Site B, Site E, and Control 1.

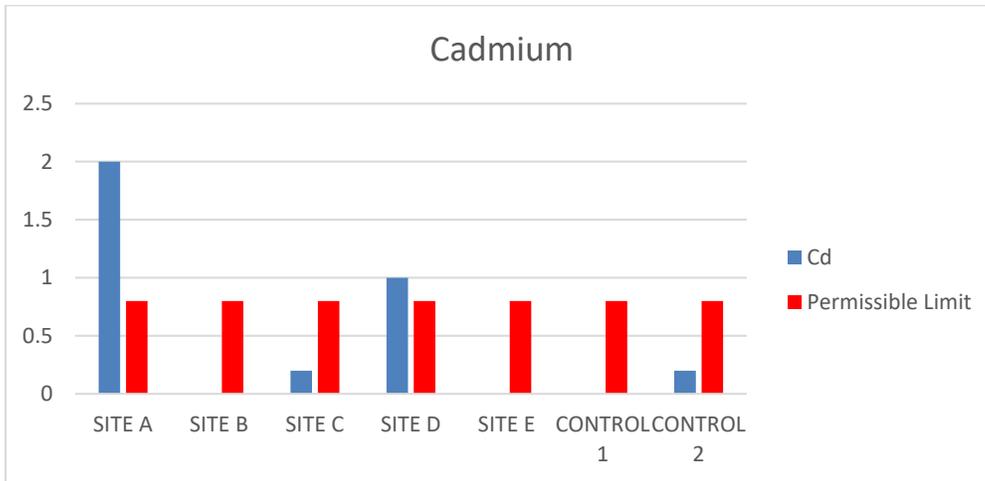


Figure 2: Mean levels of Cd in Soil Samples Collected in Comparison with WHO Maximum Permissible Limit

C. Lead

Although the brain is the main target of Lead (Pb), it affects multiple organs of the body and accumulates over time, and children are the major victims [16]. In 2010 and repeatedly 2015, lead poisoning resulting from lead-contaminated soil and dust from mining claimed the lives of many young children in Zamfara, Northern Nigeria. Inhalation and ingestion of Pb instigates long term harm in adults and pregnant women with increased risk of high blood pressure and birth deformities respectively [16]. Owing to its relevance and usefulness in the metallurgical industry, Pb recorded the highest mean concentration far above the maximum permissible limit set by WHO in Site A. Next in the spectrum are Site D and Site B. Other soil samples collected were below the WHO set standard (Figure 3).

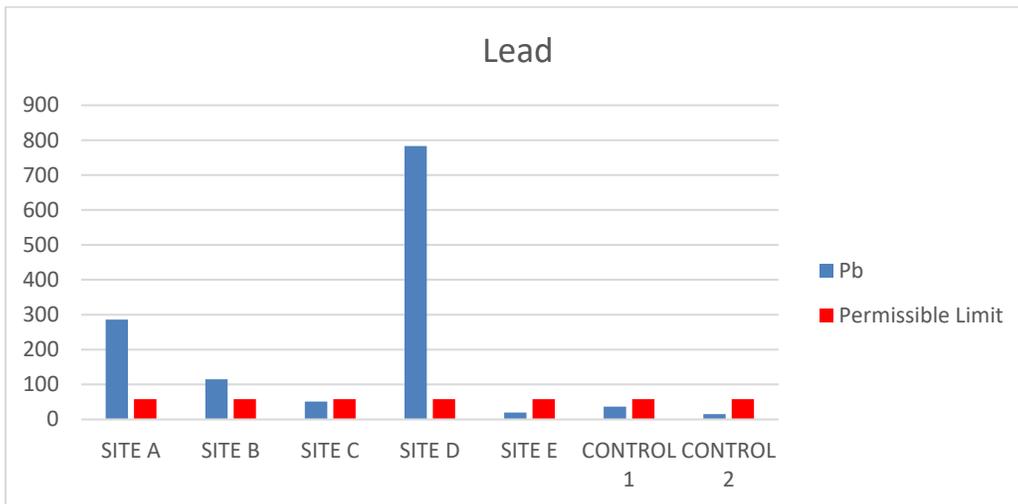


Figure 3: Mean levels of Pb in Soil Samples Collected in Comparison with WHO Maximum Permissible Limit

D. Copper

Copper is an essential trace element of the human cells but in superfluity can imperil the mitochondria and other cell membranes. Copper toxicity can lead to coma, liver damage, and even death [5]. Copper (Cu) levels recorded were below WHO maximum permissible limit in almost all the samples (Figure 4). The samples which had values above the set standard are Site A and Site D.

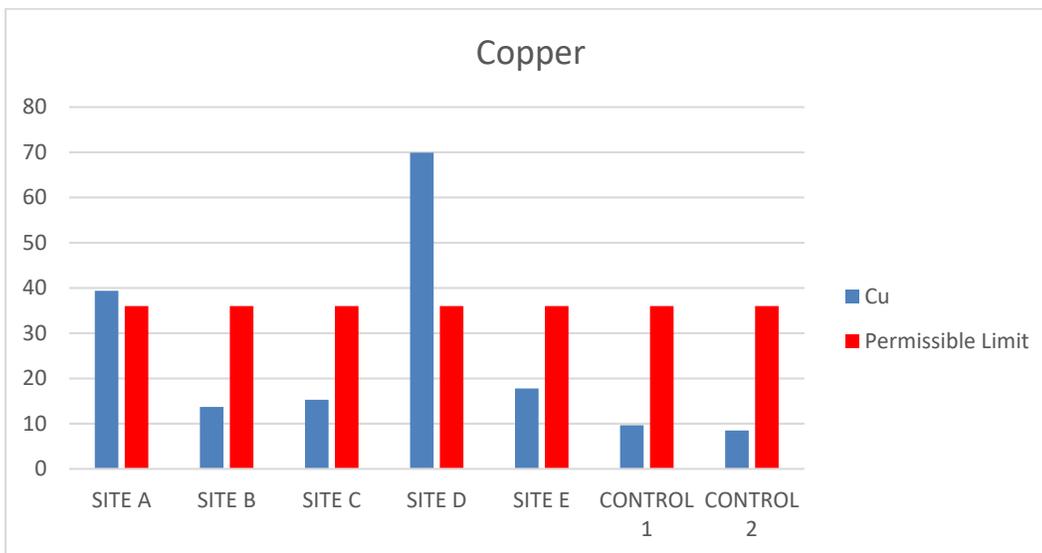


Figure 4: Mean levels of Cu in Soil Samples Collected in Comparison with WHO Maximum Permissible Limit

E. Zinc

The mean levels of zinc (Zn) were above the maximum permissible limit set by WHO. Generally, with zinc exempted, control samples had mean concentration of all examined parameters below the maximum permissible limit set by WHO (Figure 5). Toxicological manifestations of zinc include stomach pain, loss of appetite, and vomiting.

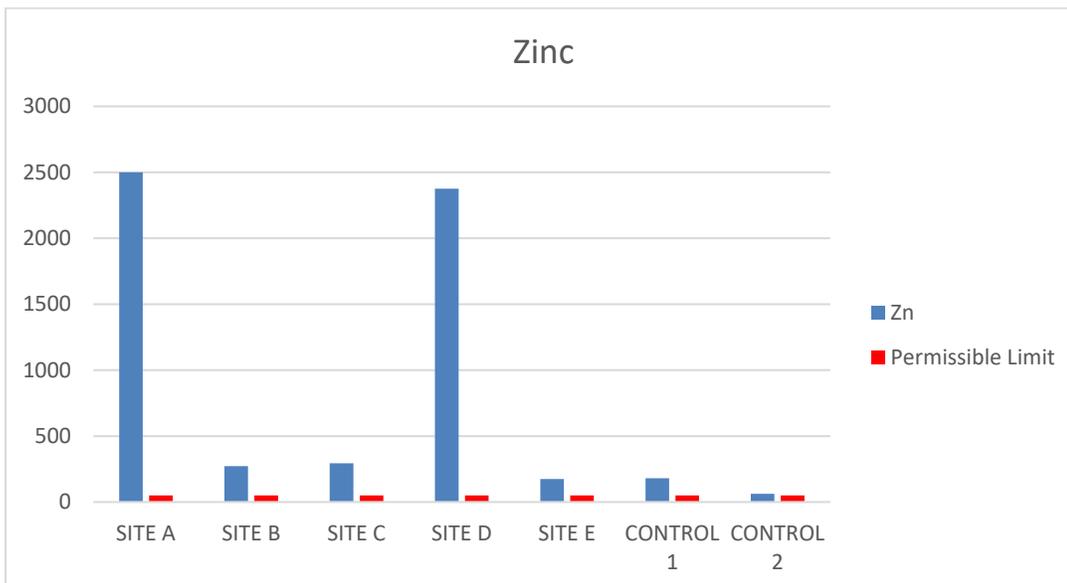


Figure 5: Mean levels of Zn in Soil Samples Collected in Comparison with WHO Maximum Permissible Limit

IV. CONCLUSION

The results show that availability and distribution pattern of the examined parameters varied with industrial activities and this is indicated by the range of concentration values observed for virtually all the heavy metals in the soils analyzed across the sample locations. Analysis also shows significant difference between the test samples and controls. With increase in vehicular movements in the industrial area as well as other small scale industrial activities such as vehicle repairs, welding, battery charging amongst others, there is bound to be an increase in environmental pollution especially heavy metal contamination since this class of metals tends to accumulate in the soil due to their non-biodegradable nature. Since these metals have toxic potential and long term chronic effect on exposure, regular assessment should be carried out to ascertain the level of heavy metal contamination in the soil to avoid accumulation of these metals in individuals through food chain. Research work should be carried out to study the effects of heavy metals on the people of Abeokuta. Sustainable management of soil should be imbibed [2]. Planting of food crops close to the

industries should be avoided, and ultimately, appropriate measures should be put in place by the government to ensure that industries are in compliance with environmental guidelines.

ACKNOWLEDGMENT

The efforts and financial assistance of Adetutu Olusola and Bukola Luwa during sample collection and analysis of this study are highly appreciated.

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Anterior Attico-antrostomy with Cortical Mastoidectomy and Attic Reconstruction with or without Ossiculoplasty Versus Canal Wall Down Mastoidectomy with Ossiculotympanoplasty using Tragal Cartilage shielded by Temporalis fascia

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DOI: 10.29322/IJSRP.9.08.2019.p92126

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92126>

Abstract : The aim of this study was to evaluate hearing and compare the hearing results of anterior atticoantrostomy with cortical mastoidectomy with attic reconstruction with or without ossiculoplasty to canal wall down mastoidectomy with ossiculotympanoplasty using tragal cartilage shielded by temporalis fascia. This was a prospective, analytical and longitudinal study which was conducted in the Department of Otorhinolaryngology, MBS Hospital kota, (Raj) From 1st Dec. 2015 to 30th Nov. 2016, included the patients with squamosal disease in age group of 15-45 years, having conductive hearing loss of 30 dB or more. 50 patients who were operated for squamosal disease were randomly selected, 25 patients in each group as named Group A and Group B. Outcome were measured in terms of Post-op ABG, ABG closure, extrusion or rejection of material used for ossiculoplasty, residual or recidivism rate of disease, patient's acceptability for procedure, and post-operative difficulties faced by patient. The study included 50 patients out of which 25 patients were male and 25 were female with a mean age of 27.62 yr. Maximum no of cases were in age group of 15-24 years (42%). ABG closure within 25 dB in Group A (ICW+A&R) who undergo anterior atticoantrostomy with attic reconstruction were in 18 (75%) patients while in Group B(CWD) who undergo canal wall down mastoidectomy with ossiculotympanoplasty were in 10 (43.47%) patients. Patients of Group A had a significant improved hearing outcome in compare of Group B patients. TORP rejection was seen in 1 case in follow-up period of 3 months, as cartilage was absorbed due to cavity infection.

Keyword: Atticoantrostomy, Cholesteatoma, Mastoidectomy, Ossiculotympanoplasty,

I. INTRODUCTION

Acquired attic cholesteatoma is due to retraction of Sharpnell's membrane caused by Eustachian tube dysfunction, proliferation of basal layer of Sharpnell' membrane, immigration of squamous epithelium, or metaplasia of inflamed middle ear epithelium into keratinizing squamous epithelium. An attic cholesteatoma develops from Prussack's space of the pars flaccida; it usually extends laterally to the mastoid cavity and medially to the mesotympanum. Cholesteatoma invading the mesotympanum appear to destroy the ossicles and to induce frequent complication. The major surgical techniques for attic cholesteatoma are the 'Canal Wall Down' (CWD) and 'Intact Canal Wall' (ICW) tympanomastoidectomy procedures. The CWD approach can give improved exposure but produces significant clinical problems after surgery, such as late healing, postoperative hearing loss and the need for long-term care of the mastoid cavity. The advantages of the ICW technique are rapid wound healing and avoidance of the need to clean the ear periodically. However, residual and recurrent cholesteatomas are common after this approach because it is difficult to access the epitympanum. With opening of the attic (atticotomy), the epitympanic space can be visualized. If the atticotomy can be performed widely enough to expose the whole extent of the cholesteatoma (atticoantrostomy), the mass can be removed without leaving any residual matrix. However, the opened epitympanic area will act as a space for postoperative retraction and might allow the development of a recurrent cholesteatoma. Consequently, procedure that can reconstruct or obliterate the epitympanic space are needed to prevent recurrence and complications. Attic reconstruction can be performed with cartilage shielded by temporalis fascia. If disease or cholesteatoma is extensive then canal wall down mastoidectomy will be done. It includes cortical mastoidectomy along with removal of posterior wall of external auditory meatus and reconstruction of eroded ossicles with tragal cartilage shielded by temporalis fascia. In place of tragal cartilage TORP (Total ossicular replacement prosthesis) or PORP (Partial Ossicular Replacement Prosthesis) can be used. Reconstruction of eroded ossicles is usually done by homologous ossicles (most frequently used ossicle is the body of incus; the head of

malleus; a cortical bone graft or a cartilage i.e, chonchal or tragal or septal cartilage) or synthetic prosthesis made up of plastipore; hydroxyapatite; gold; titanium etc.

II. MATERIAL & METHODS

This is a prospective, analytical, and longitudinal study was performed in The Department of Otorhinolaryngology, MBS Hospital & attached Medical College Kota, Rajasthan from 1st Dec. 2015 to 30th Nov. 2016.

It was a hospital based study, as patients having chronic otitis media with cholesteatoma admitted in the ENT ward for ear surgery were our study population. During study period total mastoid surgery conducted in our institute were 180, out of which in 75 patients intact canal wall procedure and in 105 patients canal wall down procedure were performed.

After approval of study protocol by the local ethical committee and obtaining fully informed patient's written consent, 50 patients of age group 15-45yr having chronic otitis media with cholesteatoma operated for anterior atticostomy with cortical mastoidectomy with attic reconstruction with or without ossiculoplasty and canal wall down mastoidectomy with ossiculotympanoplasty using tragal cartilage shielded by temporalis fascia, 25 patients in each category are included in this study.

The cases selected for this study will undergo thorough clinical examination including examination under microscope. For hearing assessment pure tone audiometry (PTA) test performed within 7 days prior to operation. The air and bone conduction threshold to be recorded both pre and post operatively. Threshold averages were calculated by taking averages of 500, 1000, 2000, & 4000 Hz frequencies.

The patients would thereafter evaluated post surgery at periodic intervals on 7 days, 1 month, 3 month and 6 months as well.

Sampling Method:

The technique used was non-probability convenience method of **Random Sampling**.

Inclusion criteria:

- a) Patient having squamosal chronic otitis media with written and informed consent for the study.
- b) Patient in the age group of 15-45 yr.
- c) Patient with hearing loss of 30db or more.
- d) Patient with no active discharge from more than 4wk.

Exclusion criteria:

- a) Patient with poor cochlear reserve or severe SNHL.
- b) Patient with acute exacerbation of chronic otitis media.
- c) Patient having intracranial complication.
- d) Patient age <15 or >45 yr.
- e) Patient with bilateral chronic otitis media where the ear to be operated was the only hearing ear.
- f) Patient who underwent mastoid surgery as an approach to other surgery such as cochlear implant, translabyrinthine approach for acoustic neuroma etc.

The study was carried out under the following headings:

- a) History Taking
- b) Clinical Examination including Examination under Microscope
- c) General physical examination
- d) Investigations (Routine investigations, ECG, LFT, RFT, Coagulation profile, Pure tone audiogram, Radiology including skiagram bilateral mastoid lateral oblique view and HRCT Temporal bone and pus culture sensitivity)
- e) Operative Procedure
- f) Follow ups.

III. OPERATIVE TECHNIQUES

After taking fully informed consent with hair shaved 1 inch above and behind the pinna and nil per orally for at least 6 hr's patient was taken to OT room, where surgery was started under general anaesthesia. External auditory canal and post-auricular incision site was injected with 2% lignocaine in 1:100,000 adrenaline to achieve haemostasis. The ear was prepared by pouring povidone-iodine solution into the ear canal and scrubbing the auricle and post-auricular area with povidone-iodine. A post-auricular incision was made about .5 cm behind the post-auricular crease and a plane was developed between the subcutaneous tissue and the temporalis muscle and the periosteum of mastoid. External auditory canal skin incision was made in the direction of 6 o'clock to 12 o'clock at a distance of about 3mm from tympanic ring. A tympanomeatal flap was elevated and the mesotympanum was exposed. The status of ossicular chain and the extent of the cholesteatoma in the middle ear were both evaluated. The lateral epitympanic wall was removed with drill burrs to make a wide opening into the to make a wide opening into the epitympanum and thus visualize the extent of the cholesteatoma. If necessary, the malleus head and/ or incus were also removed. Simple mastoidectomy was performed to expose the antrum. The whole matrix of cholesteatoma was removed as completely as possible from the epitympanum, mesotympanum and mastoid cavity. Patient's tragal cartilage and temporalis fascia were harvested under the sterile conditions. To reconstruct the lateral bony wall of Prussack's space, harvested cartilage was cut into a piece of adequate size for coverage over the attic space. If the malleus head, short process or incus remained intact, the reconstructed cartilage can be supported by the ossicles. However, when there was only the malleus handle without short process or no ossicle at all, the attic was obliterated with cartilage. In this procedure, small pieces of cartilage are packed into the epitympanum to prevent any retraction of tympanic membrane. Defects of tympanic membrane were repaired with temporalis fascia graft. If necessary, ossiculoplasty was performed with TORPs or PORP. Synthetic prosthesis made-up of porous plastic (Polycel) may be used for ossicular reconstruction. While for extensive cholesteatoma canal wall down mastoidectomy was performed by removing posterior wall of external auditory meatus and mastoidectomy was done up to posterior to facial ridge but not beyond the anterior end of horizontal canal with possible reconstruction of hearing. An adequate size of chonchomeatoplasty was done for easy postoperative drainage, aeration and regular periodic cleaning of collected.

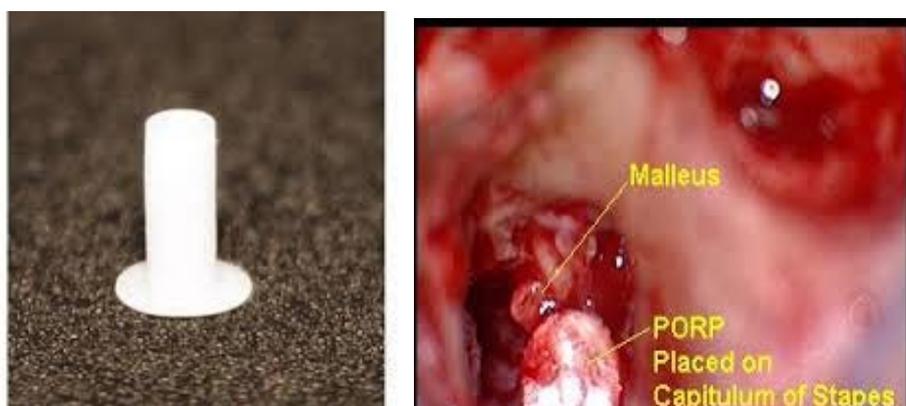


Fig 01: Material Used for Ossiculoplasty as TORP or PORP



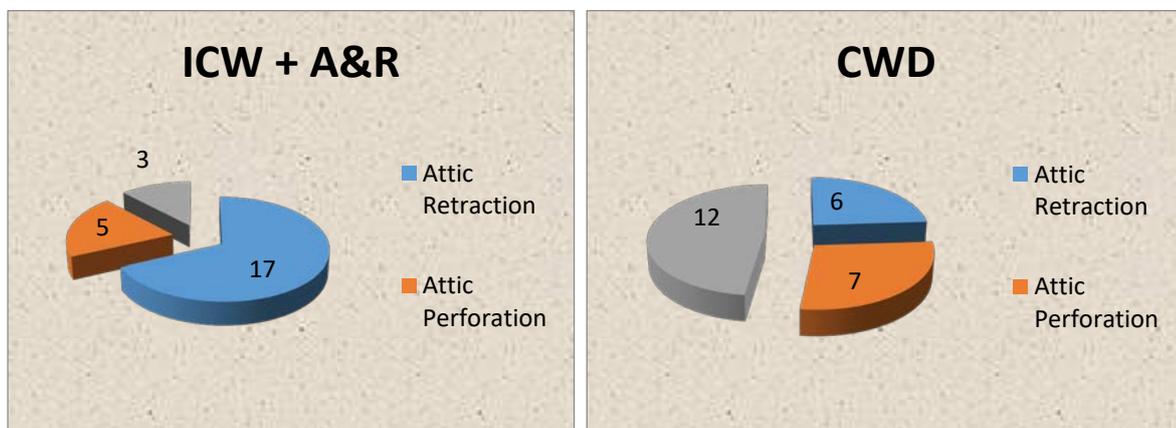
Fig 02: Attic Perforation and Attic Reconstruction

IV. OBSERVATIONS & RESULTS

Table No. 1

Distribution of the patients according to tympanic membrane status

TM Status	ICW + A&R	CWD	Total
Attic Retraction	17	6	23
Attic Perforation	5	7	12
Postero-superior Perforation	3	12	15

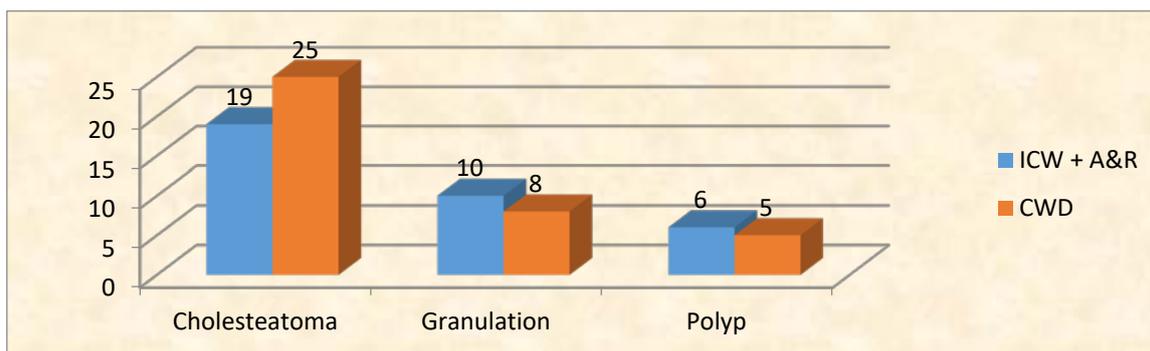


In our study we found that Attic Retraction was more commonly associated with limited disease as compare to postero-superior perforation associated with extensive disease. In total no. of 50 patients 46% had an attic retraction, 30% had a posterior-superior perforation and 24% had an attic perforation.

Table No. 2

Distribution of patient according to middle ear pathology

Clinical Finding	ICW+A&R	CWD	Total
Cholesteatoma	19	25	44
Granulation	10	8	18
Polyp	6	5	11

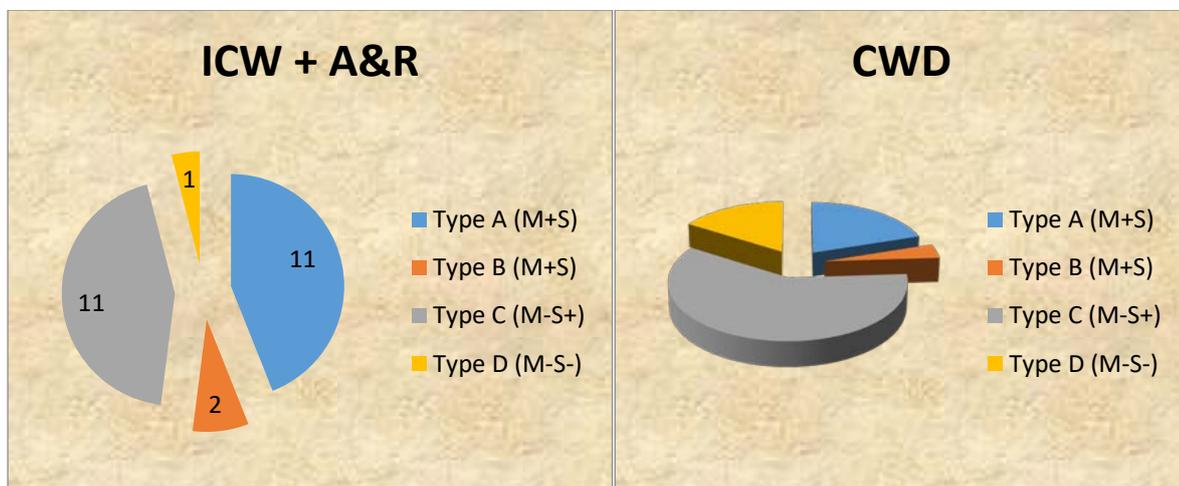


Most common pathological finding was cholesteatoma, followed by granulation and aural polyp.

Table No. 3

Distribution of patient according to the status of ossicles (Austin Classification)

Status of ossicles	ICW+A&R	CWD	Total
Type A (M+S+)	11	5	16
Type B (M+S-)	2	1	3
Type C (M-S+)	11	15	26
Type D (M-S-)	1	4	5
Total	25	25	50

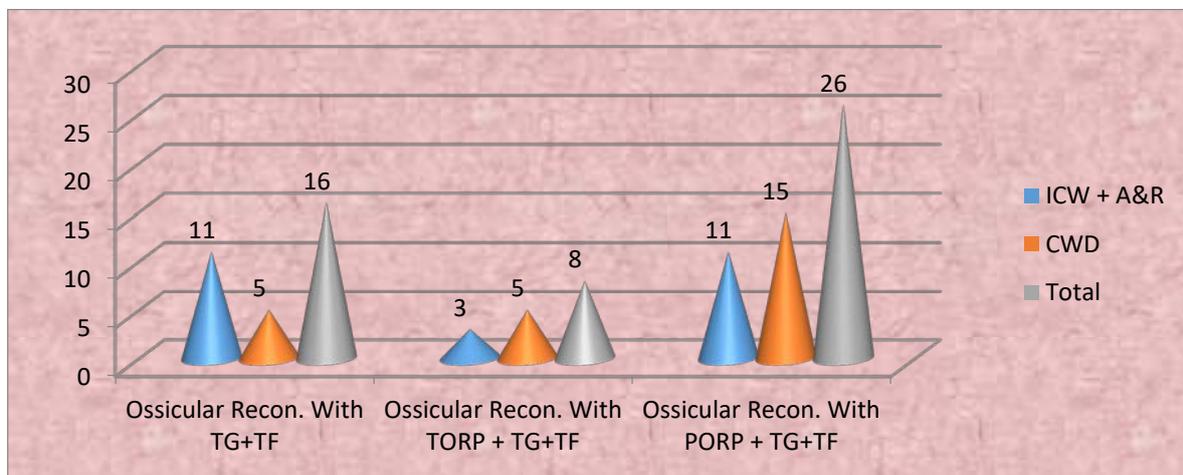


Type A (M+S+) and Type C (M-S+) were the most common ossicular finding for which ICW + A&R surgery done. CWD was done more commonly in Type C (M-S+) ossicular status.

Table No. 4

Distribution of the patients according to Surgical Technique used for Ossicular Reconstruction

Surgical Technique	Ossicular Recon. With TG+TF	Ossicular Recon. With TORP + TG+TF	Ossicular Recon. With PORP + TG+TF
ICW+A&R	11	3	11
CWD	5	5	15
Total	16	8	26

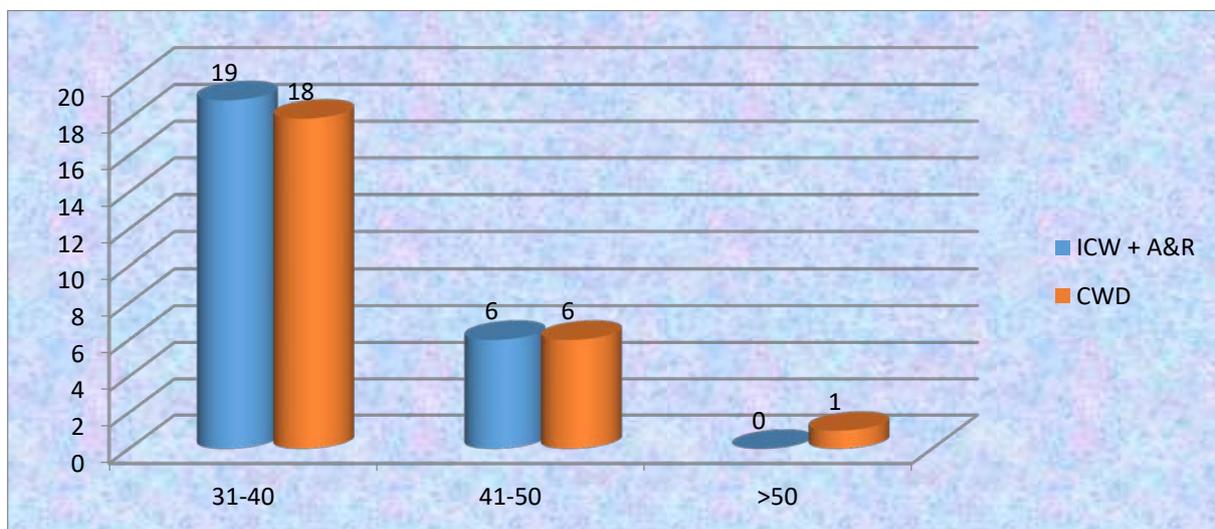


In 16 patients (ICW+A&R 11; CWD 5) tragal cartilage along with temporalis fascia were used for reconstruction.

In 8 (ICW+A&R3; CWD5) patients we use TORP with tragal cartilage and temporalis fascia; in 15 patients of Group CWD and 11 patients of Group ICW+A&R we use PORP with tragal cartilage and temporalis fascia.

Table No. 5
Pre-Op ABG Comparison

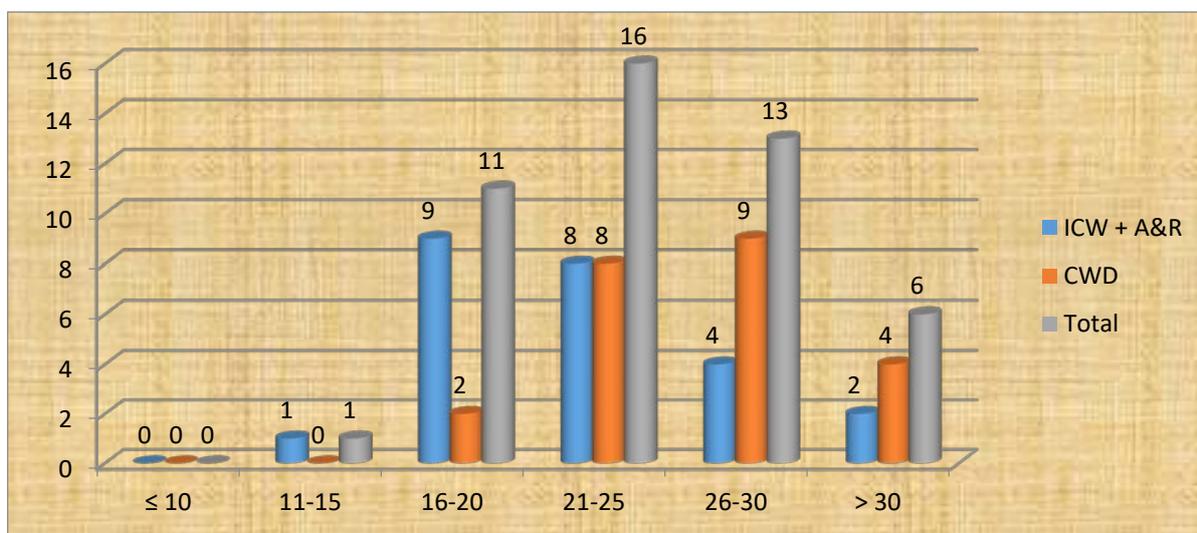
Pre-Op ABG	ICW+A&R	CWD	Total
31-40	19	18	27
41-50	6	6	12
>50	0	1	1
Total	25	25	50



Maximum number of cases were having an AB gap between 31-40 dB in both groups. No patient had having an AB gap of <30 dB in both groups.

Table No. 6
Post-Op ABG Comparison

Post-Op ABG	ICW+A&R	CWD	Total
≤ 10	0	0	0
11-15	1	0	1
16-20	9	2	11
21-25	8	8	16
26-30	4	9	13
> 30	2	4	6
Loss of follow- up	1	1	2
Prosthesis extrusion	0	1 (TORP)	1
Total	25	25	50

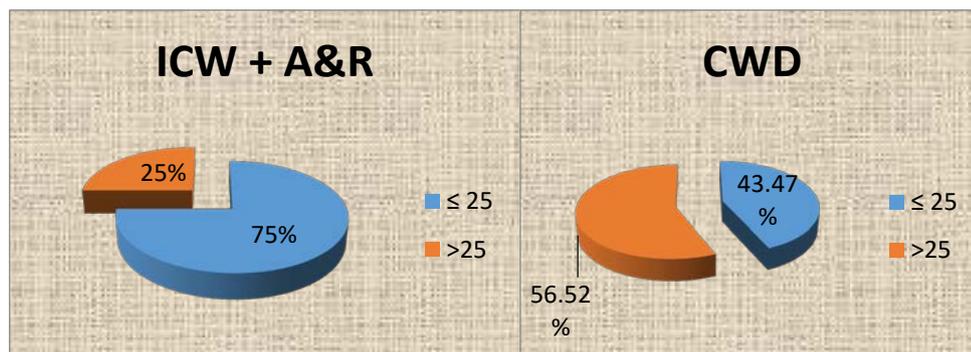


Maximum number of cases had a post-op AB gap between 21-25 dB with loss of follow-up of 2 cases, one in each group and extrusion of prosthesis (TORP) in 1 case of Group CWD.

Table No. 7

Comparison of AB Gap Closure Post Operatively

Post-Op ABG	ICW+A&R	CWD
≤ 25	18/24(75%)	10/23 (43.47%)
>25	6/24 (25%)	13/23 (56.52%)



Post-op remaining AB gap ≤25 dB in Group ICW+A&R was in 18 (75%) patients and in Group CWD was in 10 (43.47%) patients.

Table No. 8
Evaluation of Pre and Post-Operative PTA-ABC

Parameter	Group	N	Mean ± SD	P Value
ICW+A&R	Pre-operative ABG 500 Hz	24	40.62±4.73	<.0001
	Post-operative ABG 500 Hz		20.62±3.98	
	Pre-operative ABG 1000 Hz		38.54±7.4	<.0001
	Post-operative ABG 1000 Hz		20.62±5.38	
	Pre-operative ABG 2000 Hz		35.83±7.89	<.0001
	Post-operative ABG 2000 Hz		16.66±3.80	
	Pre-operative ABG 4000 Hz		35.62±6.64	<.0001
	Post-operative ABG 4000 Hz		17.5±7.22	
	Pre-operative ABG Average		37.34±4.41	<.0001
	Post-operative ABG Average		18.69±3.97	

Table No. 9
Evaluation of Pre and Post-Operative PTA-ABC

Parameter	Group	N	Mean ± SD	P Value
CWD	Pre-operative ABG 500 Hz	23	41.30±6.94	<.0001
	Post-operative ABG 500 Hz		23.26±6.50	
	Pre-operative ABG 1000 Hz		38.69±8.00	<.0001
	Post-operative ABG 1000 Hz		23.69±6.94	
	Pre-operative ABG 2000 Hz		39.13±10.40	<.0001
	Post-operative ABG 2000 Hz		20.86±7.33	
	Pre-operative ABG 4000 Hz		38.47±7.60	<.0001
	Post-operative ABG 4000 Hz		20.43±7.37	
	Pre-operative ABG Average		39.40±4.92	<.0001
	Post-operative ABG Average		21.95±5.83	

V. DISCUSSION

In our study maximum no of cases were in age group 15-24 year (42%) followed by 25-34 year (30%). Minimum age was 15 year and maximum age was 45 yr. The mean age in Group ICW+A&R was 27 years and in Group CWD was 28.24 yr. The studies done by BL Shrestha (2010)³⁶ also had the maximum no of cases in the age group 25-35 year and average age was 24.88 ± 5.82 .

According to available literature (Lee and Schuknecht 1971)³⁷ age has no significant role in success of Tympanoplasty. The studies of Russel and kloid 1991, states that failure rates are higher in patients below 10 years and above 55 year of age. This is due to poor compliance regarding procedure and audiometric recording below 15 yr. Hence in our study, we had selected patients in range of minimum age of 15 year and maximum age of 50 yr. Age does not alter the success of ossiculoplasty as seen from the studies of Iliana Fukuchi et al⁵.

The sex distribution was males 40% (10), females 60% (15) in Group ICW+A&R (n=25) and males 56% (14), and females 44 % (11) in Group CWD. As per literature available (Scott Brown otology) the success of middle ear surgery for chronic otitis media is not dependent on sex of pt.

In our study right ear were operated in 54 % (27), and left ear in 46 % (23) patients. The side of the disease was of no significance in assessing the hearing outcome for surgery.

The maximum number of cases were of service class i.e. 30 % followed by house wives i.e. 24 %. This can be explained by the fact that ladies and educated members came forward for getting hearing improvement. Uneducated and Rural population came only when there was severe hearing loss, thus we can say that education play a great role in seeking early advice regarding disease and treatment. This study is similar to Gupta J.P. (1978), in his study the maximum number of cases were house wives (36.3%) and students (23.4%) and minimum (13.3%) cases were in labour group.

The common symptoms in patients who presented with chronic otitis media, as seen in this study were hearing loss (100%) followed by ear discharge 92%, otalgia 30 %. Mac fadyean CA and colleagues in their study reported hearing impairment, aside from the disability from recurrent ear discharge, as the most frequent symptom of COM.

In this present study, the pre-operative assessment of patients included an otoscopic examination, oto-microscopic examination, assessment of hearing and radiological evaluation.

In our study we found that attic retraction (46 %) was the most common finding of tympanic membrane on otoscopic and oto-microscopic examination, followed by posterior- superior perforation (30%), and attic perforation (24%).

Middle ear pathology was cholesteatoma 76% (19), granulation 40% (10), aural polyp 24% (6) in Group ICW+A&R (n=25) and cholesteatoma 100% (25), granulation 32% (8), aural polyp 20% (5) in Group CWD (n=25)

The Austin classification of ossicular erosion is based upon the presence or absence of malleus handle (M+M-) and stapes suprastructure (S+S-). According to this classification, there are four types of ossicular defect: Type A (M+S+), Type B (M+S-), Type C (M-S+), and Type D (M-S-). Stapes suprastructure was present in total 42 cases, out of which in 22 cases ICW+A&R; in 20 cases CWD surgery was performed. Stapes suprastructure was not present in 8 (3 ICW+A&R; 5 CWD) Cases, out of which in 3 (2 ICW+A&R; 1 CWD) cases handle of malleus was present and in 5 (1 ICW+A&R; 4 CWD) cases handle of malleus was also absent.

Pre-operative X-Ray Law's view of both mastoids of all patients were taken and reported. The mastoid showing a cellular pattern were reported as Cellular; those showing no cells, showing only white pattern were labelled as Sclerotic; and those showing mixed pattern were labelled as Diploic. In this study, X-Rays in 68% of patients were sclerosed; in 20% diploic; and in 12% cavity was present.

In a study of Tiwari et al, in cases having Cholesteatoma, 92.5% patients X-Rays are sclerotic. Welin stated that radiology provides detailed description of the anatomy of temporal bone, state of pneumatization and bone structure. This is of importance to the operating surgeon.

Williams in 1938, Goodhill in 1960 and Tiwari et al in 1991 stated that sometime sclerosis might be the only radiological manifestation of cholesteatoma.

Out of 25 cases in which ICW+A&R was done, ossicular reconstruction was done with tragal cartilage and temporalis fascia in 11 cases; and with TORP, tragal cartilage, and temporalis fascia in 3 patients and with PORP, tragal cartilage, temporalis fascia in 11 patients. Whereas 25 patients in which CWD was done, ossicular reconstruction was done with tragal cartilage and temporalis fascia in 5 cases; TORP, tragal cartilage and temporalis fascia in 5 cases; PORP, tragal cartilage and temporalis fascia in 15 cases.

Pre-operatively in Group ICW+A&R, 76% of patients had an AB gap between 31-40 dB, 24% of patients between 41-50dB. Similarly in Group CWD, 72% of patients had an AB gap between 31-40 dB, 24% of patients between 41-50 dB, and 4% of patients between >50dB.

No patient had an AB gap of <30 dB in both group.

Post-operatively at 03 months, Group ICW+A&R showed an improved an AB gap having post-op AB gap of 11-15 dB range in 4% of patients, 16-20 dB range in 36% of patients, 21-25 dB range in 32% of patients, 26-30 dB range in 16% of patients, and >30 dB in 8% of patients, with loss of follow-up in 1 (4%) case. No prosthesis extrusion was seen in Group ICW+A&R during follow-up period of 3 months. In Group CWD 8% of patients had an AB gap between 16-20 dB; 32%

of patients had an AB gap between 21-25 dB; 36% of patients had an AB gap between 26-30 dB; 16% of patients had an AB gap >30 dB; with loss of follow-up of 1 (4%) case; and prosthesis (TORP) extrusion in 1 case out of 20 cases (TORP+PORP). There were no patients in both group having remaining AB gap <10dB.

Post-op remaining ABG ≤ 25 dB in Group ICW+A&R was in 18 (75%) and in Group CWD was in 10 (43.47%) patients. As it suggests that hearing improvement was better with ICW+A&R surgery.

In our study the average PTA-ABG for frequencies 500Hz, 1000Hz, 2000Hz, and 4000Hz of Group ICW+A&R (n=24), pre-operatively was 37.34 ± 4.41 dB and post-operatively was 18.69 ± 3.97 dB. The difference of pre and post-operative PTA ABG results was statistically significant ($p < .0001$). The mean PTA ABG improvement was 18.90dB. These results are consistent with the study done by Kyrodimos et al³⁸ (2007) and BL Shrestha et al³⁶ (2010).

Average PTA-ABG for frequencies 500Hz, 1000Hz, 2000Hz, and 4000Hz of Group CWD (n=23), pre-operatively was 38.64 ± 4.45 dB and post-operatively was 21.30 ± 5.02 dB. The difference of pre and post-operative PTA ABG results was statistically significant ($p < .0001$). The mean PTA ABG improvement was 17.44dB.

VI. CONCLUSION

The analysis revealed the following results:

1. There was significant improvement in hearing after Ossiculotympanoplasty in both groups at the end of 03 months.
2. At the end of 3 months there was an ABG CLOSURE of ≤ 25 dB in 75% patients of Group ICW+A&R as compared to 43.47% in Group CWD demonstrating better improvement in hearing after Atticotomy and Attic Reconstruction.

LIMITATIONS OF THE STUDY

1. The sample size of 50 was taken from a confined population of IPD patients admitted in ENT ward for tympanomastoid surgery in MBS Hospital Kota.
2. The study period was a total of Three Month for each subject; however, a longer duration could have shown more significant response.

RECOMMENDATIONS

1. Similar studies may be carried out with a larger sample size and a more diverse population.
2. Future studies may be carried out over a longer duration to assess the long term success rate of surgery.
3. The analysis of various other diseases related and surgical factors affecting the outcome of surgery may be incorporated in future studies to enable better management of patients.

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Effectiveness of the Saintificial Approach to the Ability of Problem Based Learning Model Solving the Problem And The Results of Student Learning In Natural Knowledge Science In Basic School

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DOI: 10.29322/IJSRP.9.08.2019.p92127

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92127>

Abstract- The study is intended to determine the effectiveness of the approach to scientific models of problem based learning to the ability to solve the problem and the result of learning of students in the eyes of subjects science knowledge of nature in the school base . The subjects of this study were 28 students of class IV A SDN Janti I Waru Academic Year 2018/2019. This study uses design one group pretest-posttest . The independent variable in this study is the scientific approach with the problem based learning model while the dependent variable is the ability to solve problems and student learning outcomes . Instruments research were used directly is sheet test to solve the problem and sheets test results of learning . Data collection techniques using pretest tests (pretest and posttest). Mechanical analysis of the instrument using the test validity and test reliability , while technical analysis of the data using a test for normality , test of homogeneity , test the hypothesis . P- value results from paired samples t-test Sig. (2-tailed) = 0,000 <0.05, then Ha is accepted or there is a significant difference between the results of the pretest and posttest . Based on the results of the research and discussion it can be concluded that there is the effectiveness of the scientific approach to the probem based learning model on improving the ability to solve problems and learning outcomes of students of science subjects in elementary schools .

Index Terms- Scientific approach , problem based learning, problem solving skills , learning outcomes .

I. INTRODUCTION

The 21st century is marked the acceleration in terms of connectivity that is not Inevitable , if not there are limitations of space and time . Problems that occur even Often change along with the development of information and technology in carrying out daily activities . Problems in the world of real involving a multipronged and perspectives are mutually related to one each other. The problems are more complex, it requires a skill that can bring us Able to Compete in an age like this , some skills are needed in a century have them is communication skills , collaboration skiil , critical thinking and problem solving skills, and creativity and innovation skiil (Hosnan , 2014).

Implementation of the curriculum in 2013 is one of the forms of the Efforts of government in the system of National Education to produce a generation that qualified it . The implementation of the 2013 curriculum is expected to be Able to develop the potential of students in Reviews their skills to speak , write , develop creativity and even solve problems in daily life . The approach that is used in the curriculum in 2013 is the approach scientifically that requires students to move like the researcher or scientist . The implementation of Reviews These activities is of course adapted to the level of elementary school children the which is simpler and Easier to understand . The process of learning to approach scientifically to develop the ability of the basic form of physical , psychological and social are useful for finding facts and concepts , or to develop attitudes and values that foster the skills of others in itself . Scientific approach becomes very important in the activity of learning for the development of science knowledge that is rapidly , if only to use the lecture to teach facts and concepts that learning does not give an opportunity to students to find their own concept of it . The concept which is Obtained by finding itself would be significant and lasted long in participant memory students . Program Note for International Student Assessment (PISA) in 2012, Indonesia ranked 64 out of 65 participating countries to take the test, a

math ability score of 375, a scientific ability of 396 and a reading ability of 382. The data shows that students in Indonesia are still at the level of the Lower Order Thinking Skill (LOTS) (OECD, 2014).

Learning with the models of Problem Based Learning Allows develop the skills to think of students in terms of reasoning , communication , and connection in the process pemecahan problem . The models of learning is based on the theory of learning constructivism roomates knowledge will occur through the process of finding and experiencing through experience alone . Model Problem Based Learning is very relevant to teach the ability to solving the problem since presenting problems that manifest that exist in the surrounding students , involvement of students is directly in solving the problem by integrating a variety of concepts and skills from various disciplines of science . Activities that do the students in a model of of learning is among others Determine the problem , analyze the problem , seeking information to find solutions , berkomunikasi solving problems , and memgevaluasi solving problems such . Results of question answer with teacher grade SDN Janti I in teaching Science Knowledge Alam were conducted during this has a tendency only form of activity to remember , memorize , listen and write anything that was asked by the teacher. Learning Science Knowledge Alam less raises the creativity of students , and most students are not Able to find the solution of the problem to the problems that are being faced . Learning in Janti I Elementary School is known that there are still some obstacles in teaching and learning activities, especially in the science load . The constraints are that students are Able to understand concepts , memorize , but are still lacking in problem solving skills that are associated in everyday life . Based on the results of observations on the Second Semester Assessment of the content of Natural Sciences with the scientific approach it is said to be still low, because there are 46.42% or as many as 13 students who score below 77. Minimum completeness criteria (KKM) in Class IV in Science at SDN Janti I is 77, and as many as 15 students or 53.57% who reach KKM from 28 students. .

II. METHODOLOGY

The type of research this is a research experiment with methods One Group Pre-Test and Post-Test Design were conducted on one group alone , without the group comparison , the measured or observed not only after the administration of treatment but also before treatment (Fraenkel & Wallen, 2009).

Table 1

O1	X	O2
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Information :

O 1 : Pre test .

X : Treatment

O 2 : Post test

Research is conducted in SDN J anti- I , Java East with the subject of study as many as 28 students in the class IV A Year Doctrine 2018/2019. Data collection techniques using tests . Tests are used to measure the ability to solve problems and student learning outcomes . The test is done two times that before mater i was given (pre-test) and after the administration of the material with a model of problem-based learning (post-test). Mechanical analysis of data research is among analysis items and analysis of the results of the test . Analysis of grain problem using the test the validity of the correlation product moment and test reliability using the Spearman brown. Analysis of the test to test for normality , test of homogeneity , and paired samples T test with the help of SPSS 21. Test normality is used to determine whether the data is distributed normally or not , while the test of homogeneity aims to determine whether the samples have the variants are the same or homogeneous . P enujian normality and homogeneity of data with a level of significance of > 0.05 or 5%. Paired samples t test was used to determine the significance between the results of the pre test and post test with sig <0.05 so that there was effectiveness in the study or Ha was accepted.

III. RESULT AND DISCUSS

Based on the results of the analysis show that the scientific approach to the problem based learning model effectively improves problem solving skills and student learning outcomes . Improved student problem solving skills from the results of the pretest and posttest analysis.

Table 2

Average Value Increased Ability to Solve Problems at Pretest and Posttest

Implementation	Ability greatly Very Good	Good ability	Good enough ability	Ability Less Good	Class average
Pretest	4	14	9	1	68.46
Postes	8	17	3	0	80.00

Increased pretest - posttest	4	3	6	0	11.54
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Table 2 Obtained information that at the pretest students who were used to solving problems were only four students , while in the posttest they Increased to 8 students . The increase in class average at pretest and posttest was 11.54.

Table 3
 Increased Achievement of Indicators of the Ability to Solve Problems at Pretests and Postes

Indicator	Indicator Criteria	Pretest	Postes	Increased Σ of students
Understanding the Problem	Very good	1	3	4 (14.28%)
	Well	19	20	
	Good enough	8	5	
	Not good	0	0	
Designing and planning problem solving	Very good	2	7	7 (25%)
	Well	19	20	
	Good enough	6	1	
	Not good	1	0	
Looking for a solution of the problem	Very good	6	12	13 (46.42%)
	Well	8	13	
	Good enough	12	3	
	Not good	2	0	
Review / check again	Very good	6	10	9 (32.14%)
	Well	11	16	
	Good enough	11	2	
	Not good	0	0	

Table 3 it is known that the increase is of the pretest and posttest number of students who understand the problem is 4 students with a percentage of 14:28%. Indicators of designing and planning problem solving has increased as many as 7 students with a percentage of 25%. Increased as much as 13 students occurred on the indicators looking for the solution of the problems with the percentage of 46.42%. Indicators fourth namely reviewing / checking back as many as 9 students or 32.14% Increase .

Table 4: Test Results *Paired Samples T Test* Ability to Solve Problems

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Mean Error	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	posttest - pretest	11,357	5,658	1,069	9.163	13,551	10.621	27	.000

Based on the analysis of the Paired Samples T Test on the data on problem solving ability, the results were obtained sig (2-tailed), which is $0,000 < 0,05$, it can be concluded that H_0 is rejected. This can be interpreted that there is the effectiveness of the scientific approach to problem based learning models to improve the ability to solve problems and learning outcomes of Natural Sciences in Primary Schools.

Table 5: Average results of the pre-test and post-test of student learning outcomes

Pre test	Post test	enhancement
60.7	79,64	18.94

The average yield of the pretest and posttest results of learning of students is $60.7 < 79,64$ things this shows that there is an increase of in the result of learning student after follow learning to approach the scientific models of problem-based learning.

Table 6 : Test Results *Paired Samples T Test* Results Learning Students

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Mean Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 POSTES - PRETES	18,929	12,046	2,276	14.258	23,600	8,315	27	.000

Based on Table 6 the results of the test Paired Samples T Test data results of learning students obtained results sig (2-tailed) is $0.000 < 0.05$ then it can be concluded that H_0 is rejected . It is can mean that there is the effectiveness of the approach of scientific models of problem based learning to Increase the ability to solve problems and the results of studying science at school basis.

The results of the study ya n g has been implemented a with the approach of the scientific models of problem-based learning can a make students more active in activities to learn to teach , particularly subject in improving the ability of students to solve problems and the results of learning of students . It is in accordance with the opinion of Sanjaya (2016) Problem Based Learning can be defined as the process of pe m belajaran the which emphasizes on activities to learn students to m emecahkan problems were encountered in science . Characteristics of problem based learning are focused on how to solve problems , responsibility for solving problems in students , and teachers only as support students in solving Reviews These problems (Eggen, 2012) . P emecahan problem is the process of thinking roomates Refers to the answer to a problem that involves the formation and selecting concepts that exist as well as the selection of alternative answers to the other (Priansa , 2015)

The pretest and posttest were used to see the results of the students' problem solving abilities . Differences in scores on average throughout the students in the pretest and posttest shows that there is an increase of in the results of the test 's ability to solve the problem of students is $68.46 < 80.00$ on the research that has been done is in line with research (Amita , 2016) that the Scientific Approach to setting PBL is effective in empowering the ability of Science Process Skills . Student learning outcomes at the pretest and posttest data on student learning outcomes with an average value of student learning outcomes of 60.7. Posttest acquisition with an average student learning outcomes test score of 79.64. The average yield of the pretest and posttest results of learning of students is $60.7 < 79,64$ things this shows that there is an increase of in the result of learning student after follow learning to approach the scientific models of problem-based learning . In the results of research by Destalia et al. (2014) the results of the research Showed that p Application of the model of PBM with methods of experiment can improve the skills of solving problems of students . The Paired Samples T test results also show the sig value . $5 0:05 0000$ can be interpreted that between the pretest and posttest there are significant changes .

IV. CONCLUSION

Based on the results of the study are already in laksanakan , can be concluded that , k Capacity of solving the problem of students can be Increased by using the approach of the scientific models of problem based learning seen from an average grade at the time of the pretest at 68.46 and rose into 80.00 on the posttest . The scientific approach to the problem based learning models is effective towards improving the ability to solve problems and learning outcomes of students of science subjects in elementary school based on the results of paired samples t test, namely sig. 0,000 < 0.05.

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Development of Learning Tools Based on Realistic Mathematics Education Approach (RME) to Improve Creative Thinking Skills of 4th Grade Elementary School Students

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DOI: 10.29322/IJSRP.9.08.2019.p92128

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92128>

Abstract- The low student learning outcomes and the lack of learning activities that stimulate the ability to think creatively are problems that must be overcome. This study aims to develop and test the feasibility, practicality, and effectiveness of learning tools based on the Realistic Mathematics Education (RME) approach to improve the creative thinking skills of students in grade four. This study uses a Thiagarajan development research which is known as 4D (define, design, develop, & disseminate). Validity learning tools is based on the results of expert validation. Practicality of learning tools is based on observations of the implementation of learning and student activities. While the effectiveness of the learning tools is based on the results of the questionnaire responses of students and test results of learning (mastery of concepts test and creative thinking test) using *one group pretest-posttest design*. The results of the study show that Realistic Mathematics Education-based learning tools are feasible, practical and effective to improve students' creative thinking abilities. So the RME -based learning tool is recommended to be used as a learning tool in improving the creative thinking skills of students in grade four.

Index Terms- Learning tools based on Realistic Mathematics Education Approach, creative thinking ability, elementary school.

I. INTRODUCTION

Based on Law No. 20 of 2003, the purpose of the National Education System is to improve students' ability to become the faithful man and devoted to God Almighty, noble, healthy, knowledgeable, creative, independent, and become democratic citizens and has the responsibility. [1. Based on the objectives of the National Education system has been properly that learning to form creative thinking abilities should be developed in the Indonesia education. To improve the quality of education, the active role of the Government especially the Education Office, is urgently needed. Efforts that the government can make in improving the quality of education include giving training to teachers, providing teaching aids and learning media for schools, conducting mathematical guidance and providing relevant textbooks and making changes to the learning curriculum. Not only that, to advance the quality of education needed changes in various aspects ranging from preparation, implementation, to the evaluation of learning must be changed including the way teachers deliver learning.

The paradigm of the obligation teachers not only provide some information to students but facilitate students to improve the ability to think logically, analytical, systematic, critical, and creative, as well as the ability to cooperate that has been mandated by the State [2]. When we learn and practice mathematical thinking it means we learn to think analytically, logically, systematically so that it indirectly fosters student's creativity [3]. Based on the description, it can be said that one of the capabilities that must be developed and owned by the students is the ability to think creatively.

In the background section of 2006 curriculum explains that to master and create technology, creative thinking skills are needed [4]. In a global era that full of competition and challenges, a high level of thinking ability is also needed, one of which is creative thinking. The characteristics of creative thinking itself include (a) *Originality* (the originality of composing something new); (b) *Fluency* (to analyze many ideas); (c) *Flexibility* (flexibility of changing perspective easily); and (d) *Elaboration* (development of an idea from other forming ideas) [5]. The results of creative thinking are creative products that have the following characteristics: novelty, completion, detail and synthesis [6].

Based on the results of the observations, researchers are still often find teacher-centered in mathematics learning process even though the books used in teaching already tried suitable with context in the child's environment. Teachers are more likely to conduct textbook learning process. Learning like those seems to require students to memorize and if it left unchecked, students' creative thinking skills will not increase.

In addition, based on researcher's experience of teaching in mathematics, 80% of the students are not able to process the information (the formula). 70% of students are only able to use information (formulas) from teachers and only 20% of the number of students is able to develop that information. Especially in working on story problems, 20% of students are only able to work on problems such as the example given by their teacher. If the problem is developed or improved by teacher, so 80% of students have difficulty. As a result, the average completeness of student learning outcomes during tests is below the minimum criteria which is 70. From the data described, it shows that the mastery of student concepts is still lacking especially the ability to think creatively in elaborating formula into daily activities.

From the description above, the formation of creative thinking abilities in the process of learning mathematics is lacking. It has implication that we urgently need developing a learning process which encourages and helps students be able to develop creative thinking skills. So we need an innovative development that can stimulate students' creative thinking abilities.

Based on these problems, the teacher must be able to choose the right learning approach. The selection of these approaches must be in accordance with the material and condition of students, so that it is hoped that learning can improve students' creative thinking skills.

One of the solutions is to provide a new approach. A new approach that can be used to overcome these problems is the Realistic Mathematics Education (RME) approach. Through the RME approach, teachers can apply mathematics learning that is fun and more meaningful to students. The RME learning approach emphasizes open problems related to real life so that this will stimulate students' creative thinking abilities to find ways to solve these open problems. So that the RME approach requires students to use higher-order thinking, one of high-order thinking is the ability to think creatively, and students are no longer required to memorize formulas.

From the explanation above it is clear that the RME approach prioritizes the learning process rather than learning outcomes. This approach is very useful in learning mathematics, especially for elementary students, because using this approach, learning can be very fun and can eliminate the assumption of students in general that mathematics is not a scary subject. In addition, materials that are considered difficult for students to understand become easier because students find their own concepts. That kind of thing is the significance of mathematics learning.

RME approach has several characteristics, namely the principle of activity, reality, stages of understanding, intertwinement, interaction, and guidance [7]. The application of RME approach is one of the ways to solve any problem related to mathematics. Each student has different abilities in solving each problem. RME -based learning stages begin with the preparation of learning tools that refer to these characteristics.

This study aims to (1) Describe the validity of fourth grade elementary school mathematics learning tools using the Realistic Mathematics Education (RME) approach; (2) Explain the practicality of mathematics learning tools for fourth grade elementary schools students using the Realistic Mathematics Education (RME) approach; and (3) Determine the potential effects of mathematics learning tools using the Realistic Mathematics Education (RME) approach of fourth grade elementary school students.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

This type of research is development research. The product produced in this study is a learning tools with a learning model based on Realistic Mathematics Education (RME) to improve the creative thinking abilities of elementary school students. The learning tools that are developed are syllabus, lesson plan, Student Worksheet and Learning Outcomes Test that includes concept mastery test and creative thinking ability test and teaching material. The development model used is the 4D model developed by Thiagarajan [8] which consists of the stages of define, design, develop, and disseminate. The subjects of this study were students of fourth grade of SDN Sidotopo I/48 Surabaya in the 2018/2019 academic year, which has 32 students. Trials were conducted on several students using the *One Group Pretest-Posttest Design* Design [9].

Data collection techniques used in this study is questionnaire, observation, and test. While for feasibility learning tools, researcher uses expert validation. The result of validation will be described by the modus of it. Analysis of the practicality of learning tools is obtained from the general results of the implementation of learning, and student activities, to be subsequently converted into predetermined

criteria. While the effectiveness of RME -based learning tools can be measured based on student response questionnaires, learning achievement tests (concept mastery tests and creative thinking skills tests).

III. RESULTS AND DISCUSSION

The validity test results of RME -based learning tools were obtained from validation sheets from two valuator. Based on the results of the validation sheet, it shows that the developed RME-based learning tool is valid (worth using with a little improvement). As for some of the suggestions given by the valuator, those are in the formulation of syllabus indicators it is better to include indicators and determine the allocation of clear written time; the lesson plan writing words should follow the rules; teaching material should present material related to the student environment; and the concept mastery ability test should use a clear sentences. The results of the validation sheet can be seen in the following table.

Table 1. The Result of Validator

Learning tools	Rating result		Average	Category
	V1	V2		
Syllabus	3	3	3	Valid (can be used, slightly revised)
Lesson plan	4	4	4	Valid (can be used)
Teaching materials	3	3	3	Valid (can be used, slightly revised)
Students worksheet	3	3	3	Valid (can be used, slightly revised)
Concept mastery Test	3	3	3	Valid (can be used, slightly revised)

The practicality of RME -based learning tools can be seen from the results of the observation sheet of the implementation of learning and student activities. The results of the learning outcomes were obtained from the observation sheets conducted by two observers showing their performance well. While student activities during the implementation of learning using the RME -based learning model based on observations obtained positive results. In more detail the results of the observation sheet on the implementation of learning and student activities can be explained in the following table.

Table 2. Practicality of Learning Devices

Validation	Observation Results		Average	Category
	Observer 1	Observer 2		
Implementation of learning	4	4	4	Very good
Student Activity	3	3	3	Well

The effectiveness of RME -based learning tools to improve students' creative thinking abilities is obtained from the results of the questionnaire and the results of the learning achievement test (the test of mastery of concepts and tests of creative thinking ability). Student responses are presented in the form of a questionnaire and are given after learning is finished. The results of student questionnaires showed an average student response of 3.43 in good categories. The test of creative thinking ability is measured by two questions. This test was given to 32 students before being given treatment (*pre-test*) and after being given treatment (*post-test*). Data on students' problem solving ability test results will be described in the following table.

Table 3. The result of Crative

No.	Name	Score		Achievement		N-Gain	Criteria
		Pre-test	Post-test	Pre-test	Post-test		
1	ABK	59	84	TT	T	0.6153	middle
2	AMR	25	38	TT	TT	0.1666	Low
3	AND	43	75	TT	T	0.5555	Middle
4	ARY	25	72	TT	TT	0.625	Middle
5	AST	72	94	TT	T	.7778	High
6	BAN	75	94	T	T	0.75	High
7	BAS	28	69	TT	TT	0.5652	Middle
8	BRA	25	41	TT	TT	0.2083	Low

9	BUD	38	78	TT	T	0.65	Middle
10	CER	25	44	TT	TT	0.25	Low
11	CIN	25	66	TT	TT	0.5417	Middle
12	DAN	53	91	T	T	0.8	High
13	DON	47	78	TT	T	0.5882	Middle
14	FAN	78	94	TT	T	0.7143	High
15	HAR	50	84	TT	T	.6875	Middle
16	HEN	75	91	T	T	0.625	Middle
17	HER	47	81	TT	T	0.6470	Middle
18	IND	34	75	TT	T	0.6190	Middle
19	JAL	47	81	TT	T	0.6470	Middle
20	JAN	56	91	TT	T	0.7857	High
21	KEN	38	66	TT	TT	0.45	Middle
22	LAN	34	78	TT	T	.6667	Middle
23	MIS	47	81	TT	T	0.6471	Middle
24	MUH	44	81	TT	T	.6667	Middle
25	MUS	37	78	TT	T	0.65	Middle
26	NUR	34	53	TT	TT	0.2857	Low
27	PIT	47	81	TT	T	0.6470	Middle
28	PUR	34	50	TT	TT	0.2380	Low
29	RAT	69	88	TT	T	0.6	Middle
30	ROS	78	88	T	T	0.4285	Middle
31	SAR	47	81	TT	T	0.6470	Middle
32	WAN	25	44	TT	TT	0.25	Low
	Average	46	75			0,5623	Middle

Based on table 3, it is known that in the *pretest*, the ability to think creatively students results is 9 % of students complete. While on *posttest* the ability to think creatively results is 69% of students completed. The table also shows the average score *N-gain* is 0.56 with medium category.

The application of RME -based learning tools in learning has proven to be effective in increasing the ability to think creatively of students in four grade elementary school students on the topics perimeter and area. This is according to research by Zulkardi, et al [10] which states that the learning process based RME forced to be more creative and critical thinking in order to be able to understand mathematical concepts. Based on the results of validation, the development of RME-based learning tools is in the valid category. The validity of the learning tools developed is based on the results of expert validation (syllabus validation, lesson plan, student's worksheet, teaching materials and learning outcomes tests (tests of mastery of concepts and tests of creative thinking skills)). The learning tools is declared valid can be seen from the suitability of the device with the model and learning material, as well as all components of the learning tools related consistently with one another [11]. After going through the validation stage and declared worthy of use, the RME -based learning tools can be continued at the small group trial stage. Based on the results of the feasibility analysis, then the learning tools based RME approach is suitable for use in increasing the ability of creative thinking of students in the four grade elementary school students with the material perimeter and area.

Practicality of learning tools based on RME approach is known from the results of observation of the implementation of lesson plan and student's activities. Based on the results of observation, it was found that the RME -based learning tools developed were practically used to improve the creative thinking abilities of students in grade four of elementary schools with the material perimeter and area. While the effectiveness of RME -based learning tools is based on the results of student response questionnaires and learning achievement tests (concept mastery tests and creative thinking abilities tests). Questionnaire responses from students are given at the end of the lesson at the second meeting. The results of student responses are good because the average student is 3.43. They are interested in RME -based learning because the approach trains students to solve problems and to think creatively that is solved in groups and then discussed for agreement. This can motivate students to increase attention and make them feels fun and meaningful learning [12]. As for the results of the test of creative thinking ability showed an increase in the *pretest* and *posttest scores*. Improving the ability of creative thinking of students can be determined by using *the N-gain*. The results of the students' creative thinking abilities presented in table 3 show that students have the ability to think creatively with an average *n- gain* of 0.56 (medium category). At the *pretest*, from 20 students were only 3 students or about 9 % of students completed. Whereas at the *posttest*, there was an increase in the test results (69 % of students completing the test). The test for measuring creative thinking consists of two questions. The improvement in the results of the tests of creative thinking shows that the learning tools developed by researchers can improve students' creative thinking abilities on topics perimeter and area.

IV. CONCLUSION AND SUGGESTION

Based on the results of research and discussion of research results can be concluded: (1) Learning tools based on Realistic Mathematics Education (RME) to improve the ability to think creatively is declared valid based on the score of the valuator and can be used in the learning process. (2) The practicality of learning tools based on Realistic Mathematics Education (RME) developed is seen from the implementation of the lesson plan that is going well and student activities are in the good category which means students carry out almost all activities needed in learning. (3) The effectiveness of learning tools can be seen from the increase in the ability to think creatively as indicated by the *n-gain* score in the medium category and the response of the majority of students stated well towards learning based on Realistic Mathematics Education (RME) which was followed.

Based on these conclusions can be suggested that learning tools based Realistic Mathematics Education (RME) can be used and distributed for teaching perimeter and area in four grade elementary school students, especially in training and improving the ability of creative thinking of students.

ACKNOWLEDGMENT

We are especially grateful to the Surabaya city government, Surabaya State University postgraduate lecturer, Sidotopo I/48 Surabaya elementary school students, and all those who directly and indirectly helped us in this research.

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Design and Performance Analysis of Double-Suction Centrifugal Pump

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DOI: 10.29322/IJSRP.9.08.2019.p92129

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92129>

Abstract- This paper presents the detail design of impeller and volute casing for double-suction centrifugal pump. The designed pump can develop a head of 150 ft (46 m) and deliver 335 ft³/min or 2500 gal/min (9.48 m³/min) of clean and cold water at the speed of 1760 rpm. The designed impeller has 7.32 in (19 cm) inlet diameter, 13.5 in (34 cm) outlet diameter, 13° inlet vane angle and 20° outlet vane angle. The number of vanes is 7. The inlet width and outlet width are 1.75 in (4 cm) and 1.98 in (5 cm) respectively. The discharge diameter is 6 in (15 cm) to operate the designed head and capacity. Moreover, the performance analysis of designed pump is also presented by considering on the various losses. The predicted maximum efficiency takes place at nearly designed head and capacity. The maximum efficiency is nearly 80.14% and the expected designed efficiency of designed pump is 80%. So, predicted and designed efficiencies are not large difference and the designed efficiency has a satisfactory value. The designed double-suction centrifugal pump can fulfil the requirements of agricultural process.

Index Terms- Double-suction centrifugal pump, head, flow rate, speed, performance characteristics.

I. INTRODUCTION

Pumping may be defined as the addition of energy to a fluid to move it from one point to another or to raise it to the required height. The energy given to the pump case forces the fluid to do work flowing through the pipes rising to the higher level. The input power of the pump is mechanical energy of the drive shaft driven the prime mover such as electric motor or small engine and the output energy is the hydraulic. In industries, throughout the world, pumps play in a major role. Pumps are widely used for irrigation and are most common where pumping from surface water supplies such as river, lakes and streams and rising water to a higher level. Moreover, they are widely used in many other applications such as chemical plants, firefighting, hydraulic system, and so on.

II. COMPONENTS AND OPERATION PRINCIPLE OF CENTRIFUGAL PUMP

The two main components of centrifugal pump are impeller and casing. The other components are suction nozzle, discharge nozzle, shaft, bearing, wear rings, stuffing box and mechanical

seal. The centrifugal pump moves liquid by rotating one or more impellers inside a volute casing. The liquid is introduced through the casing inlet to the eye of the impeller where it is picked up by the impeller vanes. The rotation of the impeller at high speeds creates the centrifugal force that throws the liquid along the vanes, causing it to be discharged from its outside diameter at a higher velocity. This velocity energy is converted to pressure energy by the volute casing prior to discharging the liquid to the system.

In double-suction centrifugal pumps, they are usually large and are used in water service. A double-suction impeller is the same in effect as two single-suction impellers placed back to back on a horizontal shaft, supported by bearings on either side. This construction has the effect of increasing the capacity without increasing the diameter of impeller. This type allows liquid to enter the eye of impeller from both sides. This action can be symmetrical about the centerline of double-suction impeller. The symmetry of impeller is significantly improving its hydraulic balance or does not exist axial thrust force. A central scroll serves both impellers and leads, through a single diffuser, to an exit flange. Such an arrangement often results in better efficiency because it reduces friction on the back side of the impellers, the disk friction loss, and because by splitting the flow in two the specific speed of each impeller sometimes becomes more favorable. As a result, double-suction volute pumps can produce higher pressure than single-suction centrifugal pumps.

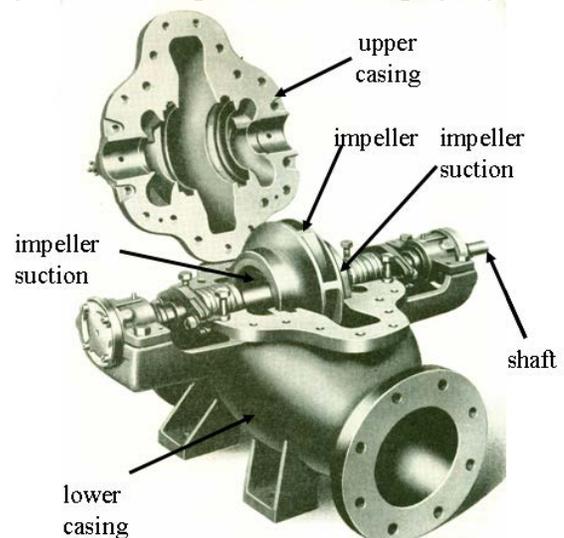


Fig. 1 Main Components of Double-suction Centrifugal Pump [1]

III. DESIGN OF CENTRIFUGAL PUMP'S IMPELLER

When the overall design of pump is considered, the shape of an impeller is the most important for optimum efficiency. Impeller design should be in such a way that, losses must be as low as possible. The design of a pump's impeller can be divided into two parts. The first is the selection of proper velocities and vane angles needed to obtain the desired performance with the best possible efficiency. The second is the layout of the impeller for the selected angles and areas.

The centrifugal pump will be designed to develop a head of 150 ft and deliver 335 ft³/min or 2500 gpm of water. The pump type to be designed is double-suction type. It is to be direct-connected to a motor operating at 1760 rpm.

A. Selection of Specific Speed and Specification of Suitable Pump Type

Firstly, a specific speed (n_s) must be selected for the best efficiency point. Moreover, it is also used to classify the type of impellers on their performance, and proportion regardless of their actual size or the speed at which they operate. It is mathematically expressed as

$$n_s = \frac{n \times \sqrt{Q}}{H^{3/4}} \quad (1)$$

When applied to double-suction impellers, it is necessary to consider such impellers as being equivalent to two single-suction impellers placed back to back or operating in parallel. This means that in applying to double-suction impellers the capacity used should be one-half of that handled by the pump. In this design, calculated value of specific speed (fps) based on required head and capacity is 1450 rpm and it is within the range of low specific speed pump that is greater than 500 and less than 1500 [2]. So, double-suction centrifugal pump typed is chosen in this study.

B. Determination of Shaft and Impeller Hub Diameters

Before the impeller dimensions can be fixed, the shaft size must first be approximated. It should be large enough to care for the torque and bending moment, to avoid excessive lateral deflection, and to keep the critical speed a safe distance from the operation speed. The shaft diameter is depending upon the torque alone and the torque is depending on the brake horsepower ($b.hp$) of designed pump. The brake horsepower is

$$b.hp = \frac{W.hp}{\eta} \quad (2)$$

Where, $W.hp$ and η are fluid horse power of pump expected overall efficiency of designed pump respectively. This efficiency can be estimated by Fig. A and the estimated value is approximately and nearly 80%.

The shaft torque is

$$T = \frac{63000 b.hp}{n} \quad (3)$$

The shaft diameter at hub section of impeller is

$$d_s = \sqrt[3]{\frac{16 T}{\pi \tau}} \quad (4)$$

Allowable shear stress of material of shaft with key way, τ is 4500 psi because the main shaft is made of mild steel. The estimated

shaft diameter will be increased 20% because it is difficult to predict the bending moment at this time.

The hub diameter, D_h is usually made 15% greater than shaft diameter. Moreover, the hub length, L_h is also from 1.0 times to 2.0 times of the shaft diameter [3].

C. Impeller Inlet and Outlet Velocities

The simplified inlet and outlet velocities diagrams for the impeller are shown in Fig. 2. In this figure, the effect of circulatory flow on the outlet diagram is shown in solid lines and the virtual diagram is dotted. For a fluid flowing through the rotating impeller, u is the tangential velocity, V is the absolute velocity and v is the relative velocity of a fluid particle to impeller rotation. The angle between V and u is α , and the angle between v and u is β and it is the angle made by tangent to the impeller vane and a line in the direction of motion of the vane. The tangential component and radial component of absolute velocity V are V_u and V_r respectively.

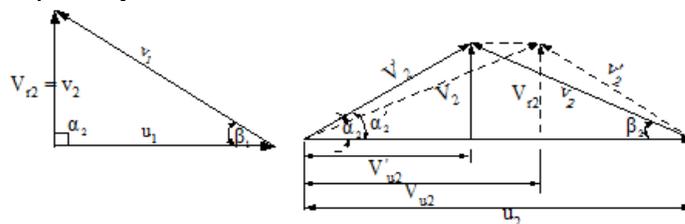


Fig. 2 Impeller Inlet and Outlet Velocity Diagrams

D. Determination of Impeller Inlet Dimensions and Vane Angle

A double-suction pump has a low percentage of leakage since the volume handled is relatively large compared to the leakage area. In this instance it will probably not exceed 2% [1]. The impeller is double-suction, so the total flow is divided by 2 and the approximate of impeller eye diameter will be.

$$D_0 = \sqrt{\frac{4}{\pi} \frac{1.02 \times 144 \times Q}{2 V_0}} + D_H^2 \quad (5)$$

The inlet velocity through the eye of the impeller V_0 is usually slightly higher than the velocity in the suction flange, say 10 to 15 ft/sec average. So, the assumed value of V_0 is 11 ft/sec.

To insure smooth flow without excessive turbulence, the inlet vane edge diameter D_1 is usually made about the same as the eye diameter D_0 . Thus, tangential velocity at impeller inlet, u_1 can be expressed as

$$u_1 = \frac{\pi D_1 n}{12 \times 60} \quad (6)$$

The impeller inlet passage width for per side is

$$b_1 = \frac{144 Q}{\pi D_1 V_{r1} \epsilon_1} \quad (7)$$

Since slowing up a fluid is always more inefficient than speeding it up, the radial inlet velocity at the vane inlet, V_{r1} is usually made 5% to 10% greater than V_0 . So, assumed value of V_{r1} is 12 ft/sec. Moreover, the inlet area will be increased by the vane thickness. Hence, a contraction factor ϵ_1 which is generally between 0.8 and 0.9 is assumed to obtain the approximate inlet width b_1 . So, assume the inlet contraction factor ϵ_1 as 0.85.

The water is usually assumed to enter the vanes radially, so that the absolute approach angle α_1 is 90° . And then, the vane inlet angle β_1 is found from

$$\tan \beta_1 = \frac{V_{r1}}{u_1} \quad (8)$$

The inlet relative velocity can also be expressed by

$$v_1 = \frac{u_1}{\cos \beta_1} \quad (9)$$

E. Determination of Impeller Inlet Dimensions and Vane Angle

The outlet diameter of impeller can be more easily obtained by means of the overall head coefficient Φ . The value of Φ varies between 0.9 and 1.2 with an average value very close to unity and this value is approximately taken as 1.05 in this study. Thus, the required outside impeller diameter is

$$D_2 = \frac{1480 \Phi \sqrt{H}}{n} \quad (10)$$

And then, the peripheral velocity at impeller outlet is

$$u_2 = \frac{\pi D_2 n}{12 \times 60} \quad (11)$$

The vane outlet angle β_2 is usually made larger than the inlet angle β_1 to obtain a smooth, continuous passage. The amount of outlet angle β_2 usually has between 15° and 40° . So, the vane outlet angle is assumed that $\beta_2 = 20^\circ$ in this study.

The radial outlet velocity V_{r2} is made the same as, or slightly less (up to 15%) than the radial inlet velocity v_{r1} to avoid any sudden changes of velocity. So, the radial outlet velocity V_{r2} is assumed that is 11 ft/sec.

To care for the vane thickness, a contraction factor ϵ_2 which is generally between 0.90 and 0.95 must be assumed in determining the gross outlet area and width b_2 . If this is tentatively taken to be 0.925, the approximate outlet width is

$$b_2 = \frac{144 Q}{\pi D_2 V_{r2} \epsilon_2} \quad (12)$$

The virtual tangential component V_{u2} of V_2 is

$$V_{u2} = u_2 - \frac{V_{r2}}{\tan \beta_2} \quad (13)$$

For radial-type impellers, the slip factor, η_∞ varies between 0.65 and 0.75 and it is assumed that is 0.7 average. Thus, the actual tangential component V'_{u2} of V'_2 is

$$V'_{u2} = V_{u2} \eta_\infty \quad (14)$$

Thus, the actual outlet is found by

$$\tan \alpha'_2 = \frac{V_{r2}}{V'_{u2}} \quad (15)$$

To design correctly the volute or diffuser, the magnitude and direction of the absolute outlet velocity V_2 of the liquid leaving the impeller must be known. The absolute outlet velocity from outlet velocity diagram is

$$V'_2 = \sqrt{V_{r2}^2 + V'_{u2}^2} \quad (16)$$

And then, the water velocity at the impeller outlet is

$$v_2 = \frac{V_{r2}}{\sin \beta_2} \quad (17)$$

F. Impeller Blade Shape and Number of Blades

A method of drawing the impeller blade by three circular arcs is used for this present design. Each radius is given by

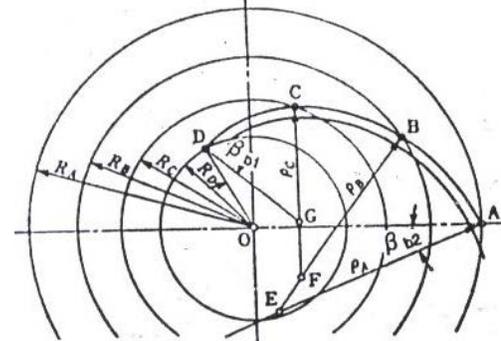


Fig. 3 Curvature of Impeller Blade [3]

$$\rho_A = \frac{(R_A^2 - R_B^2)}{2(R_A \cos \beta_2 - R_B \cos \beta_B)} \quad (18)$$

$$\rho_B = \frac{(R_B^2 - R_C^2)}{2(R_B \cos \beta_B - R_C \cos \beta_C)} \quad (19)$$

$$\rho_C = \frac{(R_C^2 - R_D^2)}{2(R_C \cos \beta_C - R_D \cos \beta_1)} \quad (20)$$

Where, R_A, R_B, R_C and R_D are base circle radii, $R_A = D_2/2$ and $R_D = D_{1h}/2$.

$$R_B = R_A - \frac{R_A - R_D}{3} \quad (21)$$

$$R_C = R_B - \frac{R_A - R_D}{3} \quad (22)$$

The angles between β_1 and β_2 are divided into three angles.

The vane thickness is scaled from the vane curvature drawing. In this design, the vane thickness at inlet width is 0.125 in (3 mm) and the thickness at outlet width is 0.275 in (7 mm). Moreover, the shroud thickness is taken as 0.19 in (5 mm).

The number of blades, Z is decided by using the Pfeiderer formula. It is

$$Z \approx 6.5 \frac{D_2 + D_1}{D_2 D_1} \sin \left[\frac{\beta_1 + \beta_2}{2} \right] \quad (23)$$

IV. DESIGN OF PUMP'S VOLUTE CASING

A volute to fit the impeller designed is used and the purpose of the volute is to convert the velocity head of water leaving the impeller as efficiently as possible. Design of volute casing is calculated depending on the D_2 and the basis of constant average flow velocity in volute casing. The volute casing increases proportionally in size from cut water to the discharge nozzle. In rear velocities distribution, across volute section is not uniform. The basic shaped of the cross section will be trapezoid with walls at a 30° angle with radial lines ($\theta = 60^\circ$).

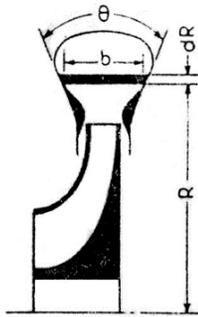


Fig. 4 Section through Volute Casing [1]

For pumps of medium specific speeds, $b_3 = 1.75 b_2$. For small pumps of lower specific speed (b_2 is small), including multistage pumps, $b_3 = 2.0 b_2$. For high specific speed pumps ($n_s > 3000$ double-suction) b_3 can be reduced to $b_3 = 1.6 b_2$. Where b_2 is impeller width at discharge and b_3 is base width at D_2 [4]. Thus, the base width in this study is taken as

$$b_3 = 1.75 \times b_2 \quad (24)$$

The width of the volute at any point is calculated from

$$b = b_3 + 2x \times \tan\left(\frac{\theta}{2}\right) \quad (25)$$

Where, x is the distance between any radius R and impeller outside radius R_2 . The volute is designed by determining the angle Φ° measured from and assumed radial line by tabular integration of Equation (26).

$$\Phi^\circ = \frac{360 R_2 V'_{u2}}{Q} \int_{R_2}^{R_\phi} \frac{bdR}{R} = \frac{360 R_2 V'_{u2}}{Q} \sum_{R_2}^{R_\phi} b \frac{\Delta R}{R} \quad (26)$$

The volute is considered to begin at the assumed base line, but it actually begins at the tongue radius R_t which 5% to 10% greater than the impeller radius R_2 to avoid turbulence and noisiness and to give the velocities of the water leaving the impeller a chance to equalize before coming into contact with the tongue [7]. The tongue angle of volute casing is determined by

$$\Phi_t^\circ = \frac{132 \log_{10} R_t/R_2}{\tan \alpha'_2} \quad (27)$$

To avoid shock losses the tongue should be made the same as the absolute outlet angle α'_2 of the water leaving the impeller.

V. RESULTS OF DESIGNED TURBINE

The calculated results for both impeller and casing design of double-suction type centrifugal pump are clearly expressed in Table I. Moreover, detail drawings of impeller and volute casing designs are also shown in following figures.

Table I. Required Parameters for Runner Design

No	Descriptions	Symbols	Results
1	Input Power	P_{shaft}	175 hp
2	Shaft diameter	D_s	2.125 in
3	Hub diameter	D_H	2.5 in
4	Impeller eye diameter	D_o	7.3125 in
5	Impeller inlet diameter	D_1	7.3125 in
6	Impeller outlet diameter	D_2	13.5 in
7	Inlet angle of impeller blade	β_1	13°

8	Outlet angle of impeller blade	β_2	20°
9	Impeller passage width at inlet	b_1	1.75 in per side
10	Impeller passage width at outlet	b_2	1.98 in
11	Number of impeller blades	Z	7 blades
12	Base width of volute casing at D_2	b_3	3.465 in
13	Volute tongue angle	Φ_t°	17.5°
14	Largest volute diameter	D_v	21.3 in
15	Discharge nozzle diameter	D_d	6 in

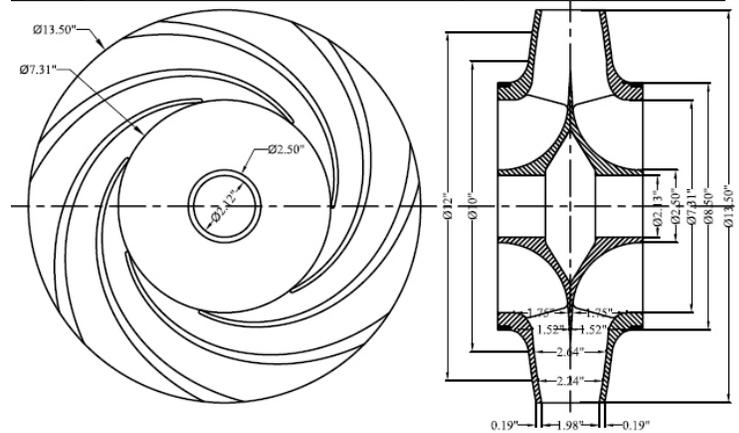


Fig. 5 Front View and Side View of Impeller

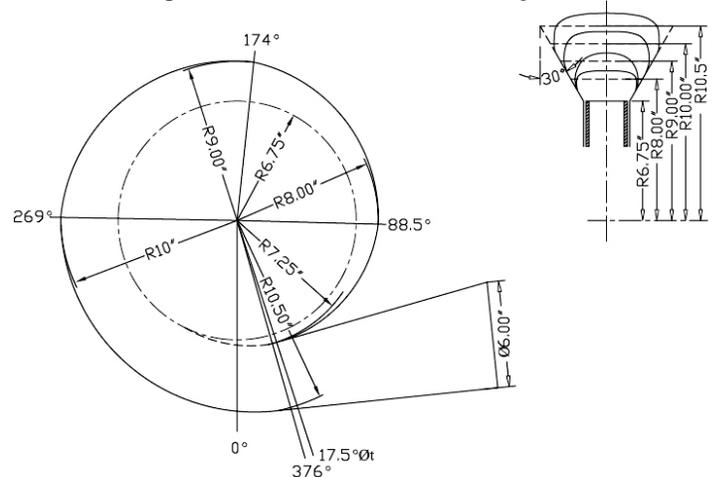


Fig. 6 Drawing of Volute Casing: Elevation of Volute Casing and Section through of Volute Casing

VI. PERFORMANCE ANALYSIS OF DESIGNED PUMP

Performance needs to be known, not only at the rated, best efficiency point, but also off design. Pump specifications often impose special requirements, such as head at shut-off, maximum power demand, rate of head rise to assure stability, and so on. A good pump design process requires trial-and-error iteration, a check on anticipated performance with a trial geometry, and progressive approximation to the optimal design configuration.

A. Theoretical Head and Net Theoretical Head

Firstly, theoretical head is calculated by

$$H_{th} = \frac{1}{g} (u_2 V_{u2}) \quad (28)$$

Where,

$$\text{Whirl velocity, } V_{u2} = u_2 - V_{r2} \cot \beta_2$$

$$\text{Flow velocity, } V_{r2} = \frac{Q_s}{\pi D_2 b_2 \epsilon_2}$$

The circulatory flow effect reduces the theoretical head developed in a practically constant ratio. Slip value for circulatory effect is

$$\sigma = 1 - \frac{(\sin \beta_2)^{1/2}}{Z^{0.70}} \quad (29)$$

By considering this effect, the whirl velocity and the net theoretical head are

$$V_{u2} = u_2 \sigma - V_{r2} \cot \beta_2 \quad (30)$$

$$H_{thm} = \frac{1}{g} (u_2 V_{u2}) \quad (31)$$

B. Shock Losses

Shock losses are considered as following expressing.

$$h_s = k (Q_s - Q_N)^2 \quad (32)$$

In the shut-off condition, $Q_s = 0$ and Q_N is design flow rate at maximum efficiency. Where, shut-off head is estimated by

$$H_{shut-off} = \frac{u_2^2 - u_1^2}{2g} \quad (33)$$

From the shut-off condition, the value of k can be calculated.

C. Friction Losses

The wall friction or skin friction losses, H_{f1} in the impeller follow the standard pipe friction model. Since the flow passage cross sections are irregular, a hydraulic radius and average flow velocities are used. The friction coefficient can be adjusted but has a default value of 0.05 in this study. The impeller friction losses are calculated by the following Equation (34).

$$H_{f1} = \frac{CF (D_2 - D_1) (v_2 + v_1)^2}{2 \times (\sin \beta_2) H_{r1} \times 4g} \quad (34)$$

Where, H_{r1} refers to hydraulic radius and it is expressed by

$$H_{r1} = \frac{\pi b_2 D_2 \sin \beta_2}{Z (b_2 + \frac{\pi D_2 \sin \beta_2}{Z})} \quad (35)$$

The volute friction losses can be found by

$$H_{f2} = \frac{CF \pi D_3 V_3^2}{2 \times 12 g \sqrt{\frac{A_{th}}{\pi}}} \quad (36)$$

Where V_3 is the volute throat velocity and A_{th} is the volute throat area. Their relationship is as follow [5].

$$V_3 = \frac{Q_s}{A_{th}} \quad (37)$$

D. Diffusion Losses

A diffusion loss H_{df} needs to be taken into account, since separation invariably appears in the impeller at some point. When the ration of the relative velocity at the inlet v_1 and outlet v_2

exceeds a value of 1.4, it is assumed that a portion of the velocity head difference is lost. The diffusion loss is

$$H_{df} = \frac{0.25 v_1^2}{2g} \quad (38)$$

E. Actual Head

Finally, the actual pump head is calculated by subtracting from the net theoretical head all the flow losses. Thus, the actual pump head is forecasted by the following relationship equation.

$$H = H_{thm} - (h_s + H_{f1} + H_{f2} + H_{df}) \quad (39)$$

F. Efficiency and Power

The overall efficiency can be predicted by the following relationship equation.

$$\eta = \eta_M \times \eta_{HY} \times \eta_V \quad (40)$$

The mechanical efficiency is

$$\eta_M = \frac{\text{Output power}}{\text{Input Shaft Power}} = \frac{\rho g (Q_s + q) H_{vir}}{P_{shaft}} \quad (41)$$

The hydraulic efficiency is

$$\eta_{HY} = \frac{\text{actual measured head}}{\text{head imparted fluid by impeller}} = \frac{H}{H_{thm}} \quad (42)$$

The volumetric efficiency is

$$\eta_V = \frac{\text{delivered flow rate}}{\text{delivered flow + internal leakage flow}} = \frac{Q_s}{Q_s + q} \quad (43)$$

By substituting these efficiencies into Equation (40), overall efficiency becomes

$$\eta = \frac{\rho g H Q_s}{P_{shaft}}$$

In this study, input shaft power is 175 hp.

VII. PERFORMANCE CHARACTERISTICS OF DESIGNED CENTRIFUGAL PUMP

The performance characteristics of designed double-suction centrifugal pump are shown in following figures.

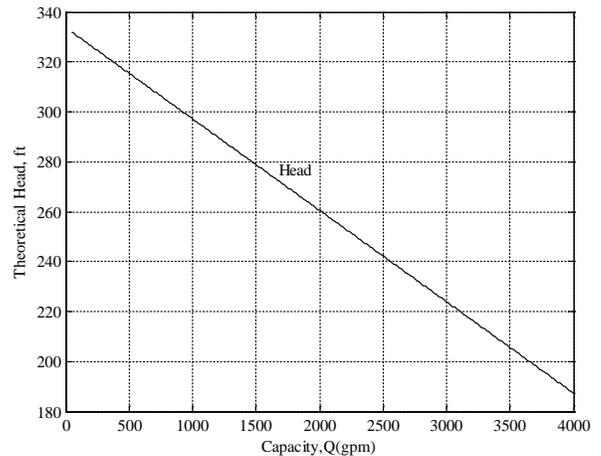


Fig. 7 Theoretical Head Curve

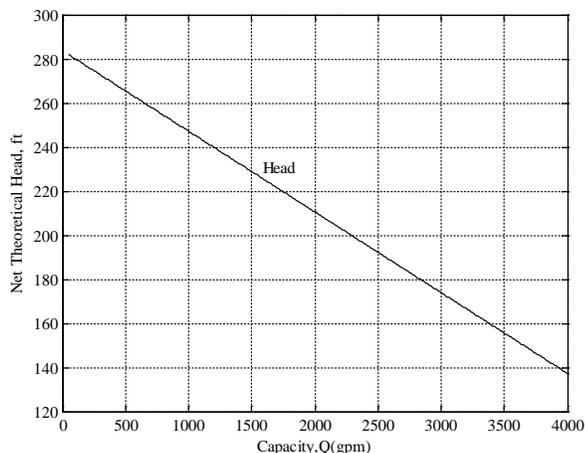


Fig. 8 Net Theoretical Head Curve
Performance Curves

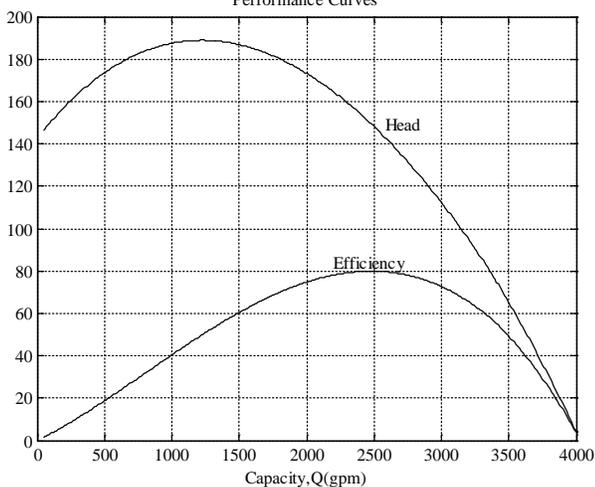


Fig.9 Performance Curves of Designed Centrifugal Pump

VIII. CONCLUSION

The designed pump is aimed to use in agriculture application for river pumping project which has about eight working hours per day and requires high head and capacity. So, double-suction centrifugal type is selected. The casing is horizontal split casing type. The designed pump can develop a head of 150 ft (46 m) and deliver 2500 gpm (9.48 m³/min) of water at 1760 rpm. The designed impeller has 7.32 in (13 cm) inlet diameter, 13.5 in (24 cm.) outlet diameter, 13° inlet vane angle and 20° outlet vane angle. The number of vanes is 7. And then, the inlet width and outlet width are 1.75 in (3 cm) and 1.98 in (5 cm) respectively. The clearance between impeller and tongue of volute is 1/2 in (1.3 cm). This value is a reasonably safe value for the tongue. The diameter of discharge flange is 6 in (15 cm). The thickness of volute casing to withstand the discharge pressure, 1/4 in is selected depending upon the suction pipe diameter, 10 in. When the performance of the designed pump is predicted, the maximum efficiency has nearly 80%. At the maximum efficiency condition, we observed that it reaches at the head of about 150 ft and capacity of about 2500 gpm. The materials to be used should be selected depending upon the type of water. The impeller is made of bronze to protect corrosion. To reduce the leakage from discharge to suction between the casing and impeller, the clearance must be made very small. It is used only to pump water

at 70° F and if very hot water is used this pump will be damaged. The designed double-suction centrifugal pump can fulfil the requirements of agriculture application and industrial application, and then can improve pump efficiency.

APPENDIX

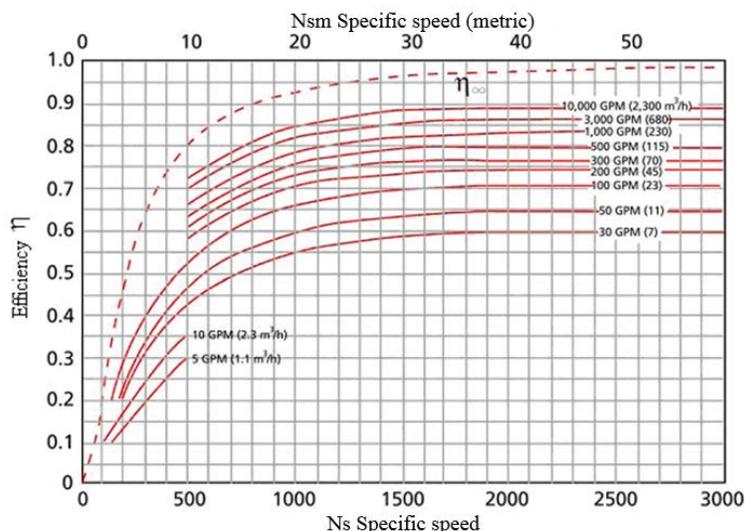


Fig. A Efficiencies as Related to Specific Speed and Flow Rate
(source: The Pump Handbook published by McGraw Hill)

ACKNOWLEDGMENT

The author would like to express his special thanks to Dr. Aung Ko, Professor, Faculty of Precision Engineering, Technological University (Cyber City) and Daw Cho Cho Khaing, Associated Professor, Department of Mechanical Engineering, Technological University (Mandalay) for their kind supervision, encouragement, suggestion and valuable guidance of this paper.

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Urbanization in The Peripheral Area of Yangon City

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DOI: 10.29322/IJSRP.9.08.2019.p92130

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92130>

Abstract- Urbanization -the increasing percentage of a population living in urban areas due to rural-urban migration and higher levels of natural increase in the urban areas.* In urban studies, peripheries were presented as an area that is subject to certain structural changes according to an urban pattern (demographic, economic, cultural, spatial).

Dala Township is located on the southern bank of Yangon River. The township includes 23 wards and 23 village tracks. It has an area of 224.1 km² (86.51 sq mi). The total number of population in 2014 census is 172,857. It is strategically located near Yangon. A bridge project was announced for 2017 to across the Yangon River. The aim of the paper is to study the patterns of urbanization in Dala Town. Semi-structured interview method is used for the primary data. The most important feature of urbanization in the periphery has been its recent remarkable growth. The growth has been caused by high birth rates and very high levels of rural to urban migration. Over one-thirds of the growth in Dala Township between 2010 and 2018 came from immigration. People moved from the countryside in search of the better life which many believe is found in the city. There are two sectors of settlement in the periphery: the formal sector and informal sector. The weight of numbers and the inability of the market to provide decent cheap housing has meant appalling housing problems in the peripheral town. The response has been the growth of self-help schemes, planned squatter settlements. The squatter settlements are both a sign of failure and a source of hope. They represent the failure of the society to provide jobs and homes.

Index Terms- Urbanization, Dala Township, periphery, patterns, formal sector, informal sector.

I. INTRODUCTION

In 2006 Yangon City has a population of over 4.34 million which was estimated. In 2014, the metropolitan population is over 7.3 million (7360703). The city has expanded to its surrounding area, leading to a significant increase in population. The most significant urban expansion is found in peripheral areas especially in the eastern, western and southern parts, where urban population has increased more than double. Among these towns, Dala Township located in the southern part of Yangon City is selected as the case study. The reasons are that Dala town is located on the other side of Yangon River. Downtown area of Yangon City and Dala town is divided by Yangon River. The town has an area of 224.1 square km. It has many open lands and underdeveloped, but the residents can easily reach to the city just through the River. They can join the jobs in the new industrial zones, companies, private hospitals, clinics training schools and private schools etc. On the other hand, the living cost is lower than the city many times especially the land rent. Therefore, Dala may be the shelter of the poor who wants to get the job opportunities in the city. The significant population growth has been found in the urban area of the town. The researchers are interested in the patterns of urbanization in Dala Town. The topic is important because to implement the urban planning effectively, it is important to know urbanization pattern of the town and the socio-economic conditions of the residents. To study these facts, the paper focuses on the three parts such as physical factor of the town, socio-economic factors of the residents and institutional factor for planning.

II. METHODOLOGY

Sources of Data

The study was based on both secondary and primary data. Secondary data such as population by ward, squatter population and town map were recorded from General Administrative Office of Dala Town. Primary data were recorded by field survey. Semi-structured questionnaire was used to interview the formal and informal settlements.

Procedures of the Research

Firstly, to study urbanization in the peripheral areas of Yangon City, Dala Town is the case study area among peripheral areas due to its strategic location and extent. Then, it intends to compare the present situation of the town and future condition after the implementation of Yangon-Dala Bridge Project and Dala Industrial Development Project. Third, questionnaire was tested in March, 2019 and data was collected in April and May 2019. The controlling factors physical factor, socio-economic factor and institutional factor. Specific variables are population number, number of households, squatter population, birth and death, migration, occupations and education level. Interviewees are formal and informal settlers. Finally, the collected data was analyzed by the qualitative method. Strategic location is pointed by Multiring buffer analysis. The study framework is shown in figure 1.

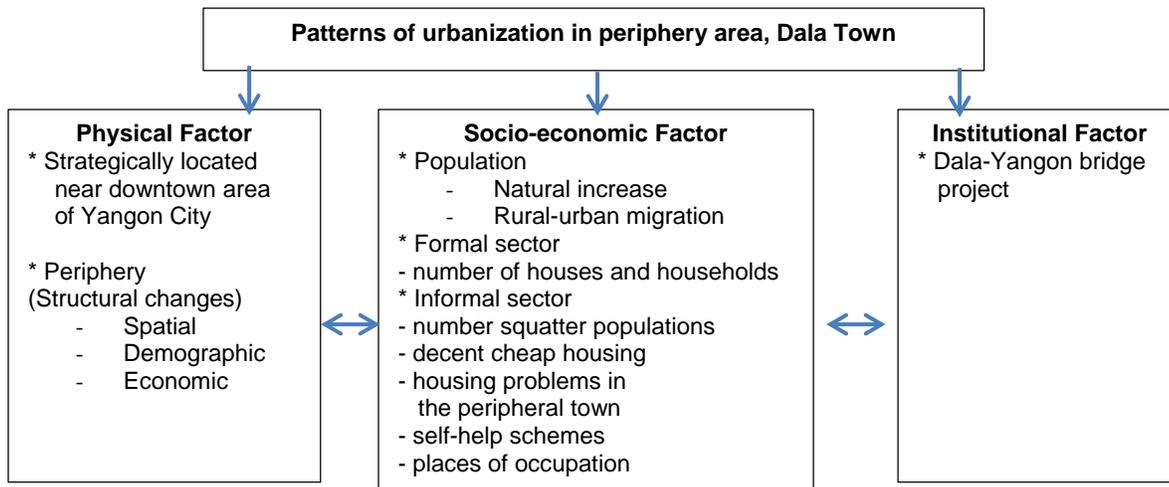
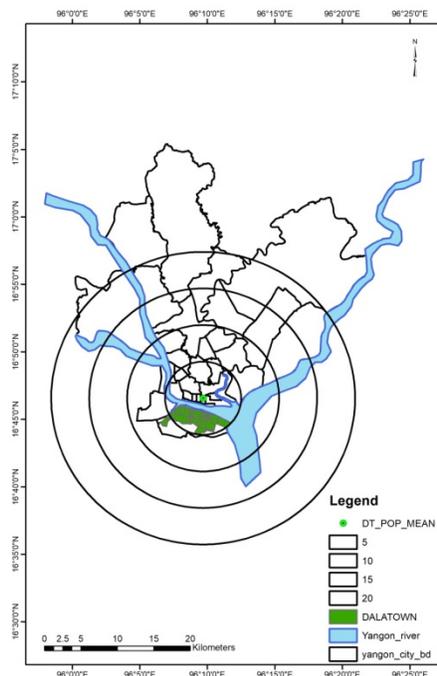


Figure 1: Framework of Urbanization in Peripheral Area
 Source: Field survey in 2019

III. RESULTS AND DISCUSSION

Physical Factor

The location of Dala Town is economically important although it is located in the peripheral areas from Yangon City. It is located within 5 km distance from population-weighted mean center of downtown area of the City. The town is strategically located near Yangon City on the other side of Yangon River (Figure 2). About 30,000 people take the ferry from Dala to Yangon City by the use of state-owned inland water transport ferries and public-owned small boats (Figure 3). People who live in Twante Township located on the southwestern part of Dala Town and Kawhmu Township on the south also depend on the ferries and boats and take the buses in Dala Town before crossing the river to Yangon.



Note: Concentric circles of 5 km distance focus on Population-weighted mean centre of Downtown area of Yangon City. Dala Town is located in the first ring. It can be clearly seen its strategic location.



Figure 3. Yangon-Dala Ferry Terminal
Source: www.alamy.com

Dala Town is located on the southern bank of Yangon River and southern part of Yangon City. It is bounded by Yangon River in the north and east, Twante Canal in the west and Kawhmu Township in the south. Dala Town has 23 wards before 2016 and increased to 24 wards in 2016. The new ward, Tarkyi, is located on the western part near Twante Canal and along Dala-Twante Road.

When the structural changes of the town are studied in the years of 2003, 2010 and 2019, the number of houses has increased significantly between 2003 and 2010 (Figure 4 and 5). New Dala Ferry Terminal was established in 2014. After 2014 new buildings have grown up in the open land near ferry terminals and along Dala-Twante Road (Figure 6).



Figure 4. The Northeastern Part of Dala Town in Jan, 2003
Source: Google Earth, Eye Alt 2139 ft



Figure 5. The Northeastern Part of Dala Town in Jan, 2010
Source: Google Earth, Eye Alt 2139 ft

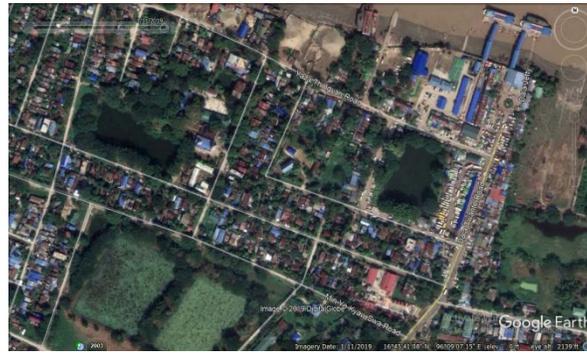


Figure 6. The Northeastern Part of Dala Town in Jan, 2019
 Source: Google Earth, Eye Alt 2139 ft

When the comparative study of the population of Dala was made in 1993 (census year), 2003 (projected year) and 2014 (census year), the total number of population in peripheral areas of Yangon City was over two times in these years. The population number of peripheral towns was significantly high in Hlaingtharyar, Shwepyithar, Mingaladon, 4 new Dagon towns and Dala Town (Figure 7). The increase number of urban population in Dala was shown in Table 1. In 2014 census population number is 119366. This number little decreases in 2015 and increased again in 2016 and 2018. This may be census number and recorded data of Dala Township.

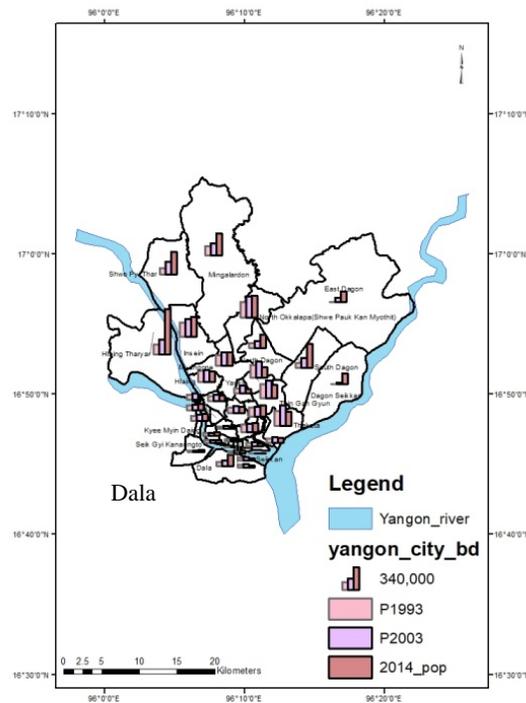


Figure 7. Urbanization in Yangon City
 Source: Population Census in 1993 and 2014

Table 1. Population Number of Dala Town

Years	2014	2015	2016	2018
Urbanization in Dala Town	119366	102477	107966	112033

Source: Census 2014 and General Administrative Office of Dala Township

Economic Characteristic

Labor force participation rates and unemployment rates of males and females were shown in Table 2 and Figure 8.

Labour force participation rate for the population aged 20-64 in Dalal Township is about 65 per cent. The labour force participation rate of female is 36.1 per cent and is obviously lower than that of male which is 82.4 per cent. Labour force participation rate for the population aged 10-14 is 8.1 percent. They are school-age children and work in elementary jobs. The unemployment rate of aged 15-64 in Dala Township is 7.8 per cent. The unemployment rate of young females aged 15-24 is 19.7 per cent.

In Dala Township, 30.1 per cent of the employed persons aged between 15 and 64 are services and sales workers and is the highest proportion, followed by 19.1 percent in craft and related trades workers.

Table 2. Population aged 10 and over by labour force participation rate and unemployment rate by age group

Age groups	Labour Force Participation Rate			Unemployment Rate		
	Total	Males	Females	Total	Males	Females
10-14	8.1	9.5	6.7	35.3	36.9	33.0
15 - 19	44.0	55.6	32.0	20.5	20.1	21.2
20 - 24	63.4	85.4	42.2	14.8	12.9	18.5
25 - 29	65.8	91.4	40.4	8.1	6.5	11.7
30 - 34	65.2	92.4	38.9	5.5	4.6	7.5
35 - 39	64.6	92.6	38.5	3.8	3.3	4.9
40 - 44	62.9	90.7	36.8	3.1	2.8	3.8
45 - 49	61.4	89.2	36.5	2.8	2.4	3.8
50 - 54	56.0	83.5	32.4	3.1	2.6	4.0
55 - 59	48.9	74.7	27.2	2.1	1.6	3.2
60 - 64	34.5	54.2	18.5	2.4	2.2	2.7
65 - 69	25.1	39.3	14.0	1.7	0.8	3.8
70 - 74	15.2	23.5	8.9	5.5	2.3	11.8
75 +	11.1	18.6	6.2	4.0	3.5	5.0
15 - 24	53.5	70	37.1	17.2	15.9	19.7
15 - 64	58.6	82.4	36.1	7.8	6.7	10.0

Figure 6. Urbanization in Yangon City
 Source: Population Census in 2014

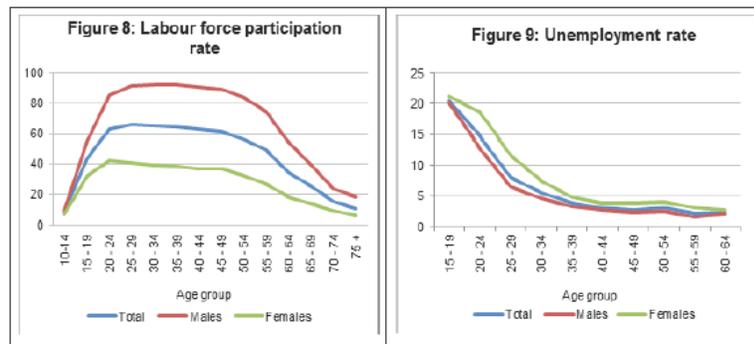


Figure 8. Labour Force Participation Rate and Unemployment Rate in Dala
 Source: Table 2

Socio-economic Factor

Proportion of Urban population in Dala is 69.1% and rural is 30.9% in 2014 census (Figure 9).

The growth of population in urban area is natural increase as well as in-migration. 51% is natural increase and 49% is in-migration. Increase is not too much different. It is found that urbanization in the town is comparable increase of natural and in-migration (Table 3).

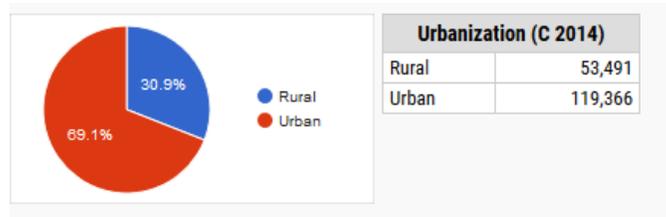


Figure 9. Urbanization in Dala Township in 2019
 Source: Population census in 2014

Table 3. The Increase Number of Population in Urban Area of Dala in 2018

Dala Township	Birth	Death	Immigration	Outmigration
Urban	161	6	154	0
Rural	26	18	0	8

Source: General Administrative Office of Dala Township

Formal sector

Number of population houses and households

There were 119366 persons living in Wards (urban areas). This represented 69.1% of the total population in Dala which is like Yangon Region having the highest urban proportion (70.1%).

Population density is 754.1 per square kilometre in Dala. The results showed a nationwide population density of 76 per square kilometre (200/sq mi). Yangon Region was the most densely populated Region, (723 per square kilometre). Population density by wards was shown in Figure 10. The western part of the town is more densely populated than the east which is nearer ferry terminals, located on Dala-Twante Road and has more crowded commercial activities. Therefore, the land rent and the cost of real estate is higher than the east.

The provisional census results indicated that there were 25212 households and 22729 houses in Dala. On average 4.44 people lived in each household in the town.

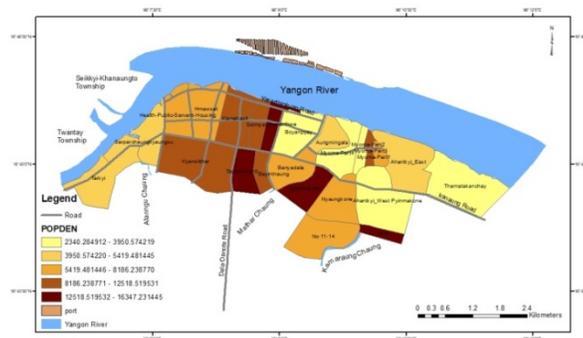


Figure 10. Population Density in Dala Town, 2018
 Source: General Administrative Office of Dala

Integrated household living conditions were found in every ward of the town. The highest sharing houses are Ahantkyi East and Kamakasit wards. They are situated beside Yangon River, near Dala ferry terminals and bus ferry, and pass through Dala-Danote Road and Dala-Twante Road (Table 4). A household may contain one or more families.

Informal sector

Distribution Pattern of Squatters

Although Dala Township has 24 wards and 23 villages, squatter population live in 22 wards and 7 villages. There are 25212 formal households and 673 squatter households in the study area. Its total urban population is 112033 persons in 2018. The number of squatters in urban area is 30407 in 2017. They also live in 7 villages out of 23 villages (Table 5). This situation is different from other towns.

Kyansittar ward has the largest number of squatters (10969 persons). It is located along Dala-Danote Major Road and has open lands in the northern part. The second largest number is in Hmawset ward (4330 persons). It has 6 lakes, located near the junction of

Twante Canal and Yangon River. Moreover, on the either side of Yangon River, Yangon-Dala Car Ferry Gate and Container compound are located. Third largest squatter population is in Yazathinkyan ward (2993 persons). It has 4 lakes and is located beside Matharchaung Chaung.

Therefore, it is found that the largest distribution is in the wards located along the main roads near lakes, and car and boat ferry terminals.

Table 4. Demographic Characteristics in Dala Town between 2014 and 2018

Id	WARD	AREA (Sq. km)	Number of Population 2014Total	Number of Population 2016	Number of Population 2018	Population Density 2018	Households (Formal) 2018	Houses (Formal) 2018
1	Thamatakanchay	1.38	4149	4286	4655	3383.62	1014	795
2	Tarkyi	0.90	0	4090	4081	4512.92	975	920
3	Sarparchaung-kyaungsu	0.77	4121	3583	3583	4635.02	824	756
4	Kyansitthar	1.50	15802	12812	14032	9374.14	3185	2880
5	Tapinshwehti	0.45	7663	7314	7314	16138.60	2755	2213
6	Yazathinkyan	0.53	7375	7157	8634	16347.20	1635	1568
7	Nyaungkone	0.80	5847	5409	6102	7631.25	1300	1205
8	No 11-14	0.93	5610	4497	5994	6451.14	1498	1466
9	No 6	0.19	2139	2246	2599	13993.00	583	530
10	Ahantkyi_West Pyinmakone	1.30	5623	4978	4989	3845.31	1091	1005
11	Ahantkyi_East	1.08	5324	5275	5349	4935.96	1320	1166
12	Myoma-Part1	0.14	1067	1105	1116	8186.24	265	223
13	Myoma-Part2	0.12	1423	1572	1545	12518.50	391	326
14	Myoma-Part3	0.19	571	557	434	2340.28	124	129
15	Myoma-Part4	0.60	4901	3702	2368	3950.57	870	735
16	Aungmingala	0.38	3025	2427	2068	5419.48	502	446
17	Kamarthwe	0.32	5143	4387	4510	14145.90	652	640
18	Setmyay	0.32	3699	3224	3163	9818.78	584	541
19	Kamakasi	0.79	12578	9710	9710	12335.50	1915	1633
20	Health-Public-Servant-Housing	0.57	3892	3556	3928	6843.93	760	736
21	Hmawset	0.79	7453	5605	5921	7511.20	1137	1102
22	Boyanpyay	0.80	4192	3343	2842	3564.74	550	525
23	Banyadala	0.64	4206	3549	4041	6273.90	647	563
24	Bayintnaung	0.26	3563	3582	3055	11917.90	635	626
	Total	15.74	119366	107966	112033	7117.22	25212	22729

Source: General Administrative Office of Dala Township and 2014 Myanmar Population Census

No. 11-14 Ward crossing Dala River and located at the southeastern end of the town have 15 squatters although it is the sixth largest formal population ward in the town (7 lakes on the west of Dala River and 7 lakes on the east). It is found that the small distribution is in the wards situated at the peripheral area and far from the main roads.

Basic infrastructures like transportation roads, rivers, streams and lakes support the distribution pattern of squatter dwelling. For example, Hmawset ward and No. 11-14 ward.

Economic factor is also important in assessing the informal settlement. To meet the job opportunities, they usually stay in the second and third places of commercially crowded area for instance, Myoma No (4) ward and Yazarthinkyan ward located south of Aungmingalar ward which is the nearest place to Dala ferry terminals. Another important controlling factor is transportation routes to access with the low cost (Figure 11 and 12).

The exceptional case is that some wards located at the peripheral area have a wide range of distribution pattern, e.g., Thamatakanchay ward has 1785 squatters, the 5th largest squatter settlement area and Tarkyi ward 4 has 1778, the 6th largest (Figure 13). It is sure that the reasons of squatter settlements are the multi-dimensional case. To get clear and acceptable explanations it needs to interview squatter population in every ward.

Table 5. The Number of Squatter Population in Dala Town

Id	WARD	Number of Squatter 2015	Number of Squatter 2017
1	Thamatakanchay	762	1778
2	Tarkyi	2443	1785
3	Sarparchaung- kyaungsu	872	1206
4	Kyansitthar	9578	10969
5	Tapinshwehti	396	350
6	Yazathinkyan	4093	2993
7	Nyaungkone	294	362
8	No 11-14	68	15
9	No 6	0	0
10	Ahantkyi_West Pyinmakone	0	0
11	Ahantkyi_East	272	234
12	Myoma-Part1	188	158
13	Myoma-Part2	80	61
14	Myoma-Part3	50	46
15	Myoma-Part4	1173	1064
16	Aungmingala	316	209
17	Kamarthwe	521	546
18	Setmyay	211	160
19	Kamakasit	3906	2967
20	Health-Public-Servant-Housing	224	320
21	Hmawset	5580	4330
22	Boyanpyay	392	347
23	Banyadala	392	334
24	Bayintnaung	152	173
	Total	31963	30407

Source: General Administrative Office of Dala Township

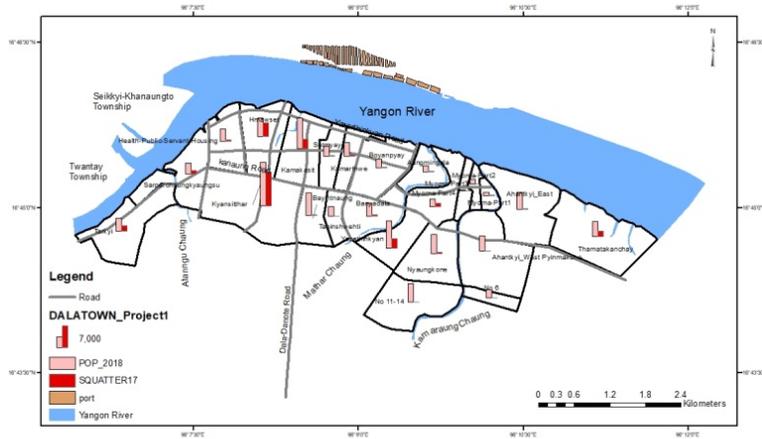


Figure 11. Number of Population and Squatters in Dala Town
Source: Based on Table 4 and 5



Figure 12. Yangon-Dala Ferry Terminal from the Yangon City Side
Source: Photo taken in 2019

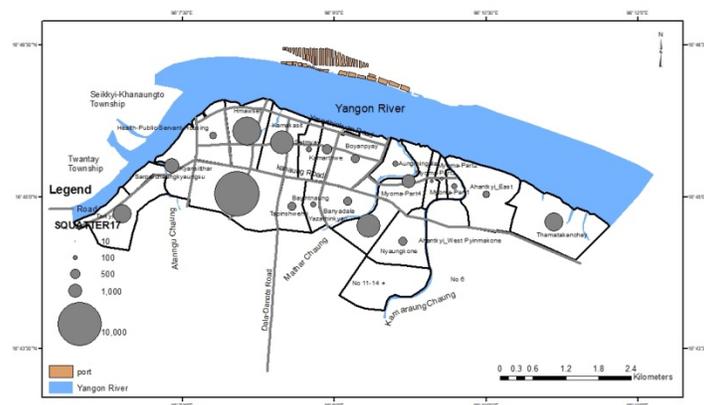


Figure 13. Proportional Number of Squatters in Dala Town
Source: Based on Table 4 and 5

Decent cheap housing and Housing problems in the peripheral town

This section focuses to identify housing problem areas of Dala Town and other related problems. The bridge project, which will be implemented in 2022, will have an impact on the real estate market in Dala Township.

Although it is located nearest place of Yangon City, it has many difficulties to stay such as electricity and water shortage especially in summer. Fresh drinking water has to be bought and water for home use is brought from the lakes nearby. Due to these basic infrastructure facilities, the land rent and the cost of real estate is lower than that of the city.

A respondent said that “as far as where all the water that we use in our homes comes from either a groundwater source such as a well, or from a surface water source such as a river and lake.”



Figure 14 (a). The Use of Water from Lake

(b). Water-use from a Well



(c). Open Lands in the Southern Part of the Town
Source: Photos taken in field survey in May 2019

Institutional Factor

Institutional factor plays an important role to develop a town. To develop Dala Town government has implemented two projects. The first one is to build the Yangon-Dala Bridge which will link Yangon's downtown area to the underdeveloped satellite town. Specifically it will link Phoneygi Street in Lanmadaw Township with Bo Min Yaung Street in Dala. To alleviate summer water shortages of the town, water pipes will also run along the bridge, bringing water from Yangon to Dala. The bridge can make transportation easier for the neighbouring townships of Dala such as Twante, Kawmhu, and Kungyunkone. The length of the bridge will be over 6,000 ft. This project will be started in January 2019. The project will be finished by mid-year of 2022.



Figure 14. Model of Yangon-Dala Bridge
Photo credit: Focuscore Group

The second project is to establish a new Special Economic Zone (SEZ) in Dala Township after completion of the Yangon- Dala Bridge. The SEZ project can make to draw more foreign direct investment (FDI), create more job opportunities for local residents and the young people of Yangon Region. This project is the fourth SEZ in Myanmar (Thilawa SEZ, Kyaukphyu SEZ in Rakhine and Dawei SEZ). Currently, only Thilawa SEZ is completed and fully operated.

IV. CONCLUSION

The most striking feature regarding the location of Dala Town is its physical landscape. Among 24 wards, 12 wards are facing Yangon River. It has 13 Jetties and 2 government-owned ferry terminals to cross to Yangon City. Moreover, 5 townships of central Yangon, namely Latha, Lanmadaw, Pabedan, Kyauktada and Botahtaung Townships, are located on the other side of Dala Town.

Another noticeable thing is its urbanization. It is included in one of the most urbanization in peripheral areas of the city due to its strategic location. However, the town is underdeveloped and 40 % join in the works Yangon City. Education of the head is mostly primary and middle levels, 40% respectively. Their jobs are sellers, motor cycle carriers and services in their town.

Having many open lands and not having appropriate urban planning make the increase of informal settlement in the town, for example, squatter population has increased to double in Thamathakanchay Ward.

On the other hand, insufficient infrastructure is a major obstacle to the development of the town. infrastructure services are generally provided by self-help.

Although it is strategically located near Yangon City, residents in Dala Town have to use ferry to come and work in the city. Dala Township is still largely rural and underdeveloped because it still lacks a bridge across Yangon River.

If the construction on the Yangon-Dala cross-river bridge, which will link Yangon's downtown area to the underdeveloped satellite town, is completed, Dala Town may become accessible to the city and create many job opportunities and then the town will be developed. As a consequence, it is necessary to solve in advance the informal settlements which are set up illegally either on the public or private land.

ACKNOWLEDGEMENTS

I specially thank to Ko Aye Win, local resident in Dala Town, who provided me to do pilot field survey and collect the primary data. I would like to express my special gratitude to respondents and heads of the wards in Dala Town.

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Spatio-Temporal Distribution and Abundance of Zooplankton Fauna in Relation to Physico-Chemical Characteristics of Ede-Erinle Reservoir

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DOI: 10.29322/IJSRP.9.08.2019.p92131

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92131>

Abstract- The study determined the seasonal and spatial variation in the species diversity and abundance of zooplankton fauna in Ede-Erinle reservoir. This was with the view to determining the effects of the physico-chemical characteristics of water on the zooplankton distribution and abundance in the reservoir. A total of 22,628 zooplankters comprising 101 species, 57 genera and five (5) groups (viz. rotifers, cladoceras, copepods, ostracods and dipterans) were collected and identified. The rotifers were the most specious (57 species) while the ostracods were the least (4 species). The copepods were the most abundant (44.8%) while the Dipteran larvae (0.20%) were the least abundant. All the classes of zooplankton occurred in all the stations monitored except the dipteran larvae which were not found in two stations. However, spatial distribution of species varied significantly ($p < 0.05$) within each class. In contrast, all zooplankton classes occurred in the two all seasons, but seasonal species distribution also differed significantly ($p < 0.05$). Conductivity, TDS, BOD₅, Ca²⁺, SO₄²⁻ and pH correlated significantly ($p < 0.05$) with the abundance of some zooplankton species. The study concluded that the distribution of zooplankton species in Ede-Erinle reservoir was significantly ($p < 0.05$) influenced by some key physico-chemical factors.

Index Terms- Hydrobiology, Aquatic life, Zooplankton, Water quality, Biodiversity

I. INTRODUCTION

Zooplankton are microscopic drifting animal-like organisms found either at or near the surface of water bodies. Ovie (2011) defined zooplankton as the free-floating, aquatic invertebrates, which are microscopic because of their usual small sizes that range from a few to several micrometres, rarely exceeding a millimetre. Global aquatic ecosystem can be broadly classified using salinity into Freshwater ecosystem and salt water ecosystem, both of which support zooplankton growth. Freshwater ecosystems are inland waters in which reservoirs fall in to and they have low concentration of salts ($< 599\text{mg/L}$). The saltwater ecosystem has high concentration of salt (averaging about 3.5%) (Tideman, 2000). Freshwater habitats can be further divided into two broad groups, the lentic and lotic ecosystems based on the differences in the water residence time and flow velocity (Wetzel, 2001). Freshwater zooplanktons in the tropics

comprise predominantly of rotifers, cladocerans, copepods and occasionally the ostracods and insects (Fernando, 2002).

In the hierarchy of the food web, the zooplanktons are the major mode of energy transfer between phytoplanktons and other aquatic animals including fish. They are, thus, the most important biotic components influencing all the functional aspects of all aquatic ecosystems, viz; food chains, food webs, energy flow/transfer and cycling of matter. Generally, they play an important role in fish nutrition, both in aquaculture and capture fisheries. Suresh *et al.* (2011) reported that different environmental factors that determine the characters of water have great importance upon the growth and abundance of zooplankton. Thus, water quality influences zooplankton abundance, clustering and biomass.

Most of the zooplankton species are cosmopolitan in distribution. Many zooplanktons, particularly the Cladocera, exhibit marked diurnal vertical migrations moving away from direct sunlight while the horizontal spatial distribution of zooplankton in lakes is often uneven and patchy (Wetzel, 2001). Pelagic zooplanktons such as cladocerans and copepods also migrate away from littoral areas (avoidance of shore movements) by behavioural swimming responses to angular light distributions. Non-random dispersion of zooplankton is caused by water movements.

The distribution of zooplankton communities depends on many factors, some of which are change of climatic conditions, physico-chemical parameters and vegetation cover. The change in water quality and limnological characteristics from riverine to middle transition and to lacustrine environments create distinct habitats which have bearing on the distribution and abundance of distinct biota inhabiting each zone (Sthapit *et al.*, 2008). For example, calanoida are generally abundant in oligotrophic environments while cyclopoids and cladocerans dominate in eutrophic waters (Margaleff, 1983; Wetzel, 1990). Zooplankton abundances range from less than one individual per litre in most oligotrophic waters to up to 500 individuals per litre in eutrophic lakes (Goldman and Horne, 1983).

Zooplankton species succession and spatial distribution result from differences in ecological tolerance to various biotic and abiotic environmental parameters (Marneffe *et al.*, 1998). Studies have shown that the zooplankton community is sensitive to extreme variation in flow; thus species composition is changed and the succession of taxa is redirected after flow recession (Tavernini, 2008). This results in different timing for the

emergence of rotifers, cladocerans, and copepods from the inundated dry river beds (Jenkins *et al.*, 1980; Boulton, 2003). Therefore, a subdivision of diversity in hierarchical scales in stream ecosystems will result from these factors, which represent the interaction of physical and biological processes. In such water bodies, specific adaptations and strategies are important to cope with the variable and commonly extreme conditions (Seminara *et al.*, 2008), and such mechanisms may lead to the spatial and temporal segregation of the zooplankton fauna.

Among the factors that influence species distribution, abundance and composition of zooplankton, physical and chemical characteristics have been observed to be the most important (Sousa *et al.*, 2008; Vieira *et al.*, 2009). For example, temperature determines the distribution of zooplankton in water column of lakes. (Wetzel, 2001; Kubar *et al.*, 2005) and also influence their densities (Masundire, 1994). Temperature is known to have a direct effect on zooplankton populations by influencing reproductive activity, the rate of moulting and the rate of egg development, (Wetzel, 1975; Hutchinson, 1967). These activities all increase as the temperature rises in the spring. Also, high water transparency increases the euphotic zone in an aquatic ecosystem which in turn favours phytoplankton growth and primary productivity. Any factor that enhances the production of phytoplankton is most likely going to enhance the production of zooplankton also, since the latter are nutritionally dependent on the former.

According to Rajagopal *et al.*, (2011) zooplankton plays an integral role and serves as bio-indicator and it is a well-suited tool for understanding water pollution status. Zooplanktons play important role in bioremediation of heavy metals and other toxic materials, biomonitoring of water pollution (Tyor *et al.*, 2014) and act as biomarker for water quality assessment for fish production (Pradhan *et al.*, 2008; Purushothama *et al.*, 2011; Hoxmeier and Wahl, 2004). Zooplankton communities are typically diverse, occurring almost in all lakes and ponds and are highly sensitive to environmental variation. Hence, zooplankton can speak to condition of water body and can be used to assess overall lake health.

In order to properly manage reservoirs or lakes, monitoring of zooplankton communities is needed to predictively model the ecosystem (Deborah and Robert, 2009). This study was motivated by the need to establish an ecological relationship between the fluctuating physico-chemical water condition and the biotic component of Ede-Erinle reservoir, using its zooplankton fauna as an index.

II. MATERIALS AND METHODS

The Study Area

Erinle Lake is the largest of all water bodies in Osun State, Nigeria. It has many tributaries of which the major inflow rivers, Awon and Erinle, are the main sources of water. The lake basin which is about 342 km extends in width from Longitude 4° 24' E to 4° 35' E and in length from Latitude 7° 45' N to 7° 58' N. The lake itself is located at Longitude 4° 27' E and 7° 46' N (Fig. 1). The surrounding vegetation has a mixture of savannah, light and thick forest, with scattered cultivations due to various human activities (Akinbuwa, 1999). The substratum of the lake is muddy and sandy with scattered logs of wood. The surface area is about 1.25 km (Akinbuwa, 1999); the highest depth of 7.6m

was recorded during the study. The sampling points on the lake are shown in (Figure 1).

Selection and Description of Sampling Stations

A reconnaissance survey of Ede-Erinle Reservoir was conducted to identify sampling stations based on important ecological landmarks. Eight sampling sites (Stations A-H) were established along the course of the Reservoir for investigation in this study. Four of the sampling sites (A-D) were established on the reservoir while the remaining four sampling sites (Stations E-H) were established on the two major inflows with Stations E and F located on River Erinle and Stations G and H located on River Awon. A Global positioning system (GPS) handset was used to determine the grid coordinates of the sampling sites.

Sample Collection and Field Determinations

Field collection from the sampling stations was conducted four times from September 2014 to June 2015, covering both the dry and rainy seasons. The samplings were conducted in September 2014 (rain season), December 2014 (early dry season), March 2015 (dry season) and June 2015 (early rainy season). Air temperature and water temperature (using mercury in glass thermometer), pH (using pH meter), conductivity (using conductimeter), water depth and transparency (using glossy white secchi disc) were each measured *in situ*. Samples for dissolved oxygen (DO) and five-day biochemical oxygen demand (BOD₅) were collected in transparent and amber 250 ml reagent bottles respectively. Dissolved oxygen samples were fixed in the field immediately on collection with Winkler's reagents (Manganate sulphate) and (Alkali iodide). BOD₅ samples were collected in black reagent bottles and kept in the dark cupboard at room temperature (about 27 ± 2°C) for 5 days after which they were treated as described for oxygen determination. Water samples were collected in sterile capped containers (2.0 L plastic bottles) and returned to the laboratory for the analysis of other parameters using both instrumental and non-instrumental methods according to standard methods by APHA *et al.* (1998).

Zooplankton Sampling

Zooplankton distribution and abundance were assessed by straining 30 L of water through a 25 cm diameter zooplankton net with a 45 µm mesh size to a concentrated volume of 30 ml. This was preserved in 4% formalin. Zooplankton species in 3 ml concentrate subsample were identified and counted under the scanning (x40) and low power (x100) magnifications. Identification was done using the descriptive keys of Akinbuwa (1999); Alekseev (2002); Brooks (1959) and Edmondson (1959); Cander-Lund and Lund (1995); Durand and Lévêque 1980; Egborge (1994); Korinek (2002); Kutikova (2002); Jeje and Fernando (1982; 1986; 1991); Turner and Da Silva (1992); Victor (2002); Wilson and Yeatman (1959).

Community structure was assessed using the indices of species diversity, Simpson's dominance index (S). Abundance of each species was estimated based by multiplying the number in the final concentrate volume (30 ml for 30 Litres) by 1000 and expressed as Organism per m³ (Org/m³).

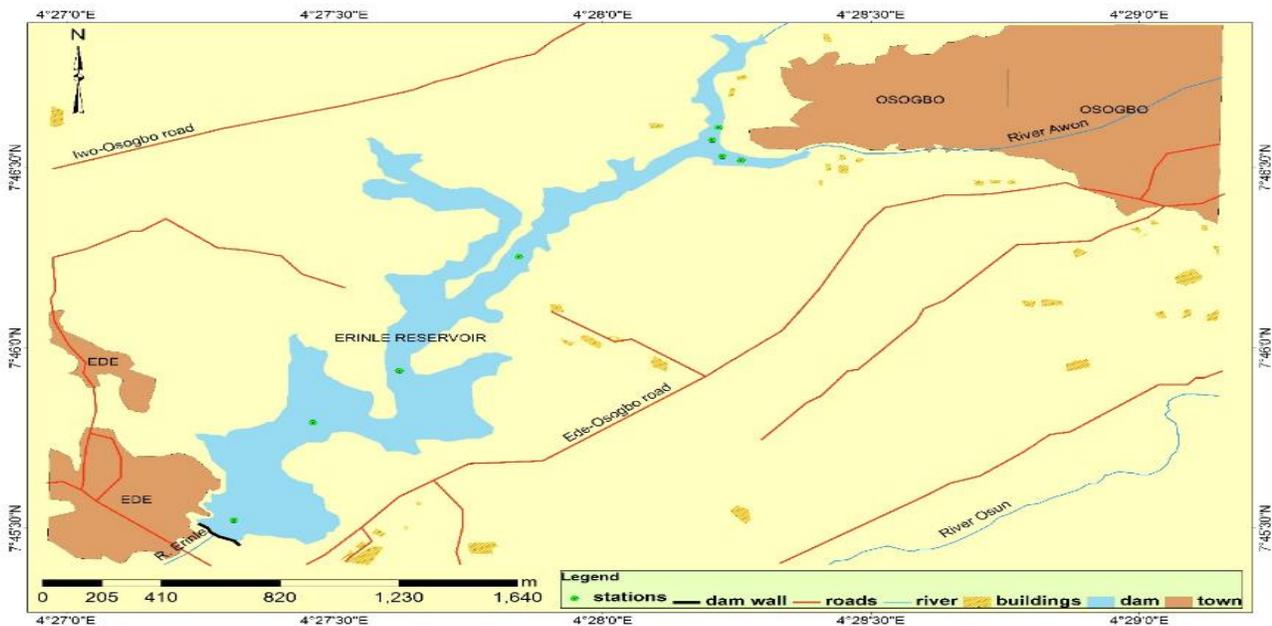


Figure 1: Map of study area showing sampling points

Statistical Analysis of Data

All the data obtained were subjected to appropriate statistical methods using SPSS version 17.0 software. Statistical methods such as Analysis of variance (ANOVA), Cluster Analysis (CA), Correlation and Regression analysis were used as applicable. Analysis of variance (ANOVA) was used to find and identify levels of significance and establish the spatio-temporal variation in water physicochemical parameters. Correlation and Cluster Analysis (CA) were used to show the relationship and association amongst the zooplankton fauna group and water quality parameters accordingly while Regression Analysis was used to show the effect of the physicochemical parameters on the zooplankton fauna.

III. RESULTS AND FINDINGS

The Spatio-Temporal Effect of Physical and Chemical Parameters on the Abundance of Zooplanktons in Ede-Erinle Reservoir

The results of a correlation and regression analyses of the relationship between the various physico-chemical parameters and abundance of zooplankton species are presented in Tables 4.43 and 4.44 respectively.

Abundance of Cladocera and copepod were both positively and significantly correlated with ambient air temperature, pH, conductivity, transparency, TDS and bicarbonate ions. Conversely, they were both negatively and significantly related with turbidity, organic matter, Mg^{2+} , sulphate, ($p < 0.05$) as

shown in Table 4.43. Also, cladocera had a significant relationship with pH, total acidity, K^+ , hardness ($p < 0.05$). Organic matter favoured the abundance of Diptera ($p < 0.05$). Phosphate, Ca^{2+} , hardness were found to be significantly related with ostracod and rotifers were discovered to be related with ambient air temperature, conductivity, transparency, BOD, TDS, TS, Ca^{2+} and sulphate ($p < 0.05$). Also observed, was the positive association between cladocera and copepods. Similar positive relationship was observed between rotifers and copepods too. The regression analysis revealed that the predictors accounted for over 65% of the zooplankton’s abundance in cladoceras, copepods and rotifers (Table 4.44). Also all the predictors significantly affect the abundance of the planktons at ($p < 0.05$).

4.1 Zooplankton Groups Abundance Relationship Using Cluster Analysis

Figure 4.5 shows the cluster plot of the relationship among zooplanktons groups abundance of Ede-Erinle Reservoir. There are two major clusters observed; the first comprised of dipteras, ostracods and cladoceras while the second comprised of copepods and rotifers.

The result of the cluster analysis showing the relationship among the zooplankton species abundance based on the sampling stations of Ede-Erinle reservoir during the study period is presented in figure 4.6 ($p = 0.05$). There are two major clusters in which the first comprises stations A, C, D, E, F, G and H while station B forms a single cluster.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a	b	c	d	e	
A	1																														
B	0.339**	1																													
C	0.390**	0.065	1																												
D	0.311*	0.214	0.513**	1																											
E	0.144	-0.422**	0.393**	-0.058	1																										
F	0.083	-0.270*	0.455**	0.016	0.881**	1																									
G	-0.540**	-0.258*	-0.543**	-0.565**	-0.311*	-0.356**	1																								
H	-0.379**	-0.196	-0.327**	-0.375**	-0.205	-0.131	0.295*	1																							
I	-0.220	0.025	-0.338**	0.041	-0.467**	-0.384**	0.085	0.631**	1																						
J	0.009	0.222	-0.029	0.281*	-0.375**	-0.439**	-0.150	-0.110	0.184	1																					
K	-0.380**	-0.246	-0.125	-0.273*	-0.054	-0.103	0.291*	0.311*	0.084	-0.005	1																				
L	-0.039	0.293*	-0.342**	-0.122	-0.532**	-0.466**	0.313*	0.032	0.172	-0.155	0.073	1																			
M	0.172	-0.391**	0.429**	-0.032	0.996**	0.897**	-0.341**	-0.211	-0.472**	-0.410**	-0.069	-0.501**	1																		
N	-0.183	-0.096	-0.119	-0.252*	-0.069	-0.071	0.066	0.296*	0.197	0.000	0.137	0.019	-0.094	1																	
O	-0.013	-0.432**	0.220	-0.212	0.732**	0.623**	-0.204	0.070	-0.224	-0.301*	-0.005	-0.398**	0.714**	0.582**	1																
P	-0.188	-0.223	0.174	-0.044	0.268*	0.473**	-0.089	0.284*	0.048	-0.420**	0.120	-0.171	0.296*	-0.025	0.198	1															
Q	0.326**	0.331**	0.179	0.033	-0.068	0.082	-0.235	-0.089	0.059	-0.155	-0.118	0.248*	-0.024	0.097	0.028	0.265*	1														
R	-0.233	-0.510**	-0.072	-0.210	0.638**	0.403**	-0.018	-0.049	-0.223	0.093	0.050	-0.568**	0.575**	0.255*	0.657**	-0.076	-0.424**	1													
S	-0.047	0.099	-0.230	-0.292*	-0.515**	-0.592**	0.500**	0.138	0.050	0.286*	0.202	0.011	-0.553**	0.094	-0.357**	-0.281	-0.162	-0.109	1												
T	-0.622**	-0.155	-0.324**	-0.332**	-0.165	-0.076	0.316*	0.512**	0.264*	-0.200	0.426**	0.096	-0.172	0.397**	0.133	0.380**	-0.012	0.050	-0.017	1											
U	0.072	0.253*	0.276*	0.156	-0.037	0.233	-0.251*	0.108	0.114	-0.487**	-0.031	0.304*	0.037	-0.045	-0.041	0.543**	0.540**	-0.609**	-0.471**	0.309*	1										
V	0.334**	0.355**	-0.020	0.333**	-0.408**	-0.247*	-0.371**	-0.103	0.187	0.061	-0.245	0.282*	-0.383**	0.152	-0.221	-0.098	0.145	-0.438**	-0.108	-0.153	0.224	1									
W	-0.710**	-0.221	-0.639**	-0.529**	-0.472**	-0.500**	0.828**	0.442**	0.290*	0.112	0.382**	0.160	-0.523**	0.313*	-0.172	-0.077	-0.336**	0.126	0.593**	0.541**	-0.377**	-0.229	1								
X	-0.170	0.029	-0.097	0.024	-0.124	-0.104	0.389**	0.132	0.107	-0.248*	0.438**	0.184	-0.112	-0.194	-0.249*	0.095	0.000	-0.276*	0.210	0.096	0.120	-0.186	0.219	1							
Y	-0.149	-0.262*	0.178	-0.043	0.284*	0.484**	-0.079	0.282*	0.061	-0.425**	0.089	-0.178	0.309*	-0.031	0.208	0.943**	0.241	-0.057	-0.271*	0.346**	0.505**	-0.119	-0.076	0.110	1						
Z	-0.238	-0.416**	-0.184	-0.343**	0.320*	0.066	0.240	0.026	-0.179	0.232	0.150	-0.515**	0.243	0.281*	0.419**	-0.213	-0.471**	0.860**	0.414**	0.037	-0.800**	-0.457**	0.420**	-0.145	-0.192	1					
a	0.444*	0.285	0.408*	-0.079	0.370*	0.520**	-0.386*	-0.144	-0.229	-0.372*	-0.211	0.071	0.423*	-0.105	0.252	0.286	0.564**	-0.209	-0.468**	-0.048	0.627**	0.009	-0.595**	-0.139	0.418*	-0.430*	1				
b	0.377*	0.011	0.321	-0.150	0.660**	0.673**	-0.384*	-0.059	-0.263	-0.377*	-0.173	-0.203	0.690**	-0.081	0.473**	0.309	0.324	0.134	-0.540**	-0.124	0.310	-0.215	-0.561**	-0.121	0.391*	-0.150	0.747**	1			
c	0.172	0.046	-0.055	-0.122	0.073	0.058	-0.008	-0.056	0.070	0.371*	-0.043	-0.278	0.057	-0.051	0.009	-0.122	0.176	0.072	-0.041	-0.280	-0.236	0.114	-0.036	-0.139	-0.085	0.045	0.017	0.119	1		
d	0.060	-0.193	-0.014	-0.087	0.179	0.099	-0.112	0.144	-0.054	0.216	-0.121	-0.443*	0.149	0.341	0.341	0.025	-0.168	0.396*	0.172	0.042	-0.313	-0.127	0.074	-0.284	0.013	0.453**	-0.186	-0.038	-0.002	1	
e	0.380*	-0.061	0.206	-0.047	0.624**	0.349*	-0.291	-0.216	-0.430*	-0.218	-0.165	-0.245	0.622**	-0.019	0.462**	0.088	-0.045	0.355*	-0.207	-0.216	-0.123	-0.313	-0.400*	-0.057	0.086	0.223	0.235	0.530**	-0.182	0.303	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

A- Air Temp, B- Water Temp, C- pH, D- Water Depth, E- Conductivity, F- Transparency, G- Turbidity, H- DO, I- BOD, J- Organic Matter, K- Nitrate, L- Phosphate, M- TDS, N- TSS, O- TS, P- Alkalinity, Q- Acidity, R- Ca²⁺, S- Mg²⁺, T- Na⁺, U- K⁺, V- Cl⁻, W- SO₄²⁻, X- App Colour, Y- Bicarbonate, Z- Hardness, a- Cladocera, b- Copepod, c- Diptera, d- Ostracod, e- Rotifer

Table 4.44: Regression Indices of the relationship between Zooplankton Groups and Different Explanatory variable investigated at Ede-Erinle Reservoir.

Zooplankton Groups	Predictor Parameters	a	b	r
Cladocera	Water Temp.	-1487.980	37.772	0.891
	pH		8.361	
	Transparency		1.327	
	Turbidity		2.381	
	Organic Matter		-9.987	
	TDS		-0.419	
	Acidity		4.882	
	Mg ²⁺		-14.347	
	K ⁺		36.479	
	Sulphate		-2.933	
	Hardness		5.625	
	Copepod		0.292	
	Copepod	Water Temp.	-2697.053	82.731
Conductivity			7.858	
Transparency			-2.005	
Turbidity			-0.752	
Organic Matter			-42.775	
TDS			-10.259	
TS			0.041	
Mg ²⁺			-33.060	
Sulphate			-2.587	
Bicarbonate			12.251	
Cladocera			1.68	
Rotifer			0.277	
Diptera		Organic Matter	0.315	0.039
Ostracod	Phosphate	13.219	-1.168	0.522
	Ca ²⁺		-0.432	
	Hardness		0.457	
Rotifer	Air Temp.	-1305.196	50.758	0.831
	Conductivity		-6.048	
	Transparency		-18.355	
	BOD		-34.027	
	TDS		22.052	
	TS		0.550	
	Ca ²⁺		-5.345	
	Sulphate		3.680	
	Copepod		0.717	

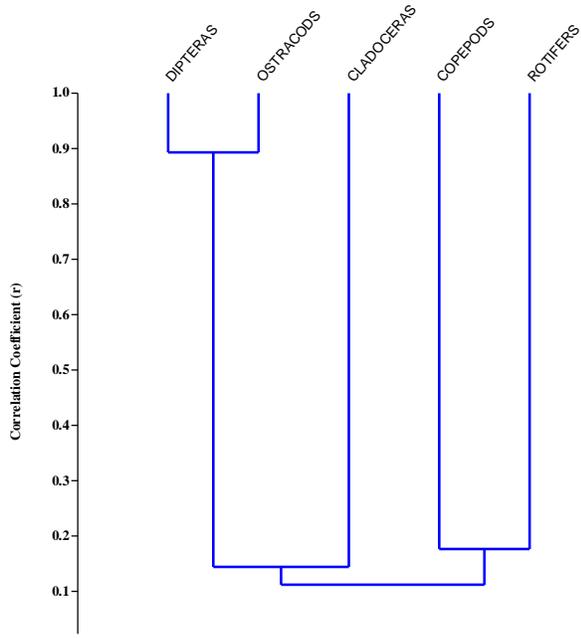


Figure 4.5: Cluster Analysis Showing the Relationship Among the Zooplankton Groups Abundance at Ede-Erinle Reservoir During the Study Period (0.9385).

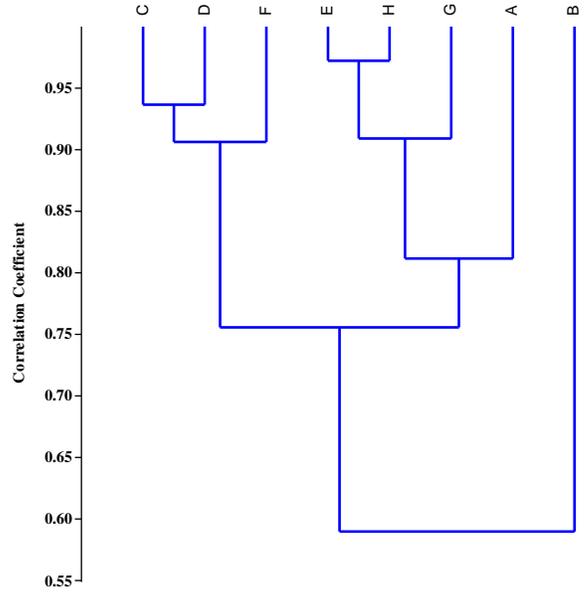


Figure 4.6: Cluster Analysis Showing the Relationship of the Zooplanktons Species Abundance Along the Horizontal Axis of Ede-Erinle Reservoir (R = 0.8537).

IV. DISCUSSION

Influence of Physico-Chemical Characteristics on Zooplankton Diversity and Abundance

Zooplankton assemblages respond rapidly to different water quality conditions, most importantly so to temperature, conductivity, pH, light intensity, and nutrient concentration (Wetzel, 2001). Several authors have noted that it is difficult to designate a single abiotic factor as significantly limiting (Kaartvedt and Svendsen, 1995; Buyukates and Roelke, 2005; Abo-Taleb, 2010). They all, however, concluded that such processes are mainly controlled by a combination of factors acting at different rates throughout the year. Surprisingly, our findings in Ede-Erinle reservoir did not completely agree with this basic assumption. For instance, the current investigation found that most physico-chemical parameters varied both spatially and temporally in tandem with patterns of zooplankton variation. The regression analysis also revealed predictor variables accounting for as much as 65% of the zooplankton's abundance in cladoceras, copepods and rotifers and also that all the predictors significantly affected the abundance of the planktons at ($p < 0.05$).

Rotifers abundance was significantly related to TS, and Ca^{2+} , probably as a result of ionic and nutrient enrichment of the reservoir from the inlet tributaries. TS showing positive relationship could be as a result of rotifers being able to tolerate turbid waters more than other predatory crustaceans that feed on them, thereby leading to increase in rotifer population. BOD_5 showed negative relationship with rotifers and this suggests the amount of organic nutrients dissolved in water. This suggests why some rotifer families have low density or total absence at various times. The dominance of Brachionidae, Lecanidae and Trichocercidae (nutrient loving and unstable environment tolerant rotifer families) in the Ede-Erinle reservoir could also be attributed to this enrichment which could in effect lead to algal bloom. Heiskary and Markus, 2001 established that water bodies with high nutrients exhibited high chlorophyll *a* and high BOD while those with low nutrients exhibited the inverse. These relationships should prove useful for nutrient criteria development, determining the reservoir trophic status and waste load allocations (where excess nutrients and dissolved oxygen are of primary concern). Rotifers are usually considered to be useful indicators of water quality and of trophic status (Whitmana *et al.*, 2004; Baiao and Boavida, 2005). According to many studies (Duggan *et al.*, 2001; Mageed, 2007; Salvador, 2007) the presence of genus *Brachionus* is indicative of moderate to high organic pollution. Also other genera observed during this study (*Keratella* and *Rotaria*) are cosmopolitan, eurythermic freshwater and indicates eutrophic conditions (Tackx *et al.*, 2006; Mageed, 2007). *Trichocerca* are likely to be found in eutrophic environments (Castro *et al.*, 2005).

Rotifer, Cladocera and Copepod abundance all had a positive significant relationship with ambient air temperature, conductivity, transparency and TDS. Atmospheric temperature rises with emergence of sunlight and it easily influences temperature of the upper layer of waterbodies and hence will lead to increase in water temperature (Welch, 1952). Temperature is known to have a direct effect on zooplankton populations by influencing reproductive activity, the rate of moulting and the rate of egg development, (Wetzel, 1975; Hutchinson, 1967).

These activities all increase as the temperature rises. Water transparency is the limit of visibility in the water. Light intensity has been said to be one of the important factors affecting zooplankton distribution and abundance (Aduwo, 2008). High water transparency increases the euphotic zone in an aquatic ecosystem which in turn favours phytoplankton growth and primary productivity. Any factor that enhances the production of phytoplankton is most likely going to enhance the production of zooplankton also, since the latter are nutritionally dependent on the former. The higher the total dissolved solids (TDS), the higher the conductivity. Zooplankton species diversity is also shown to decrease with conductivity (Tavsanoglu *et al.*, 2015).

Copepod and cladocera were still further positively related to pH and bicarbonate. Also, cladocera further showed positive relationship with K^+ , hardness. An increase in pH could lead to corresponding increase in zooplankton occurrence as most of the zooplankton species are alkaline water species as suggested by Akinbuwa (1988; 1999). During the study period, the Ede-Erinle reservoir recorded an overall pH mean range of 6.41 - 7.99 (7.20 ± 0.36) which is slightly alkaline. pH values recommended range for aquatic life as documented by Chapman and Kimstach, 2006 is "6.0 - 9.0" and values outside this range could negatively affect the distribution and abundance of zooplankton in the reservoir.

Copepods and cladoceras are generally considered to have low tolerances to poor water quality (Hoff and Snell 1987). They both relate negatively with turbidity, organic matter, Mg^{2+} and sulphate. The reason for this negative relationship with this mentioned parameters could be due to the fact that they tend to reduce the degree of light penetration which aids primary productivity in the reservoir. Biological productivity in tropical lakes is mainly limited by the introduction of highly turbid waters and wind-induced turbulence during the wet season (Carr and Neary, 2006). This could reduce the phytoplankton food which serves as source of food to zooplanktons. Also, it is suggested that high concentrations of non-nutritional suspended particulate matter may decrease copepod abundances (Bonnet and Frid 2004; Wang *et al.* 2007).

Organic matter favoured the abundance of Diptera. This is evidenced in the diptera species peak abundance coinciding with the peak concentration of organic matter in the early dry season. Organic matter in fresh waters comes from aquatic photosynthetic production and from terrestrial sources such as wash in of dead animals and vegetation, swine and poultry waste (washed into River Erinle and River Awon respectively) from agricultural waste products. These sediment on to the substratum. Diptera larvae make use of the organic matter as food and also for building tubes and hence increase their abundance (Berg, 1995; Chaloner and Wotton, 1996; Pringle, 1985). Similar positive relationship was also documented in the work of Hirabayashi *et al.*, 1999.

Ca^{2+} and hardness were found to be significantly positively related with ostracod while phosphate ion showed inverse relationship. There was also strong relationship between the mentioned parameters and ostracods as documented in the work of Iglukowska and Namiotko, 2012 and Gifre *et al.*, 2002. The total hardness of water is mainly governed by the content of calcium and magnesium largely combined with carbonates and bicarbonate or with other minerals ions. So the more the presence

of calcium in the water, the higher the probability of the water hardness. In freshwater, calcium is often a limiting factor for crustaceans such as ostracods that need it for their carapace formation (Lampert and Sommer, 1997). The importance of calcium availability in controlling and limiting the post-embryonic development of ostracods as individuals, as well as occurrence and diversity of ostracods species and assemblages has been demonstrated in several works (e.g. Mezquita *et al.*, 1999a; Holmes and Chivas, 2002 and Viehberg, 2006). The relationship between phosphate and ostracods abundance is a strong indication that the abundance of the ostracods are largely regulated by the resource base and tend to increase with increasing trophic state of freshwaters (Canfield and Jones, 1996).

In addition, the probable reason as documented by Stark *et al.* (2000) for the direct relationships between some zooplankton groups (rotifer, cladocera and copepod) abundance and various ions (Ca^{2+} , K^{+} and HCO_3^{-}) in addition to conductivity and TDS in the reservoir in spite of the inverse relationship between the mentioned zooplankton groups species with sulphate ion could be the fact that dissolved salts and minerals are necessary components of good quality water as they help maintain the health and vitality of aquatic organisms that rely on this ecosystem service. The direct relationships may also be supported by the fact that the mean values for the ions did not exceed their recommended limits for aquatic life (Chapman and Kimstach, 2006). Changes in the ionic composition of water can exclude some species while promoting the population growth of others (Weber-Scannell and Duffy, 2007). Magnesium, sodium, potassium and calcium concentrations tend to be influenced by metabolic activities of aquatic organisms and can exhibit marked seasonal and spatial dynamics as a result of biological activity. Sulphate and bicarbonate ion can be driven by production and respiration cycles of the aquatic biota (Wetzel, 2001). These ions have also been reported as being responsible for salinity in a body of water. The level of salinity in aquatic systems is important to aquatic plants and animals as species can survive only within certain salinity ranges (Friedl *et al.*, 2004). The significant positive correlations recorded between zooplankton species abundance with Ca^{2+} , K^{+} and HCO_3^{-} in this study are further justified by the fact that these ions were within their preferred ranges for freshwater life. Zooplankton communities respond to a wide variety of disturbances including nutrient loading (Dodson, 1992), and this was evident in the inverse relationships of organic matter, sulphate (both in rotifer, cladocera and copepod) and phosphate (in ostracods) ion with species abundance. Nutrient compounds are expected to stimulate phytoplankton growth and by extension zooplankton growth, but their positive impacts could have been far outweighed by the high concentrations of hydro-physical parameters which are capable of limiting the euphotic zone, hence the inverse relationships between those nutrient compounds and zooplankton species occurrence (Akindele, 2013).

As observed by Akinbuwa (1999) in his previous rotifer study on the reservoir. It is worth mentioning that dissolved oxygen did not show any significant correlation or regression with zooplankton species. The absence of significant relationship of oxygen with the zooplankton species in Ede-Erinle reservoir may

be due to the fairly stable condition of oxygen in the reservoir throughout the study period.

Finally, cladocera and copepod of Ede-Erinle show significant positive relationship between them while rotifer also show similar positive relationship with copepod. Apart from the fact that these zooplankton groups have similar factors (transparency, temperature, pH etc.) affecting their distribution and abundance, another reason for this relationship could be the fact that they all belong to the littoral region of the water, living among the weeds and macrophytes (as a form of shelter from predatory zooplanktivorous fishes) and feeding on phytoplankton algae and similar or rather smaller zooplankton organisms. The cladocera and copepod association could also be primarily due to the frequent upwelling of the reservoir which leads to the mixing of the water and the zooplanktons in it, thereby causing overlap of different zooplankton groups' species (Valentin *et al.*, 1976). This is a more tenable reason as larger zooplankters like the adult cladoceras will normally migrate a bit down the water column in order not to be easily spotted by predatory fishes. More so, sensory acuity of fish decreases with depth as a result of decreased light intensity, producing a refuge for susceptible prey in the deeper layers of lakes (Gliwicz 1986; Lampert 1993). This could be the reason for the overall low cladocera abundance when compared with rotifers and copepods abundance in the Ede-Erinle reservoir. It should also be noted that copepods are more efficient than cladocerans at evading predators due to their ability to perform jumps when attacked (O'Brien 1987). Therefore they may not need to rely so heavily on spatial avoidance.

Rotifers' association with copepods is more likely due to the fact that close to 50% of the copepods observed at Ede-Erinle reservoir are the Nauplius larvae (the copepods developmental stages) which are co herbivores, feeding primarily on phytoplanktons like the rotifers. Generally, the smaller the copepod species and/or the younger its developmental stage, the more important is the algal component in its diet (Adrian and Frost, 1993). However, it is noteworthy that even small species of limnetic copepods (e.g., species of the genera *Tropocyclops* and *Thermocyclops*) prey on rotifers (Brandl, 2005). Practically all of the limnetic rotifer species co-occurring with predatory copepods have been reported as copepod prey. Even predatory rotifers of the genus *Asplanchna* species form prey for some copepod species (Brandl, 2005). Over the years, it has been established that copepods feeding on rotifers positively influences both their survival and reproduction (Adrian (1991); Adrian and Frost (1993); Hansen and Jeppesen (1992); Hansen and Santer (1995) and Brandl, 2005). The ability of copepods to feed on any limnetic rotifers does involve both selection preference for certain prey species: in addition to size limitation and other factors. For example, the vulnerability and consistent selection of soft-bodied rotifers *Synchaeta* and *Polyarthra* species for predation by *Diacyclopsthomasi* was species specific and perhaps related to the slow speed of the escape response (Stemberger and Evans, 1985). This attempts to explain the reason for the low abundances for both rotifer species and high abundance of *Diacyclopsthomasi* (second copepod highest after Nauplius larvae) in the reservoir during the study period. Brandl and Fernando (1981) documented similar inter-relationship of rotifer individuals with *Mesocyclops edax* and *M. leuckarti*

(which are also dominant copepod species of Ede-Erinle reservoir). Thus, the coexistence of rotifer and copepod populations in plankton communities can be said to be the result of their interspecific relationships in which copepods act as important predators.

Although rotifers are able to achieve high reproductive rates to maintain their population and generation survival, the impact of copepod predation on rotifer population density can be high (Brandl, 2005; Plassmann *et al.*, 1997; Couch *et al.*, 1999; Yoshida *et al.*, 2000; Die'guez and Gilbert, 2002) and in some cases responsible for the decline of a rotifer population and seasonal extermination of a species from a community. Predation by copepods may have a significant impact on rotifers often causing seasonal decline of the rotifer populations and replacement of species that are more susceptible to predation by the less susceptible ones (Brandl, 2005).

V. CONCLUSION

The physico-chemical characters and zooplankton fauna shares a lot in common with other Nigerian and tropical waters. The reservoir water can be considered fairly clean and not under serious pollution threat. The reservoir water can be said to be potable and suitable for pisciculture, irrigation and agricultural uses.

ACKNOWLEDGMENT

My uttermost gratitude goes to the Almighty God for His mercy, grace and favour throughout the period of study. I wish to express a deep and invaluable appreciation to Professor I. E. Ofoezie for his mentorship, guidance, advice and contribution towards the success of this research.

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Spatio-Temporal Distribution and Abundance of Zooplankton Fauna of Ede-Erinle Reservoir

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DOI: 10.29322/IJSRP.9.08.2019.p92132

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92132>

Abstract- The study determined the seasonal and spatial variation in the species diversity and abundance of zooplankton fauna in Ede-Erinle reservoir. This was with the view to determining the effects of the physico-chemical characteristics of water on the zooplankton distribution and abundance in the reservoir. A total of 22,628 zooplankters comprising 101 species, 57 genera and five (5) groups (viz. rotifers, cladoceras, copepods, ostracods and dipterans) were collected and identified. The rotifers were the most specious (57 species) while the ostracods were the least (4 species). The copepods were the most abundant (44.8%) while the Dipteran larvae (0.20%) were the least abundant. All the classes of zooplankton occurred in all the stations monitored except the dipteran larvae which were not found in two stations. However, spatial distribution of species varied significantly ($p < 0.05$) within each class. In contrast, all zooplankton classes occurred in the two all seasons, but seasonal species distribution also differed significantly ($p < 0.05$).

Index Terms- Hydrobiology, Aquatic life, Zooplankton, Water quality, Diversity

I. INTRODUCTION

The plankton community is a heterogeneous group of tiny plants (phytoplankton) and animals (Zooplanktons) adapted to float in the sea and freshwaters. Their intrinsic movements are so feeble that they remain essentially at the mercy of water current. The plankton population which occurs in an ecosystem is an indication of the physico-chemical characteristics of the water body (Pradhan *et al.*, 2008). The overall quality of a water body can be determined from the species diversity and abundance of its plankton community. (Ahmad and Singh, 1989; Dhawan and Karu, 2002; Islam and Bhuiyan, 2007; Rahman and Hussain, 2008; Radhakrishnan *et al.*, 2009; Poongodi *et al.*, 2009). Plankton species are ubiquitous in nature, existing in all types of water habitat, no matter their quality, be it in clean freshwater, sea water, and polluted waters like industrial and municipal wastewaters (Jafari *et al.*, 2011).

Zooplanktons are microscopic drifting animal-like organisms found either at or near the surface of water bodies. Ovie (2011) defined zooplankton as the free-floating, aquatic invertebrates, which are microscopic because of their usual small sizes that range from a few to several micrometres, rarely exceeding a

millimetre. Global aquatic ecosystem can be broadly classified using salinity into Freshwater ecosystem and salt water ecosystem, both of which support zooplankton growth. Freshwater ecosystems are inland waters in which reservoirs fall in to and they have low concentration of salts ($< 599\text{mg/L}$). The saltwater ecosystem has high concentration of salt (averaging about 3.5%) (Tideman, 2000). Freshwater habitats can be further divided into two broad groups, the lentic and lotic ecosystems based on the differences in the water residence time and flow velocity (Wetzel, 2001). Freshwater zooplanktons in the tropics comprise predominantly of rotifers, cladoceras, copepods and occasionally the ostracods and insects (Fernando, 2002).

In the hierarchy of the food web, the zooplanktons are the major mode of energy transfer between phytoplanktons and other aquatic animals including fish. They are, thus, the most important biotic components influencing all the functional aspects of all aquatic ecosystems, viz; food chains, food webs, energy flow/transfer and cycling of matter. Generally, they play an important role in fish nutrition, both in aquaculture and capture fisheries. Suresh *et al.* (2011) reported that different environmental factors that determine the characters of water have great importance upon the growth and abundance of zooplankton. Thus, water quality influences zooplankton abundance, clustering and biomass.

Most of the zooplankton species are cosmopolitan in distribution. Many zooplanktons, particularly the Cladocera, exhibit marked diurnal vertical migrations moving away from direct sunlight while the horizontal spatial distribution of zooplankton in lakes is often uneven and patchy (Wetzel, 2001). Pelagic zooplanktons such as cladoceras and copepods also migrate away from littoral areas (avoidance of shore movements) by behavioural swimming responses to angular light distributions. Non-random dispersion of zooplankton is caused by water movements.

The distribution of zooplankton communities depends on many factors, some of which are change of climatic conditions, physico-chemical parameters and vegetation cover. The change in water quality and limnological characteristics from riverine to middle transition and to lacustrine environments create distinct habitats which have bearing on the distribution and abundance of distinct biota inhabiting each zone (Sthapit *et al.*, 2008). For example, calanoida are generally abundant in oligotrophic environments while cyclopoids and cladoceras dominate in eutrophic waters (Margaleff, 1983; Wetzel, 1990). Zooplankton abundances range from less than one individual per litre in most

oligotrophic waters to up to 500 individuals per litre in eutrophic lakes (Goldman and Horne, 1983).

Zooplankton species succession and spatial distribution result from differences in ecological tolerance to various biotic and abiotic environmental parameters (Marneffe *et al.*, 1998). Studies have shown that the zooplankton community is sensitive to extreme variation in flow; thus species composition is changed and the succession of taxa is redirected after flow recession (Tavernini, 2008). This results in different timing for the emergence of rotifers, cladocerans, and copepods from the inundated dry river beds (Jenkins *et al.*, 1980; Boulton, 2003). Therefore, a subdivision of diversity in hierarchical scales in stream ecosystems will result from these factors, which represent the interaction of physical and biological processes. In such water bodies, specific adaptations and strategies are important to cope with the variable and commonly extreme conditions (Seminara *et al.*, 2008), and such mechanisms may lead to the spatial and temporal segregation of the zooplankton fauna.

Rotifers are potentially cosmopolitan because resting eggs are easily transferred by birds, grazing animals and the wind, and rapid parthenogenetic reproduction also makes it possible to colonize a suitable biotope (Lair, 1980; Ruttner-Kolisko, 1974; cited by Kutikova, 2002). According to Egborge (1994), the typical pattern of seasonal distribution of rotifers in Nigeria freshwater bodies is one of abundance and peaking in the dry season and low densities or total absence in the rainy season. The cladoceras are found in all sorts of freshwaters. Lakes and ponds contain much larger number of forms than rivers do. The greater number of species belongs to the littoral region, living among weeds and feeding on algae and similar organisms with a few species living near the mud. Copepoda are found in all types of waters at all latitudes (Alekseev, 2002). Most are littoral while only few are typically limnetic.

Being heterotrophic in nature, they play a key role in cycling of organic materials in an aquatic ecosystem (Gupta and Sharma, 2007). Ostracods are mainly bottom dwellers of lakes and live on detritus and dead phytoplanktons. These organisms are food of fish and benthic macroinvertebrates. They are fundamentally important in the transfer of energy and nutrient cycling in aquatic ecosystems (Stemberger and Lazorchak, 1994). Among crustaceans, cladocerans may be the best indicator for biodiversity assessment in ponds and small lakes because they are easy to identify, play a key role in food webs, and respond to environmental gradients (Jeppesen *et al.*, 2000). Aside their importances in fisheries, some crustacean plankton (cyclopoids) are also ecologically important in suppressing mosquito larvae. They are also known as intermediate hosts in the transmission of many parasites, especially worms. Some pathogenic human bacteria are carried and nurtured by copepods (Alekseev, 2002).

According to Rajagopal *et al.*, (2011) zooplankton plays an integral role and serves as bio-indicator and it is a well-suited tool for understanding water pollution status. Zooplankton play important role in bioremediation of heavy metals and other toxic materials, biomonitoring of water pollution (Tyor *et al.*, 2014) and act as biomarker for water quality assessment for fish production (Pradhan *et al.*, 2008; Purushothama *et al.*, 2011; Hoxmeier and Wahl, 2004). Zooplankton communities are typically diverse, occurring almost in all lakes and ponds and are

highly sensitive to environmental variation. Hence, zooplankton can speak to condition of water body and can be used to assess overall lake health.

In order to properly manage reservoirs or lakes, monitoring of zooplankton communities is needed to predictively model the ecosystem (Deborah and Robert, 2009).

II. RESEARCH ELABORATIONS

The Study Area

Erinle Lake is the largest of all water bodies in Osun State, Nigeria. It has many tributaries of which the major inflow rivers, Awon and Erinle, are the main sources of water. The lake basin which is about 342 km extends in width from Longitude 4° 24' E to 4° 35' E and in length from Latitude 7° 45' N to 7° 58' N. The lake itself is located at Longitude 4° 27' E and 7° 46' N (Fig. 1). The surrounding vegetation has a mixture of savannah, light and thick forest, with scattered cultivations due to various human activities (Akinbuwa, 1999). The substratum of the lake is muddy and sandy with scattered logs of wood. The surface area is about 1.25 km (Akinbuwa, 1999); the highest depth of 7.6m was recorded during the study. The sampling points on the lake are shown in (Figure 2.1).

Selection and Description of Sampling Stations

A reconnaissance survey of Ede-Erinle Reservoir was conducted to identify sampling stations based on important ecological landmarks. Eight sampling sites (Stations A-H) were established along the course of the Reservoir for investigation in this study. Four of the sampling sites (A-D) were established on the reservoir while the remaining four sampling sites (Stations E-H) were established on the two major inflows with Stations E and F located on River Erinle and Stations G and H located on River Awon. A Global positioning system (GPS) handset was used to determine the grid coordinates of the sampling sites.

Sample Collection

Field collection from the sampling stations was conducted four times from September 2014 to June 2015, covering both the dry and rainy seasons. The samplings were conducted in September 2014 (rain season), December 2014 (early dry season), March 2015 (dry season) and June 2015 (early rainy season).

Zooplankton Sampling

Zooplankton distribution and abundance were assessed by straining 30 L of water through a 25 cm diameter zooplankton net with a 45 µm mesh size to a concentrated volume of 30 ml. This was preserved in 4% formalin. Zooplankton species in 3 ml concentrate subsample were identified and counted under the scanning (x40) and low power (x100) magnifications. Identification was done using the descriptive keys of Akinbuwa (1999); Alekseev (2002); Brooks (1959); Edmondson (1959); Cander-Lund and Lund (1995); Durand and Lévêque 1980; Egborge (1994); Korinek (2002); Kutikova (2002); Jeje and Fernando (1982; 1986; 1991); Turner and Da Silva (1992); Victor (2002); Wilson and Yeatman (1959).

Community structure was assessed using the indices of species diversity, Simpson's dominance index (S). Abundance of each species was estimated based by multiplying the number in the final concentrate volume (30 ml for 30 Litres) by 1000 and expressed as Organism per m³ (Org/m³).

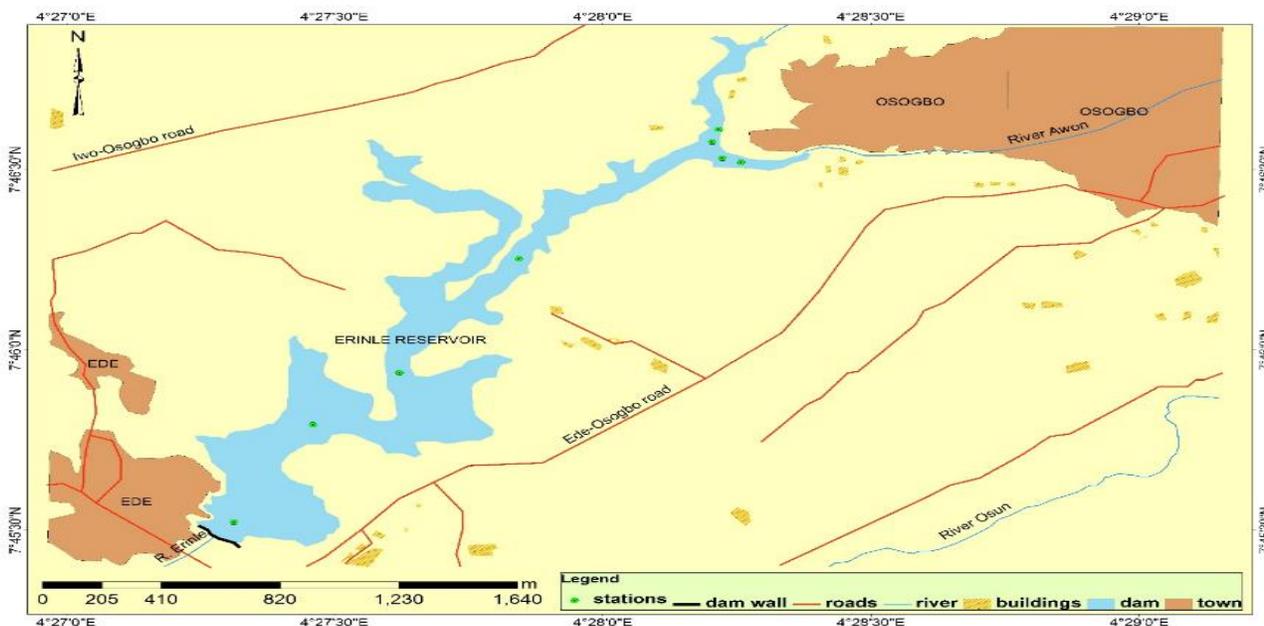


Figure 1: Map of study area showing sampling points

Statistical Analysis of Data

All the data obtained were subjected to appropriate statistical methods using SPSS version 17.0 software. The seasonal and spatial species diversity were analysed using Simpson’s diversity index and Shannon and Weiner diversity index (H).

III. RESULTS

Zooplankton Species Diversity, Distribution and Abundance

A total of 22,628 individuals of zooplankton were recovered from the samples during the study period. These comprised five groups of zooplankton species, namely cladocerans, copepods, dipterans, ostracods and rotifers. Numerically, copepods were the most dominant accounting for 41.69% of the total plankton. The dipterans were numerically, the least important accounting for only 0.20% of the plankton (Table I and Fig. 2). Zooplankton abundance in the reservoir

thus, followed the order Copepoda > Rotifera > Cladocera > Ostracoda > Diptera. The zooplanktons were present throughout the year and peaked in March (dry season) when nearly half of the plankton (49.76% (11259 Individuals)) was collected. A high species relative abundance of 31.33% was also recorded in the month of June (early rain). Abundances were comparatively low during the rainy and early dry season with species relative abundance of 7.33% and 11.58% respectively (Table II).

Using the Simpson’s index of diversity (1 – D), the zooplankton diversity was found to be high both spatially and temporally. The greatest diversity was observed among Cladocera (0.9266) and lowest in Ostracods (0.6653) (Table 4.32). Zooplankton diversity thus, followed the order Cladocera > Rotifera > Diptera > Copepoda > Ostracoda in the reservoir. Nauplii, the developmental stages of Copepoda, were the most common.

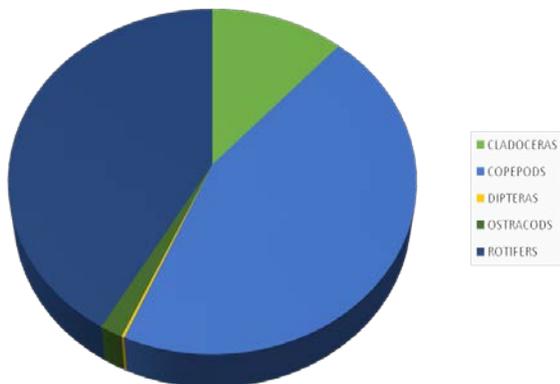


Figure 2: Pie Chart Representation of the Zooplankton Group Abundance

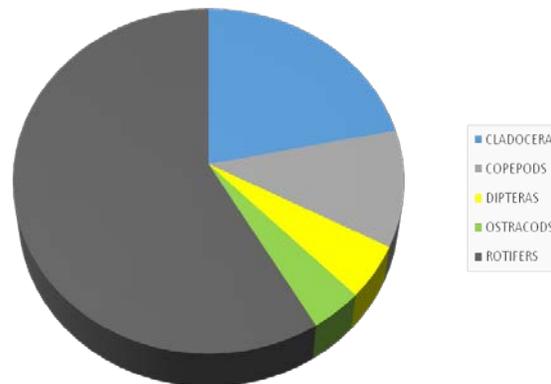


Figure 3: Pie Chart Representation of the Zooplankton Group Richness

Table I: Zooplankton Species Richness, Diversity and Evenness in the Different Zooplankton Groups During the Study Period (September, 2014 – June, 2015).

Indices/Species	Cladoceras	Copepods	Dipteras	Ostracods	Rotifers	Total
Species Richness	22	11	5	4	59	101
Abundance	2632	10142	46	375	9433	22628
Relative Abundance (%)	11.63	44.82	0.20	1.66	41.69	100
Dominance_D ($\Sigma(n/N)^2$)	0.07342	0.2531	0.2316	0.3347	0.09723	
Simpson_1-D	0.9266	0.7469	0.7684	0.6653	0.9028	
Shannon_H	2.841	1.77	1.537	1.144	2.965	
Evenness_e ^{H/S}	0.779	0.5335	0.9302	0.785	0.3287	

Table II: Zooplankton Species Richness, Diversity and Evenness across the Seasons During the Study Period (September, 2014 – June, 2015).

Indices/ Seasons	Rainy Season	Early Dry Season	Dry Season	Early Rain Season
Species Richness	30	60	69	74
Individuals	1659	2620	11259	7090
Relative Abundance (%)	7.33	11.58	49.76	31.33
Dominance_D ($\Sigma(n/N)^2$)	0.1039	0.07896	0.08497	0.09189
Simpson_1-D	0.8961	0.9210	0.9150	0.9081
Shannon_H	2.688	3.154	3.121	3.208
Evenness_e ^{H/s}	0.49	0.3906	0.3284	0.3343

Table III: Zooplankton Species Richness, Diversity and Evenness of the Various Stations Sampled During the Study Period (September, 2014 – June, 2015).

Indices/ Station	Station A	Station B	Station C	Station D	Station E	Station F	Station G	Station H
Species Richness	57	49	60	79	64	66	66	64
Abundance	1524	1329	3676	4030	2655	2962	2835	3617
Relative Abundance (%)	6.74	5.87	16.25	17.81	11.73	13.09	12.53	15.98
Dominance_D ($\Sigma(p/N)^2$)	0.05718	0.06257	0.0917	0.07351	0.1234	0.0611	0.05067	0.1284
Simpson_1-D	0.9428	0.9374	0.9083	0.9265	0.8766	0.9389	0.9493	0.8716
Shannon_H	3.349	3.164	3.006	3.293	2.98	3.336	3.542	3.035
Evenness_e^H/S	0.4995	0.483	0.3367	0.3407	0.3077	0.4257	0.5232	0.3249

Table IV: Spatio-Temporal Variations in Cladoceras Abundance in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015).

Station	Rain		Dry		Overall		T-Test Value	P-Value
	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD		
A	7-47	27±28.28	0-66	33±46.70	0-66	30±31.70	-0.155	0.891
B	0-48	24±33.94	7-40	23.5±23.34	0-48	23.75±23.78	0.020	0.988
C	0-70	35±49.50	0-120	60±84.85	0-120	47.5±58.52	-0.360	0.753
D	3-186	94.5±129.40	7-153	80±103.24	3-186	87.25±95.94	0.120	0.913
E	3-147	75±101.82	3-236	119.5±164.76	3-236	97.25±114.74	-0.330	0.776
F	3-284	143.5±198.70	17-110	63.5±65.76	3-284	103.5±129.36	0.540	0.643
G	3-329	166±230.52	14-161	87.5±103.94	3-329	126.75±152.87	0.440	0.704
H	3-375	189±263.04	0-190	95±134.35	0-375	142±178.958	0.450	0.697
Overall	0-375	94.25±129.90	0-236	70.25±79.67	0-375	82.25±106.70	0.630	0.533
F		0.353		0.259		0.69		
Sig.		0.906		0.954		0.68		

The copepods had the highest abundance among all the zooplanktons with a record value of 10,142 individuals and 44.82% relative abundance during the study period (Table I). The dominant copepods were the nauplii (developmental stages; with approximately 45.13% of the total copepods), *Diacyclops thomasi*, *Megacyclops viridis*, *Metacyclops minutus*, *Mesocyclops edax*, *Thermocyclops ermini*, and *Diatomus* sp. Overall, the number of copepods collected ranged from 50 to 1123 with a mean of 316.94 ± 295.71 Organisms/m³ (Table V). There was no significant difference in the abundance of organism temporally.

The abundance of diptera recorded at Ede-Erinle Reservoir during the study period ranged from 0-7 and the dominant species discovered was the chironomid larvae. The diptera had the least relative abundance 0.20% in Ede-Erinle reservoir during the study period (Table I). Overall, there was no spatial

significant distribution ($p > 0.05$) in the number of dipteras in the reservoir during the study period. Station A and G had significantly the highest number of species among all stations investigated. Conversely, seasonal distribution was significantly different ($p < 0.05$) (Table VI).

As shown in Table VII, the population and abundance of ostracoda was generally low with *Cycloprissubera* (having a 75% occurrence (Table IX) and *Cycloprisserena* being the dominant species. The relative abundance of ostracods during the study period was low (1.66%) (Table I). The study revealed that the highest number was recorded in station F (26 ± 47.45 Organisms/m³) and lowest in station H (5.00 ± 10.00 organisms/m³), although no significant spatial distribution was observed ($p > 0.05$) (Table VII). Temporally, ostracod species were not found in some stations during the rainy season and overall number collected during this season (4.5 ± 9.702 organisms/m³) was significantly lower than number collected during the dry season (18.94 ± 24.365 organisms/m³).

Table V: Spatio-Temporal Variations in Copepod Abundance in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015).

Station	Rain		Dry		Overall		T-Test Value	P-Value
	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD		
A	77-174	125.5±68.59	63-240	151.5±125.16	63-240	138.5±83.76	-0.258	0.893
B	79-140	109.5±43.13	103-257	180±108.89	79-257	144.75±78.93	-0.850	0.484
C	97-512	304.5±293.45	143-539	341±280.01	97-539	322.75±235.13	-0.130	0.910
D	96-693	394.5±422.14	97-737	417±452.55	96-737	405.75±357.54	-0.050	0.964
E	96-697	396.5±424.97	60-597	328.5±379.72	60-697	362.5±331.36	0.170	0.882
F	76-425	250.5±246.78	96-597	346.5±354.26	76-597	298.5±255.35	-0.310	0.783
G	72-636	354±398.81	97-523	310±301.23	72-636	332±289.67	0.130	0.912
H	97-853	475±534.57	50-1123	586.5±758.73	50-1123	530.75±539.71	-0.170	0.881
Overall	72-853	301.25±282.74	50-1123	332.63±316.62	50-1123	316.94±295.71	0.296	0.770
F		0.319		0.242		0.728		
Sig.		0.925		0.961		0.650		

Table VI: Spatio-Temporal Variations in Dipteras Abundance in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015).

Station	Rain		Dry		Overall		T-Test Value	P-Value
	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD		
A	-	-	-	-	-	-	-	-
B	-	-	3-6	4.50±2.12	0-6	2.25±2.87	-3.000	0.095
C	-	-	0-3	1.50±2.12	0-3	0.75±1.50	-1.000	0.423
D	0-3	1.50±2.12	-	-	0-3	0.75±1.50	1.000	0.423
E	0-3	1.50±2.12	0-3	1.50±2.12	0-3	1.50±1.73	-	-
F	0-3	1.50±2.12	0-3	1.50±2.12	0-3	1.50±1.73	-	-
G	-	-	-	-	-	-	-	-
H	0-6	3.00±4.24	6-7	6.50±0.71	0-7	4.75±3.20	-1.151	0.369
Overall	0-6	0.94±1.81	0-7	1.94±2.54	0-7	1.44±2.23	-1.283	0.209
F		0.633		4.846		2.635		
Sig.		0.72		0.021		0.036		

Rotifera had the richest and second most abundant class of the zooplanktons in Ede-Erinle reservoir during the study period. Its relative abundance was 41.69%) (Table I) and the dominant species included *Brachionus dimitiatus*, *Brachionus angularis*, *Brachionus calyciflorus*, *Asplanchna priodonta*, *Anuraeopsis navicula*, *Brachionus budapestinensis*, *Anuraeopsis fissa*, and *Keratella cochlearis*. Spatially, station

B had the lowest number of species while Station C had the highest, but the difference was significant ($p > 0.05$) (Table VIII). However, seasonal distribution was significantly different ($p < 0.05$). The highest mean abundance occurred during the dry season (443.5 ± 451.752 Organisms/m³) and the lowest in the rainy season (145.88 ± 71.054 Organisms/m³).

Table VII: Spatio-Temporal Variations in Ostracodas Abundance in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015).

Station	Rain		Dry		Overall		T-Test Value	P-Value
	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD		
A	-	-	0-40	20±28.28	0-40	10.00±20.00	-1.000	0.423
B	-	-	10-13	11.5±2.12	0-13	5.75±6.75	-7.670	0.017
C	-	-	7-40	23.5±23.34	0-40	11.75±19.12	-1.420	0.290
D	3-23	13±14.14	13-23	18±7.07	3-23	15.5±9.57	-0.450	0.698
E	3-33	18±21.21	0-13	6.5±9.19	0-33	12.25±14.91	0.700	0.555
F	-	-	7-97	52±63.64	0-97	26±47.45	-1.160	0.367
G	0-10	5±7.07	0-20	10±14.14	0-20	7.5±9.57	-0.450	0.698
H	-	-	0-20	10±14.14	0-20	5.00±10.00	-1.000	0.423
Overall	0-33	4.5±9.70	0-97	18.94±24.36	0-97	11.72±19.66	-2.200	0.035
F		0.781		0.471		0.441		
Sig.		0.622		0.832		0.867		

Table VIII: Spatio-Temporal Variations in Rotiferas Abundance in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015).

Station	RAIN		DRY		OVERALL		t-test value	P-value
	Min-Max	Mean±SD	Min-Max	Mean±SD	Min-Max	Mean±SD		
A	73-185	129±79.20	7-542	274.5±378.30	7-542	201.75±238.44	-0.523	0.648
B	93-171	132±55.15	80-279	179.5±140.71	80-279	155.75±91.47	-0.440	0.700
C	73-272	172.5±140.71	237-1563	900±937.62	73-1563	536.25±689.98	1.090	0.391
D	146-218	182±50.91	224-1405	814.5±835.09	146-1405	498.25±605.54	-1.070	0.387
E	56-202	129±103.24	105-398	251.5±207.18	56-398	190.25±151.21	-0.750	0.532
F	34-132	83±69.30	346-732	539±272.94	34-732	311±309.43	-2.290	0.149
G	126-190	158±45.26	308-346	327±26.87	126-346	242.5±102.19	-4.540	0.045
H	110-253	181.5±101.12	7-517	262±360.62	7-517	221.75±221.18	-0.300	0.790
Overall	34-272	145.88±71.05	7-1563	443.5±451.75	7-1563	294.69±352.21	-2.600	0.014
F		0.213		0.606		0.628		
Sig.		0.972		0.739		0.728		

Table IX: Species Composition, Richness, Occurrence and % Frequency of Occurrence of Zooplanktons in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015). (+ = Presence, - = Absence of Zooplanktons)

	Species Composition	A	B	C	D	E	F	G	H	OCCURENCE	% FREQUENCY
CLADOCERAS	<i>Diaphanosoma excisum</i>	+	-	-	+	-	-	+	+	4	50
	<i>Moina micrura</i>	-	-	+	+	+	+	+	+	6	75
	<i>Daphnia magna</i>	-	-	-	+	+	+	+	+	5	62.5
	<i>Diaphanosoma brachyurum</i>	+	+	-	+	+	+	+	+	7	87.5
	<i>Daphnia pulex</i>	+	-	-	-	+	+	+	+	5	62.5
	<i>Daphnia longiremis</i>	+	+	+	-	-	+	-	+	5	62.5
	<i>Daphnia middendorffiana</i>	-	+	+	+	+	+	+	+	7	87.5
	<i>Simocephalus sp</i>	-	-	-	+	-	+	+	+	4	50
	<i>Daphnia longispina</i>	-	-	-	+	+	+	+	+	5	62.5
	<i>Chydorus sphaericus</i>	-	-	-	+	+	+	+	+	5	62.5
	<i>Ceriodaphnia lacustris</i>	-	-	-	-	+	-	+	+	3	37.5
	<i>Bosminia longirostris</i>	+	+	+	+	+	+	+	+	8	100
	<i>Daphnia parvula</i>	-	+	+	+	+	+	+	+	7	87.5
	<i>Diaphanosoma sarsi</i>	+	-	+	+	+	+	+	+	7	87.5
	<i>Simocephalus vetulus</i>	-	+	+	+	+	+	+	+	7	87.5
	<i>Scapholebris mucronata</i>	-	+	+	+	+	+	+	+	7	87.5
	<i>Holopedium gibberum</i>	-	-	-	+	+	+	+	+	5	62.5
	<i>Ceriodaphnia reticulata</i>	-	-	-	+	+	+	+	-	4	50
	<i>Pseudoevadne tergestina</i>	-	-	-	+	+	+	+	+	5	62.5
	<i>Polyphemus pediculus</i>	+	+	+	+	+	+	+	+	8	100
<i>Podon intermedius</i>	-	+	+	-	-	-	-	-	2	25	
<i>Alona affinis</i>	+	-	+	+	-	-	-	-	3	37.5	
COPEPODS	<i>Diaptomus sp</i>	-	+	+	+	+	+	+	+	8	100
	<i>Metacyclops minutus</i>	+	+	+	+	+	+	+	+	8	100
	<i>Eudiaptomus gracilis</i>	+	+	+	+	-	-	+	-	5	62.5
	<i>Thermocyclops consimilis</i>	+	+	+	+	+	+	+	+	8	100
	<i>Mesocyclops leuckarti</i>	-	-	-	+	-	-	+	+	3	37.5
	<i>Nauplius</i>	+	+	+	+	+	+	+	+	8	100
	<i>Diacyclops thomasi</i>	+	+	+	+	+	+	+	+	8	100
	<i>Megacyclops viridis</i>	+	+	+	+	+	+	+	+	8	100
	<i>Thermocyclops ermini</i>	+	+	+	+	+	+	+	+	8	100
	<i>Cyclops scutifer</i>	-	-	+	+	+	+	+	+	6	75
	<i>Mesocyclops edax</i>	+	+	+	+	+	+	+	+	8	100

Table 4.42: Species Composition, Richness, Occurrence and % Frequency of Occurrence of Zooplanktons in Ede-Erinle Reservoir, Osun State, Nigeria (September, 2014 – June, 2015). (+ = Presence, - = Absence of Zooplanktons)

	Species Composition	A	B	C	D	E	F	G	H	OCCURENCE	% FREQUENCY
DIPTERAS	<i>Ceratopogonid sp larva</i>	-	-	-	-	+	+	-	+	3	37.5
	<i>Chironomid sp larva</i>	-	-	-	+	+	-	-	+	3	37.5
	<i>Hesperocorixa obliqua</i>	-	+	-	-	-	+	-	+	3	37.5
	<i>Chaoborus sp larva</i>	-	+	-	-	-	-	-	+	2	25
	<i>Erystalis sp larva</i>	-	+	+	-	-	-	-	-	2	25
OSTRACODS	<i>Cyclocypris pubera</i> O.F. Muller	+	+	+	+	+	+	+	-	7	87.5
	<i>Cyclocypris serena</i> Koch	+	-	-	+	+	+	-	+	5	62.5
	<i>Cyprois occidentalis</i> G.O. Sars	+	-	+	-	-	+	-	-	3	37.5
	<i>Eucypris fuscatus</i>	-	-	-	+	+	-	-	-	2	25
ROTIFERS	<i>Pompholyx complanata</i>	+	+	-	-	-	-	-	-	2	25
	<i>Albertia sp</i>	+	+	-	+	+	-	+	+	6	75
	<i>Trichocerca bicristata</i> Gosse	+	+	+	+	+	+	+	+	8	100
	<i>Brachionus angularis</i> Gosse	+	+	+	+	+	+	+	+	8	100
	<i>Brachionus dimitiatus</i> Bryce	+	+	+	+	+	+	+	+	8	100
	<i>Brachionus calyciflorus</i> Pallas	+	+	+	+	+	+	+	+	8	100
	<i>Keratella cochlearis</i> Gosse	+	+	+	+	+	+	+	+	8	100
	<i>Syncheta tremula oblonga</i> Ruther Kolisko	+	+	+	+	+	+	+	+	8	100
	<i>Brachionus budapestinensis</i>	+	+	+	+	+	+	+	+	8	100
	<i>Brachionus pliticeus</i> Muller	-	+	+	+	-	+	+	-	5	62.5
	<i>Brachionus patulus</i>	+	+	+	+	-	+	+	+	7	87.5
	<i>Argonotholca foliacea</i> Ehrenberg	+	+	+	+	+	+	+	+	8	100
	<i>Rotaria neptunia</i> Ehrenberg	-	-	-	+	+	-	-	-	2	25
	<i>Cephalodella gibba</i> Ehrenberg	-	-	+	-	+	+	-	-	3	37.5
	<i>Brachionus falcatus</i> Zacharias	+	+	+	+	-	-	-	-	4	50
	<i>Notholca labis</i> Gosse	-	-	+	+	-	-	-	-	2	25
	<i>Lecane (monostyla) bulla</i> Gosse	-	-	-	+	+	-	+	+	4	50
	<i>Lecane signifera</i> Jennings	-	-	-	+	-	-	+	+	3	37.5
	<i>Brachionus quadridentatus</i> Hermann	-	-	-	+	-	-	-	-	1	12.5
	<i>Trichocerca tigris</i> O.F. Muller	+	-	-	+	+	-	+	+	5	62.5
	<i>Lecane leotina</i>	+	-	+	+	+	+	+	+	7	87.5
	<i>Eothinia sp</i> Harring & Myers	+	-	+	-	+	+	+	-	5	62.5
	<i>Testudinella berzinsi</i> Gillard	+	+	-	+	-	+	-	-	4	50
	<i>Polyathra vulgaris</i> Carlin	-	-	-	-	-	+	-	-	1	12.5
	<i>Habrotrocha angusticollis</i> Bryce	+	-	+	+	-	+	+	-	5	62.5
	<i>Ptygura sp</i>	-	-	-	-	-	+	-	-	1	12.5
	<i>Trichocerca similis</i> Wierzejski	+	-	-	+	+	-	+	+	5	62.5
	<i>Trichocerca elongata</i>	+	-	+	+	+	+	+	-	6	75
	<i>Trichocerca chattoni</i> DeBeauchamp	+	-	+	+	+	+	+	+	7	87.5
	<i>Ascomorpha ovalis</i> Bergendahl	+	+	+	+	+	+	+	+	8	100
	<i>Trichocerca insulana</i> Hauer	+	-	+	-	+	-	-	-	3	37.5
	<i>Asplanchna priodontal</i> Gosse	+	-	+	+	+	+	+	+	7	87.5
<i>Lepadella cristata</i> Roussellet	+	+	-	-	-	-	-	-	2	25	
<i>Anuraeopsis fissa</i>	+	+	+	+	+	+	+	+	8	100	
<i>Asplanchna brightwelli</i> Gosse	-	-	+	+	+	+	-	+	5	62.5	
<i>Filinia longiseta</i> Ehrenberg	-	-	+	+	+	+	+	+	6	75	

Table 4.42 Contd.: Species Composition, Richness, Occurrence and % Frequency of Occurrence of Zooplanktons in Ede-Erinle Reservoir. (September, 2014 – June, 2015). (+ = Presence, - = Absence of Zooplanktons)

	Species Composition	A	B	C	D	E	F	G	H	OCCURENCE	% FREQUENCY
ROTIFERS	<i>Platylas quadricornis</i>	-	-	+	-	-	-	+	+	3	37.5
	<i>Keratella tropica</i> Apstein	+	-	-	+	-	-	+	+	4	50
	<i>Filinia terminalis</i>	+	+	+	+	+	+	+	+	8	100
	<i>Horaella brehmi</i>	-	+	+	+	-	+	+	+	6	75
	<i>Asplanchna sieboldi</i>	-	+	+	+	+	+	-	+	6	75
	<i>Lepadella patella</i>	-	-	-	-	-	+	-	-	1	12.5
	<i>Synchaeta pectinata</i> Ehrenberg	+	+	+	+	+	-	-	-	5	62.5
	<i>Keratella lenzi lenzi</i> Hauer	+	+	+	+	-	-	+	-	5	62.5
	<i>Anuraeopsis navicula</i> Rousselet	+	+	+	+	-	+	+	-	6	75
	<i>Brachionus caudatus</i> Barrois & Daday	-	-	-	-	+	-	+	-	2	25
	<i>Hexarthra mira</i> Hudson	-	-	-	+	-	-	-	-	1	12.5
	<i>Polyathra dolichoptera</i> Idelson	+	+	+	+	+	-	-	-	5	62.5
	<i>Lecane (monostyla) styra</i> Meyer	+	+	+	+	+	+	-	+	7	87.5
	<i>Lecane (Hemimonostyla) inopinata</i>	+	-	+	+	-	-	+	-	4	50
	<i>Lecane luna</i>	+	-	-	-	-	-	-	-	1	12.5
	<i>Lecane (monostyla) sympoda</i>	+	-	-	-	-	-	-	+	2	25
	<i>Trichocercapusilla</i>	+	-	+	+	-	-	-	+	4	50
	<i>Filinia opoliensis</i>	-	+	-	+	-	-	-	-	2	25
<i>Ploesomahudsoni</i>	-	+	+	+	+	-	-	-	4	50	
	SPECIES RICHNESS	57	49	60	79	64	66	66	64		

IV. DISCUSSION

Although literature is sparse on related studies in our clime, the work of Akinbuwa (1999) on the rotifer fauna and physico-chemical conditions of Erinle Lake and its major inflow at Ede provided suitable baseline information. The study revealed a rotifer fauna of more than 120 species. Nearly 16 years later this study identified a rotifer fauna of 59 species and a total zooplankton species diversity of 101 species. The lower species diversity reported by this study can be explained in several ways. Most important of these is probably the ongoing dredging of the dam which may have destroyed several zooplankton habitats and negatively affected standing crop. In spite of this, the findings of this and the previous study suggest that the lake is very productive and can compare favourably with other highly productive lakes in both tropical and temperate water ecosystems. Most of the species identified in this study were typical tropical assemblages but a few temperate genera like *Synchaeta* and *Notholca* were also recorded. Akinbuwa (1999), Akin-Oriola (2003) and Imoobe and Adeyinka (2010) had earlier reported on similar observations of temperate zooplankton species in tropical waters.

When compared with previous work done by Akinbuwa (1999), only *Anuraeopsis navicula* is a new species addition to the rich rotifer fauna of Ede-Erinle reservoir. In terms of abundance, the copepods dominated the zooplankton community of the reservoir, although this was driven mostly by increased numbers of nauplii (developmental stages). Similar result was documented in the works of Anago *et al.* (2013); Uttah *et al.* (2013); Abowei and George (2011) and Ajuonu *et al.* (2011) amongst others. This was followed closely by rotifers. Egborge (1981) reported that

there was alternation in abundance between crustaceans and rotifers in Lake Asejire resulting in abundance of all zooplankton year round in the Lake. Copepods dominated most aquatic ecosystems because of their resilience and adaptability to changing environmental conditions and ability to withstand varying environmental stresses (Uttah *et al.*, 2013). According to previous workers, the success of the crustaceans could be attributable to their possession of chitinous exoskeleton, which enhances their adaptation to different environmental conditions. Specifically, the copepods are the dominant members of the zooplankton (Uttah *et al.*, 2013). However, this result was in contrast to findings in other Nigerian water bodies which reported dominant rotifers in standing crop (Ayodele and Adeniyi, 2006; Jeje and Fernando, 1986). The families Brachionidae, Trichocercidae and Lecanidae were predominant among the rotifers collected from the reservoir and these have also been documented by Egborge (1981), Egborge and Chigbu (1988), Akinbuwa and Adeniyi (1991) Akinbuwa (1999), Ayodele and Adeniyi (2006). These workers suggest that this could be due to the fact that these families are traditional tropical species. Probably for this reason, they are often regarded as indicator species of high trophic levels (Kutikova, 2002).

The spatial distribution and abundance of zooplankton fauna in the reservoir showed that of decrease from the riverine to the lacustrine regions and peak or maxima in the transition region. This pattern however differed from that described by Akinbuwa (1999) which followed a pattern of increase from the riverine to the lacustrine. The maxima species abundance in the transition zone is in accordance with Wetzel (2001). In essence, the distribution and abundance were patchy and uneven across the horizontal axis. Although the hydrology of the lake was not

investigated, earlier studies had attributed such pattern to tidal regimes, water current, dispersal or flood (Wetzel, 2001; Akinbuwa, 1999).

Temporal distribution and abundance in zooplankton fauna of Ede-Erinle reservoir revealed a fairly stable pattern all through the year with peaks in the dry and early rainy seasons. This is an example of multi-peak pattern of variation and multi succession usually associated with different genera within each zooplankton group. These phenomena had been described by several workers working in different water systems such as Sokoto River (Holden and Green, 1960), Lake Asejire (Egborge, 1981), University of Ibadan Fish Pond (Etta, 1974); Bas-Zaire in Zaire (De Smet, 1989); Ede-Erinle Lake (Akinbuwa, 1999) and Opa Reservoir (Akinbuwa and Adeniyi, 1996). Besides, Akinbuwa (1999) opined that Ede-Erinle reservoir is one of a few inland freshwater bodies in Nigeria with plankton maxima in both the rainy season and dry season.

Zooplankton Species Diversity

During the course of this investigation, a very high species richness, evenness and diversity of the zooplankton was observed. Besides, the Simpson's index of diversity revealed a high spatio-temporal diversity of 0.8716 to 0.9493 (spatial) and 0.8961 to 0.921(temporal). Similar results were obtained by Adedeji *et al.* (2013). The high diversity observed at Ede-Erinle lake was explained by Jørgensen and Johnsen (1989) as an indication of stable physico-chemical conditions, which suggests that the river is not presently under serious pollution threat. This finding is in agreement with the earlier assertion by Akinbuwa (1999) that the reservoir is fairly clean and unpolluted, hence favourable for zooplankton species growth. Among the different zooplankton groups, rotifers showed highest species richness (59) while the ostracods and dipteras had a record low. Spatially, species richness was highest in station D (transition zone) agreeing with the findings of Wetzel (2001) while disagreeing with the earlier findings of Akinbuwa (1999) on rotifers in Ede-Erinle reservoir.

Temporally, the highest species richness was recorded in the early rainy season while the lowest occurred in the rainy season. Akinbuwa (1999) observed a similar trend and attributed it to the effect of inflow tributary rivers rich in zooplankton being washed down the reservoir during the early rainy season. The low species richness observed during the rainy season could be as a result of release of water from the reservoir due to too high water level coupled with the effect of highest turbidity experienced in the reservoir during the rainy season. High turbidity is known to reduce the activities, productivity and development of zooplankton species and have more effect on larger zooplankton groups like the crustaceans made up of cladoceras and copepods (Threlkeld, 1986; Kirk, 1992).

V. CONCLUSION

The high richness of zooplankton fauna of Ede-Erinle reservoir complements the previous biota study on the reservoir by Akinbuwa (1999) to further substantiate the enormous aquatic productivity and high biota diversity of Ede-Erinle Reservoir. The reservoir water can be considered fairly clean and not under serious pollution threat. The reservoir water can be said to be potable and suitable for pisciculture, irrigation and agricultural

uses.

ACKNOWLEDGMENT

My uttermost gratitude goes to the Almighty God for His mercy, grace and favour throughout the period of study. I wish to express a deep and invaluable appreciation to Professor I. E. Ofoezie for his mentorship, guidance, advice and contribution towards the success of this thesis.

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Cloning Phenomena: Appraising Legal and Bioethical Issues in The Islamic Jurisprudence

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DOI: 10.29322/IJSRP.9.08.2019.p92133

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92133>

Abstract- Genetic engineering is certainly new speculative frontier and one of the academic areas that kindle tremendous concern and anxiety among Muslim communities world over. In particular, when in 1997, the first cloned sheep called Dolly was produced in Scotland using mature cells of mammary glands (somatic cell nuclear transfer, SCNT), the idea of cloning became both interesting and hot debate among Muslim jurists. Without prejudice to the contentious issues, this scientific innovation of cloning hold prospect of remedying a number of maladies that afflict our civilization such as Parkinson's disease, diabetes and Alzheimer. But then, some socio-legal and ethical issues need to be addressed as the scientific feat is susceptible to abuse and illegality. So far, the recent announcement of the creation of genetically edited babies (in China) was globally received with shock and uneasiness. The Islamic world is part of the globe and as such, some Islamic scholars, *fuqaha*, and clerics (*ulama*) see the whole issue beyond apocalypse and afar the blasphemous action of scientists and researchers 'playing God'. They got engaged in jurisprudential deliberations that resulted to layers of *fatwa* on the issue. This paper explore the clear and conscience discussions on the topic. The focus is on the legal status of reproductive and therapeutic cloning in the context of the Islamic jurisprudence. The paper seek to find how the orthodox law accommodate, if ever, developments and progresses in medical sciences.

mathematics and intellectual property. It is equally controversial because of its entanglement with politics, theology, ethics, social science and law. The case of *Davis V Davis*¹ is one of the *nobilis* cases in the English law that borders on embryological birth and vitro fertilization without normal pregnancy. Of course, the case in its entirety is not centered on cloning, but it brought to light some legal jurisprudence on procedures similar to cloning technology. The plaintiff in the case sued Junior Davies over control of frozen embryos with the intent to have them transferred to her own uterus in a post-divorce effort to become pregnant. Junior Davis objected to that and the court of appeal and Supreme Court of Tennessee respectively affirmed his constitutionally protected right not to beget a child where no pregnancy had been made. Then came the ruling of the Court of Appeal on Human Fertilization and Embryology Authority in the *milliarium* case of *ProLife Alliance V E. S.*² *Cell Resources*. The court overturned the decision of the lower court by maintaining that the controversial method of cell nuclear replacement (CNR) can be regulated by the government.

This paper explore the *fatwa* literature on this scientific innovation. Citing hypothetical cases, it focus on the clearance of the mists surrounding the complication and complexities of the subject of cloning. The end result is the review of bioethical and jurisprudential aspects of Islamic law.

I. INTRODUCTION

The subject of genetic engineering, including human cloning, is of special concern to Islamic jurisprudence, *fiqh*, because it relates to the institution of family which is a consecrated area in Islam. There are several expressions of declarations, *fatwas* (rulings on a point of Islamic law) and resolutions by a number of Islamic scholars, organisations and independent Islamic bodies regarding the religious stance on the issue. However, this subject-matter of cloning, though new, is conceivably the most dimensional and controversial area in science and technology; dimensional in the sense that it enmesh the extent of science, technology, medicine, medical jurisprudence, legal jurisprudence, physiology, agriculture, horticulture, genetic engineering,

II. MEANING AND APPLICATION OF CLONING

Cloning, *literatim*, is the technique of making an identical copy of something. The very word 'clone', which was derived from the Ancient Greek word '*klōn*', was originally used to mean 'twig', referring to the process whereby a new plant can be created from a twig.³ Originally the spelling of the word is '*clon*' until the twentieth century when the final "e" came into use to indicate the vowel is a long "o" instead of a short "o". The coining of the word in the modern sense was attributed to an American plant

¹ 8 42 S. W. 2d 588, 597 (Tenn. 1992).

² The Guardian, Government wins Human Cloning Court Challenge, < www.theguardian.com/s > @ 11/4/19.

³ Nabavizadeh S. L. et al, Cloning: A Review on Bioethics, Legal, Jurisprudence and Regenerative Issues in Iran, World Journal of Plastic Surgery, < <https://www.ncbi.nlm.nih.gov/articles> > @ 12/4/19.

physiologist, Herbert John Webber.⁴ Scientifically, it refers to asexual replication of organism, a kind of the process of creating an exact copy of a biological unit.⁵ In biology, it is the process of producing similar populations of genetically identical individuals that occurs in nature when organisms such as bacteria, insects or plants reproduce asexually.⁶ The word 'clone' itself denotes to any cell or individual which is identical to another. Thus a copy could be made of someone's DNA and genetic makeup because every single bit of DNA could be identical.

Cloning can happen naturally, as in the case of identical twins. In this case the individuals had developed from one fertilized egg. Again, honey bees propagate by cloning as the queen bee mates once during her life and the eggs propagate in the queen up to thousands of eggs that are further hatched into bees. Another instance is the asexual reproduction of bacteria, plants, fungi and algae. A water hyacinth is capable of multiplying itself into manifold copies. In fact, many trees, shrubs and vines form clonal colonies naturally. The cloning can also be artificial as in the case of Cellular Cloning which involved manipulation procedures that sees a cell being cultured to produce single-celled organisms with the exact genetic content of the original cell. Dolly,⁷ the sheep is an example of artificially cloned mammal. Several clones had been produced in the lab before Dolly, including fogs, mice and cows, which had all been cloned from the DNA from embryos.⁸ Cloning in this case involve replacement of the egg nucleus of an organism with the donor's nucleus. This nucleus contains unique genes of the donor. The procedure involves removing the nucleus of a somatic cell and inserting it

into an enucleated or unfertilized egg cell. Unlike natural reproduction, wherein the egg contains a combination of genetic material, this egg which grows into an embryo contains only the donor's gene.⁹

There are three types of artificial cloning, namely, gene cloning, reproductive cloning and therapeutic cloning.¹⁰ Generally, gene cloning (otherwise called DNA¹¹ cloning) is used to produce copies of genes or segments of DNA,¹² reproductive cloning produces copies of whole animals,¹³ whilst therapeutic cloning produces embryonic stem cells for experiments aimed at creating tissues to replace injured or diseased tissues.¹⁴

III. POTENTIAL USES AND BENEFITS

Cloning technology has the potential of revolutionizing the field of medicine by providing novel treatments for the maladies

⁴ Webber (December 27, 1865-january 18, 1946) was a professor emeritus of sub-tropical horticulture and the author of several publications on horticulture. He was the first director of the University of California Citrus Experiment Station. He was also the third curator of the University of California Citrus Variety Collection

⁵ (Biology Online Dictionary < dictionary <https://www.biology-online.org/dictionary/cloning>> @ 12/4/19.

⁶ *ibid*

⁷ Dolly is the first mammal to be cloned from an adult cell. To produce her, scientists used an udder cell from a six year old Finn Dorset white sheep. They injected the cells into an unfertilized egg cell of a Scottish ewe which had had its nucleus removed, and made the cells fuse by using electrical pulse. Dolly was so named 'Dolly' after a famous countryside singer Dolly Parton because the cells cloned to make her were from a mammary gland cell, and Parton is known for her ample cleavage.

⁸ In the late 2000, scientists cloned 8 species of mammals. In 2003, the first cloned mule was produced by the American scientist. In 2005, the first cloning of a dog called Snoopy was carried out.

⁹ The Legal and Ethical Issues of Cloning that makes it Controversial, ScienceStruck, <<https://sciencestruck.com/ethical-issues-of-cloning>> @ 11/3/19.

¹⁰ Cloning Fact Sheet, National Human Genome Research Institute < <https://www.genome.gov/about-genomics/fact-sheets/Cloning-Fact-Sheet>> @ 11/3/19

¹¹ DNA is short of deoxyribonucleic acid. It is the hereditary material in humans and almost all other organisms, mostly located in the cell nucleus.

¹² The procedure consists of inserting a gene from one organism, often referred to as "foreign DNA," into the genetic material of a carrier called a vector. Examples of vectors include bacteria, yeast cells, viruses or plasmids, which are small DNA circles carried by bacteria. After the gene is inserted, the vector is placed in laboratory conditions that prompt it to multiply, resulting in the gene being copied many times over.

¹³This technique involve the researchers removing a mature somatic cell such as a skin cell, from an animal that they wish to copy. They then transfer the DNA of the donor animal's somatic cell into an egg cell, or oocyte that has had its own DNA-containing nucleus removed. Researchers then add the DNA from the somatic cell to the empty egg in two different ways. In the first method, they remove the DNA-containing nucleus of the somatic cell with a needle and inject it into the empty egg. In the second approach, they use an electrical current to fuse the entire somatic cell with the empty egg.

¹⁴ Therapeutic cloning is achieved by creating embryonic stem-cells in the hopes of treating diseases such as diabetes and Alzheimer's. The process begins by removing the nucleus (containing the DNA) from an egg cell and inserting a nucleus from the adult cell to be cloned.

of Alzheimer's,¹⁵ Parkinson's,¹⁶ Huntington's,¹⁷ Multiple Sclerosis,¹⁸ diabetes,¹⁹ heart diseases,²⁰ infertility, Myocardial Infarction,²¹ series of genetic abnormalities and hereditary ailments.²² Equally, the feat could be used to propagate genes for the creation of human parts. For example it can be used to reproduce the amputated limbs and replicating them to culture and replace the destroyed organs such as liver and heart. Such cloned limbs may have full genetic adaptation with the recipient individual who is the donor of the stem cells. This kind of cell or organ transplantation is within the area of regenerative medicine which is helpful even in the case of bone marrow transplantation. Regenerative medicine also allow autologous transplantation of stem cells, and it help in reducing the risk of organ transplant rejection by the recipient. For instance, in liver diseases, a new liver may be grown using the same genetic material and it then get transplanted after the removal of the damaged one. In the area of agriculture, the technology is expedient in replicating and propagating plants and animals.

IV. CONTEMPORARY LEGAL FRAMEWORK

In the conventional English legal system, there is little presence of legislation in the area of cloning. In fact since the creation of Dolly the sheep there is no Common Law legal framework regarding the regulatory issues and patentability of human cloning. Within the US, the federal laws circumvent the matter and merely focus on research funding. That, perhaps is the reason why in the case of *Missourians Against Human Cloning V Carnahan*²³ the Missouri Stem Cell Research and Cares Institute took the government to court over proposal to amend the Missouri Constitution so that they may legally be allowed to undertake cloning research.

the general position of the law in the US regarding cloning, in the meantime, is therefore prohibition. Most of the countries worldwide also places ban on it. The only legal area that touches much of cloning is patent law. Indeed there are patents for some biological processes such as stem-cell lines,²⁴ but none is available for human cloning. Even Dolly the sheep which enjoyed publicity

as the first mammal cloned from an adult cell was denied being patented by the US Court of Appeal for the Federal Circuit.²⁵ In Europe, despite the existence of the law that established Human Fertilisation and Embryology Authority (which however was drawn up when the technique of cloning that led to the creation of Dolly was not much in use), the Directive on the Legal Protection of Biotechnological Inventions does not allow the patent of human body. Article 5 of the Directive clearly states that the human body and the simple discovery of one of its elements, including the sequence or partial sequence of a gene, will not be subject to a patent. Article 6 further consider human cloning to be an unpatentable invention.

At global level, there is a non-binding 'United Nations Declaration on Human Cloning', passed by UNESCO in March 2005, which states: "Practices which are contrary to human dignity, such as reproductive cloning of human beings, shall not be permitted." Prior to that, there is the International Declaration on Human Genetic Data of 2003 and the International Declaration on the Human Genome and Human Right. The articles of these two declarations prioritized preservation of human dignity in scientific researches. There is also the European Convention on Human Rights and Biomedicine (Strasbourg) which proposed concerns with this scientific phenomenon and the experimentation on human. The UN, therefore, had not yet taken a firm stand on the issue, except that in the deliberation of 2003, member states have attempted voting for total ban on reproductive cloning. At the moment, the legal framework of cloning could be said to be characterized by medical ethics and professional rules of practice all of which are short of legal rules.

V. FRAMEWORK OF ISLAMIC REGULATION

The juridical status of cloning had been subject of various theological *fatwas* which in turn are extrapolated from the sources of Islamic law, namely, Qur'an (revelation, word of Allah), Hadith/Sunna (authenticated traditions on the sayings or actions of the prophet Muhammad, SAW, serving as guidance to humanity), *ijma* (consensus of opinion by the *ulama*), *qiyas* (analogical

¹⁵ Alzheimer's disease is associated with genetic factors which could be cured through embryonic stem cell cloning. Former American president, Ronald Reagan was said to have suffered the disease and that prompted the former first Lady Nancy Reagan to urge the then US president Bush to reconsider his policies banning the therapeutic cloning and embryonic stem-cell research.

¹⁶ Researchers had successfully used cloned cells from mice to treat a mouse model of Parkinson's disease in related animals.

¹⁷ Huntington's disease is an inherited condition in which nerve cells in the brain break down over time.

¹⁸ This is a disease in which the immune system eats away at the protective covering of nerves.

¹⁹ Human cloning has been used to create stem cells which could cure diabetes by triggering insulin production. For the first time, scientists have successfully replaced the damaged DNA of a type 1 diabetes sufferer with the healthy genetic material of an infant donor.

²⁰ Human tissue cloning has the prospect of treating heart diseases.

²¹ This is a blockage of blood flow to the heart muscle.

²² Cloning techniques could be combined with genetic engineering to cure hereditary disease. For example, couples who did not want to pass on a genetic disease could first produce an embryo through in vitro fertilisation. The embryo would then be screened for the genetic abnormality.

²³ WD 66495, WD 66496.

²⁴ See US Patent 8647872.

²⁵ The court ruled that "Dolly's genetic identity to her donor parent renders her patentable."

reasoning), *istihsan* (juristic preference), and *maslaha* (public interest). Islamic legal theory (*usul*) dictate that these sources are the vetting parameters in declaring whether or not an action is permissible, prohibited, obligatory, commendable, discourage or detested.

All the jurists are unanimous in permitting cloning that happen in nature. Numerous vegetables and fruits are genetically designed by Mother Nature to clone by themselves. In addition, for years farmers were known to traditionally clone fruit trees, by cutting a cleft in one tree and inserting a branch from another. This and similar practices are held to be permissible in Islam. A hadith was reported by Musa bn Talha who reported from his father that Allah's messenger happened to pass by the people who had been busy in grafting the trees. Thereupon the prophet said 'if you were not to do it, it might be good for you.' So the people abandoned the practice that season and there was a decline in their yield. Afterwards the Prophet happened to pass by them again, noticing the decline in the yield, he asked 'what has gone wrong with your trees?' They said 'you said so and so.' Thereupon he said 'if there is any use for it, then do it, for it is just a personal opinion of mine, and do not go after my personal opinion. But when I say to you anything on behalf of Allah, then do it, for I do not attribute lie to Allah.' (Emphasis supplied).

But then again, jurists have different verdict when it comes to human cloning, predicating their decisions on numerous reasons that include the question of quality of life of the clone individual. In Islamic philosophy, human beings are made up of matter and spirit. The soul, *ruh*, of individual gets inserted into him during fetal development. There is therefore 'one' soul for every fetus. As a result, a cloned individual will only be having the biological elements of human being. He will be devoid of the soul, *ruh*, which is of spiritual importance.

Yet, considerable number of jurists made a stand of prohibiting cloning on the basis of it being a means of weakening religious beliefs, changing God's creation, violating human dignity, disturbing family life, and bringing heritage and lineage regulations into disarray. Therefore, they hold cloning even for partners living together to be illegitimate. A Saudi Arabian *Salaf* scholar Muhammad ibn Saleh al-Othimin²⁶ was so stern in holding to the prohibition of cloning that he advocate for Islamic penalties to be executed in relation to those who involved themselves in such

scientific procedures. Those that hold unanimity on this

²⁶ Al-Othimin (9th march 1925-10th January 2001) is described as 'a giant within conservative *salaf* Islam.

²⁷ Damad, S. M., Human Cloning from the Viewpoint of Islamic *Fiqh* and Ethics, Asian Bioethics Review, NUS Press Pte Ltd, Vol. 3, Issue 4, December 2011 pp. 342-350

²⁸ Taleb R., A Critique of Islamic Argument on Human Cloning, <[@12/4/19](https://www.scribd.com/document/248894182/A-Critique-of-Islamic-Argument-on-Human-Cloning)>

²⁹ Abdolrahman Abdollah Avazi [1997] *Islamic Approach on Some Contemporary Medical Problems Symposium, volume 2 Cloning, Dar al Beiza*, 512,

ruling of prohibition are institutions that include *Rabiatu al-'Alam al-Islami* (based in Mecca, Saudi Arabia), Muslim World League, Islamic Jurisprudence Council of the Organisation of Islamic Countries, Islamic Medical Association of North America, Islamic Organisation of Medical Sciences, the *Majma' al-Bohus al-Islamiyya* (Conference of Islamic Discussions of the Al-Azhar University in Egypt),²⁷ Academy of Research of Al-Azhar, Islamic Research Council, *Majma Fiqh al-Islam* (Islamic *Fiqh* Academy), *Jamaah Kibar al-Ulama* (Grand Assembly of Scholars in Egypt), European Council for *Fatwa* and Research and Council of Islamic *Fiqh*.²⁸ Furthermore, a seminar held in Morocco in 1997 ended with several recommendations, one of which is calling for the "prohibition of human cloning by the transfer of stem cell of body to the nucleus-free ovule."²⁹ The health Ministers of the Gulf Cooperation Council, while ascribing to this view, have even called cloning as the biggest crime that is irreconcilable with medical ethics.³⁰

A class of jurists placed prohibition on cloning because it is liken to abortion since it is hinged on the procedure of destroying human embryos and fetus to obtain and culture stem-cells. Yet other jurists analogized it to ethnic cleansing, which also is prohibited in Islam. The *ratio* used here is that, human cloning may involve scenario whereby a woman somatic cell's nucleus gets inserted into another woman's de-nucleated egg resulting into predominance of a certain genotype thereby reducing the percentage of another.

Some Islamic scholars, that include Muhammad Rafat Uthman, of the Sharia department of Al-Azhar University, moreover hold the view that cloning is subsumed under Lesbian and gay interactive activities, as such it is palpably prohibited. Reproductive cloning, in particular, has the prospect of helping LBGD community³¹ to have genetically related children without the use of donor eggs or sperm, as the case may be (though sometimes a surrogate would have to carry the clone).

Another structured analogy places cloning on the same level with adultery because it may embroil two marital-unrelated persons of opposite sexes copulating. The scenario may be that of a man's somatic cell's nucleus being inserted into denucleated egg of a woman not wedded to him. On this basis, human cloning was prohibited.

Notwithstanding the preceding juristic arguments, the grand Imam of al-Azhar and former president of al-Azhar University,

³⁰ Health Ministers of Persian Gulf Cooperation Council countries: Human Cloning is a Crime, available at www.emi.ae

³⁰ Abdolrahman Abdollah Avazi [1997] *Islamic Approach on Some Contemporary Medical Problems Symposium, volume 2 Cloning, Dar al Beiza*, 512,

³⁰ Health Ministers of Persian Gulf Cooperation Council countries: Human Cloning is a Crime, available at www.emi.ae

³¹ LGBT is an initialism that stands for lesbian, gay, bisexual and transgender people.

Ahmad at-Tayyib³² hold the view that therapeutic cloning was condoned by the Sharia. As a matter of fact, other prominent scholars, such as Muhammad Sa'id al-Hakim,³³ one of the four grand Ayatollahs of the Hawza of Najaf, are in support of this holding. However, famous Egyptian theologian Yusuf al-Qaradawi,³⁴ took a more critical posture on therapeutic cloning, pleading for allowing only those forms of cloning by which organs can be cultivated "directly" in the guest organisms, without taking a "detour" by way of creating a human clone. Similar arguments are advanced by Shi'ite scholars like Hasan al-Jawahiri from Qom in Iran, who believes that only those forms of cloning should be permissible that do not entail embryo destruction, which, in view of the current state of research in this field, amounts to a complete ban on this technology.

A pivotal point of argument among the jurists is whether cloning technology is posing challenge to the basic tenet in Islam that God is the sole creator of everything. An Egyptian professor of Islamic theology and philosophy, Hiasan al-Sha'fi'i detailed out the philological meaning of the word 'creation' (*khalq*) explaining its theological and linguistic connotations. He elucidated that linguistically speaking, *khalq* has two main denotations. First, it means measuring or determining the proportion of something and then acting accordingly. Second, it means giving a form or shape to a substance already created by God. Creation in either meaning, al-Sha'fi'i argued, can be attributed to God or to creatures. Thus, theologically speaking, creation means bringing something into existence from the state of nonexistence without any external help. The second theological meaning is breathing life and soul into creatures. In these two theological meanings, creation is exclusive to God.³⁵ Sha'fi'i then conclude that the cloning of Dolly cannot be categorized under either of the two theological meanings of creation. This is because it is not the researchers that breathe life or soul into Dolly and its likes.

VI. CLONING AS A CHANGE IN ALLAH'S CREATION

There are numerous verses in the Holy Qur'an that reflect the facts about human creation by God. They include:

³² Al-Tayyib (born on 6th January 1946) is a Grand Imam of al-Azhar and former president of al-Azhar University. He authored *Al-Janib al-naqdi fi falsafat Abi al-Barakat al-Baghdadi*.

³³ Al-Hakim (born 1st February, 1934) is a senior Iraqi Twelver Shi'a *Marja*.

³⁴ Qaradawi (born 9th September 1926) is the chairman of the International Union of Muslim Scholars and is best known for his program *Al-Shari'a wa al-hayah* broadcast on Al Jazeera. He is also one of the founders of IslamOnline, website founded

³⁵ Ghaly, M., Human Cloning through the Eyes of Muslim Scholars: The New Phenomenon of the Islamic International Religioscientific Institutions, ijihadnet.com/wp-content/uploads/Ghaly_cloning_Zygon.pdf @ 12/3/19.

³⁶ *Surat Rum*, Chapter 30:27

³⁷ *Surat Nisaa*, Chapter 4:1

It is He Who begins (the process of) creation; then repeats it; and for Him it is most easy. To Him belongs the loftiest similitude (we can think of) in the heavens and the earth: For He is Exalted in Might, full of wisdom.³⁶

O Mankind! Reverence your Guardian-Lord, who created you from a single person, created, of like nature, his mates, and from them twain scattered (like seeds) countless men and women; reverence God, through Whom ye demand your mutual (rights), and (reverence) the wombs (that bore you): for God ever watches over you.³⁷

The verses above imparts that Allah had ordain human being to live in harmony with nature, and as such, since human cloning is inconsistent with the pattern of creating things in pair as is mentioned in the Qur'an, then it stand as being prohibited. In fact, generally, cloning is seeing by considerable number of jurists as an affront to the Islamic belief that only Allah is the Creator of life and its various forms and that human beings cannot act as "God". The technology and the procedure involved has therefore attracted condemnation as the works of evil. The proponents of this position includes Syrian professor Wahba al-Zuhaili³⁸ and Dr. Nasr Farid Wasil, the former Mufti of Egypt.³⁹ This is on the basis of the following Qur'an verses where the devil vow to seduce people into changing Allah's creation:

God did curse him, but he said: 'I will take of Thy servants a portion marked off; I will mislead them, and I will Create in them false desires; I will Order them to slit the ears of cattle, And to deface the fair nature created By God. Whoever, forsaking God, takes Satan for a friend, hath of a surety suffered a loss that is manifest.'⁴⁰

A Lebanese Shi'ite cleric, Hussein Fadlallah,⁴¹ however had argued that the above verse do not apply in cloning issue, since cloning does not constitute a change in creation, but rather the

³⁸ Al-Zuhaili (1932-2015) was a Syrian professor and Islamic scholar specializing in Islamic law and legal philosophy. He authored over one hundred and sixty books among which are *Athar al-Harb fi al-Fiqh al-islami: Dirasa Muqarin*, *Al-Fiqh al-islami wa Adilataha*, *Usul al-Fiqh al-islami*, *Al-Fiqh al-Shafi'i al-Muyasir*, *Al-Fiqh al-islami ala Madhhaba al-Maliki*, *Al-Alaqaq al-Dawali fi al-islam*, *Al-Huquq al-insan fi al-Fiqh al-islami bi al-ishtirak ma al-Akhireen*, *Al-islam Din Shura wa Dimuqratiyah* and *Haqq al-Huriyah fi al-Alam*.

³⁹ He authored *Nazariyat al-da wa wa-al-itbath fi al-fiqh al-islami* and *Al-Wilayat al-Khassah: Al-wilayah ala al-nafs wa-al-mal fi al-shariah al-islamiyah*

⁴⁰ *Surat Nisaa*, Chapter 4:118-119

⁴¹ Grand Ayatollah Hussein Fadlallah (16th November 1935- 4th July 2010) was a prominent but controversial Lebanese Shi'ite cleric

discovery of new forms of reproduction within creation.⁴² He then maintain an argument that cloning is not ‘*creation*’ but ‘*manipulation*’ and that there is distinction between the two doings. He further explain that contrary to the thinking of people that scientists and technologists create or invent things, they only or merely discover or develop things from the elements or compounds that are already created by Almighty Allah. Allah originates creation, while scientists discover or explore His creation. Whatever human invents, develops, discovers or creates are already in the knowledge of Almighty Allah. In fact, human gets the knowledge of all things from Allah. He then makes reference to the verses of the Qur’an that says
See thy not how God originates creation, then
Repeats it: Truly that is easy for God.
Say: ‘Travel through the earth and see
how God did originate creation; so will
God produce a later creation: for God has
power over all things.’⁴³

For the jurists that consider cloning as an act of interference in Allah’s will, it is a forbidden act that warrants punishment if done. Others however, consider it only as detestable for being a form of corruption on earth and an evil act.

VII. CLONING WITHIN THE MARRIAGE INSTITUTION

Human cloning may be done within the wedlock particularly where the couple wants to avoid the risk of having children with a genetic diseases such as *Tay-Sachs* disease,⁴⁴ *Spina bifida*⁴⁵ and Down’s syndrome.⁴⁶ Cloning technology may also be resorted to where a wife has fertility problem such as where she is unable to produce effective ovum, or she has no uterus (or the uterus is affected with cancer or any other disease), or she is unwilling to use the uterus for whatever reason. In case of the absence of ovum, she can use the ovum of another woman to fuse it with the DNA of her husband and the resulting embryo can be gestated by the wife. Similarly, the wife can donate only egg which is then enucleated with the DNA of her husband. Then the fertilized egg may be implanted into a surrogate mother who may carry it up to delivery.

Under Islamic law, procreation takes place within the legitimate framework of marriage. In this regards, some jurists that include professor Wahba az-Zuhaili consider cloning as a negation of the context of marriage. In support of this, Sheikh al-Azhar Muhammad Sayyid at-Tantawi⁴⁷ condemned it as being a tool that

seeks to disrupt the institution of marriage and the family unit. He clarified that “All forms by which a human is created from nothing and outside of the context of marriage are forbidden in the Sharia.”

Concerning what the religious scholars called traditional (reproductive) cloning, the overwhelming majority agreed that it is forbidden in Islam. The different stages of a baby born to married couples are detailed in the Qur’an. A Moroccan Islamic scholar, Abu Hassan Ash-Sha’dhili⁴⁸ quoted these verses: “So let man see from what he is created! He is created from a water gushing forth. Proceeding from between the back-bone and the ribs” (86:5–7). He considered this passage to be a clear statement that the human being is composed of both the man’s sperm (back-bone) and the woman’s egg (ribs). Therefore any procedure that may not involve male sperm is forbidden in Islam. In line with this, the jurists further maintained the prohibition of cloning upon the reason that it obscure the *nasab* (paternal lineage) of the cloned person. More often than not, the mixture of the DNA of the donors is shrouded with uncertainty and lack of clarity.

VIII. ESTABLISHMENT OF PATERNITY, MATERNITY AND SIBLING RELATIONSHIP

Cloning is bound to complicate family relationship because it raises questions about paternity, lineage, inheritance, guardianship, fosterage and marriage prohibition. Family Law and Law of Succession are fundamental subjects in Islamic jurisprudence. Also it is on records that the classical jurists had taken family issues seriously to the extent that they hold that anything that causes upheavals to the very formation of family relationship stand as being prohibited.

There is bound to be a dilemma in determining the relationship of a husband that donates his DNA in cloning a child and the cloned child. Is the relationship parental or that of sibling (more of biological twin)?⁴⁹ And if the individual is cloned from his grandparents and not his parents, is the relationship parental or that of sibling? It needs to be understood that in reality a cloned person does not have a father (because it is not from the male sperm) and a mother (because it is not by composition of gamete and it is possibly grown in the uterus which is not of his mother but the surrogate mother) and a sister and a brother and a relative. The novelty of cloning is that it does not need male sperm, it just require cells. So it is possible to find a situation where the donor of the womb, the egg and the DNA is a woman. The clone person in such case may be an absurd personality with no relativity. In such situation, to get a legal aspect into the matter, some jurists

⁴² (Muslim Religious Scholars on Cloning Useful Technology or the Work of the Devil? <https://en.qantara.de/content/muslim-religious-scholars-on-cloning-useful-technology-or-the-work-of-the-devil>)

⁴³ *Surat Ankabut* Chapter 29:19-20.

⁴⁴ Tay-Sachs disease is a rare hereditary disorder that destroys nerve cells in the brain and spinal cord.

⁴⁵ This is a birth defect in which a developing baby’s spinal cord fails to develop properly.

⁴⁶ Down syndrome is genetic chromosome 21 disorder causing developmental and intellectual delays.

⁴⁷ Tantawi (28th October 1928-10th march 2010) was an influential Islamic scholar in Egypt and had served as the Grand Mufti in 1996.

⁴⁸ He is of Maliki School of jurisprudence.

⁴⁹ Moeinifar M. and Ardebeli F. A., Lineage and the Rights of Cloned Child in the Islamic Jurisprudence, journal of Reproduction and Fertility, Vol. 13 (4) Oct-Dec. 2012, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3719344/>,

maintained that if the cloning procedure was made with the consent of the husband, then the principle of *walad lil firash* ('the son belongs to the bridal bed) will apply on the basis of *Maslaha* in order to legitimize the cloned personality. Shi'ite scholars that include Ayatollah Makarem Shirazi⁵⁰ and Abolghasem Georgia ascribed to this view.⁵¹ This view did not hold for majority of the sunning jurists.

Loss of kinship and lineage is therefore highly probable for cloned personalities. But then in Islamic law, lineage is one of the most basic human rights that entitled an individual to inherit (from his family and also be inherited). Understandably any biomedical science or technology that seek to annihilate this God's given right is deemed to be illegal and hence, prohibited. Again, in the area of *qasas* (a Doctrine of Equal Retaliation in Islamic criminal law that provides for a punishment analogous to the crime), a cloned individual may not have relations to contribute towards payment of *diyyah* (financial compensation paid to the heirs of a victim in the case of murder) enforced to him.

IX. CLONING AS DEHUMANIZATION ACT

Cloning technology creates a new form of humans with no speck of uniqueness and individuality because the cloned personalities are merely being manufactured and hand-made not born naturally. It follows therefore that the worthiness and honour of human identity is not with a cloned person. This, in itself bears a strong psychological problem in him and placed him in inferior position with the rest of humanity. Such personality defy definition and position in the society. On the basis of this, some jurists prohibited it, citing the verse of the Qur'an where Allah had said that He dignified human race. Says He, "We have honoured the sons of Adam...and conferred on them special favours, above a great part of Our creation."⁵²

Though the concept of human dignity and human right don't play much of a role in the discussion of cloning, the former Mufti of Tunisia, Muhammad Mukhtar as-Salami, had place emphasis on them while reviewing the procedure. His argument that the technology represent an encroachment on basic human dignity had found the acceptance of the Abd al-Muhsin al-Turki, the Secretary-General of the Muslim World League, Professor Ali Khalifa (of Ain Shams University). Khalifa emphasized that it is a threat to one's human personality, human dignity and honour, while al-Turkey even call the technology heretical.

Some jurists work upon the speculation that cloned humans are likely to be created for the sole purpose of providing organ donations to naturally born humans, despite the fact that they are

fully sentient and self-aware. In such situation, humans would be created for their commodity and utility value. They even be 'manufactured' for erotic purpose or for military drive. All these and similar purposes defeated the purpose of human creation, and as such, the jurists maintained the stand of prohibition.

X. CONCLUSION

Discussions on cloning are complex and controversial even in the conventional English legal systems. The Islamic jurisprudence is likewise not straight-forward on the issue, perhaps because it is a recent development relatively unknown in the early period of Islam. Islamic law, however, (in addition to the Qur'an and Sunnah) is (further) equipped with legal elements of *ijma*, *ijtihad*, *qiyas*, *ih-tisan* and *maslaha* that always propel the law to move with human progressions and developments. Islamic law is therefore bound to move in tandem with scientific feat in this area of genetic engineering and cloning. To arrive at a better Islamic perspective on the issue, the concepts of *ijtihad* and *maslaha* should particularly be exploited wholesomely by, not only religious theologians, but also Muslim experts in the areas of law, genetics, embryology and medicines.

The efforts of some Islamic/scientific institutions that include Organisation of Islamic Conference (OIC), Islamic Educational, Scientific and Cultural Organisation (ISESCO), Islamic Organisation of Medical Sciences (IOMS), Islamic Fiqh Academy (IFA), International Islamic Fiqh Academy and Al-Hiyan Institute for the Scientific and Medical Researches is commendable, especially in seeing to the successes of the Casablanca and Jeddah Conferences sometimes in 1997 over the issue. Equally creditable is the scholarly efforts of the likes of Sa'id bn Mansur of the Faculty of Shari'a and Law of the University of Sanaa, Yemen. University in reviewing the opinions of Muslim scholars on the topic in his two-volume work titled *Al-Mawsu'a al-fiqhiyya li al-ajinna wa al-istinsa kh al-bashari* (Juristic Encyclopedia on Embryos and Human Cloning). These experts must delve into discussion of this area of knowledge with passion, interest and enthusiasm.

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⁵⁰ Shirazi (born 25th 1927) is an Iranian scholar a billionaire mullah.

⁵¹ *ibid*

⁵² Surat Banu Isra'il, Chapter 17: 70.

The Effect of Leadership and Organizational Culture on Employees Performance at Pt. Pertamina EP Limau Field

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DOI: 10.29322/IJSRP.9.08.2019.p92134

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92134>

Abstract- This study aims to determine the effect of Leadership and Organizational Culture on employee performance at PT. Pertamina EP Limau Field. The population in this study were all employees of PT. Pertamina EP Limau Field as many as 115 employees. The method of collecting samples in this study using the census (saturated sample) method. The results showed that Leadership and Organizational Culture had a positive and significant influence on the performance of PT. Pertamina EP Limau Field and Organizational Culture have the most dominant influence on the performance of employees of PT. Pertamina EP Limau Field. For further research it is recommended to add other variables that affect employee performance such as motivation, compensation, skills, competence, motivation, commitment, facilities and infrastructure, stress levels and work environment.

Index Terms- Leadership, Organizational Culture and Employee Performance

I. INTRODUCTION

Human resources are a central factor in the management of an organization. Human resources in organizations are required to have good performance because it will determine the successful of an organization. According to Armstrong and Baron in (Sedarmayanti, 2011: 202) performance is a means to get better results from organizations, teams, and individuals by understanding and managing performance within the framework of objectives and standards, and agreed upon attribute requirements.

PT. Pertamina EP is a subsidiary of PT. Pertamina Persero, as national oil and gas company conducts business in the upstream oil and gas sector which includes exploration and exploitation activities. Limau Field which is part of the working area of Pertamina EP operates in the South Sumatra province including Prabumulih City, Muara Enin and Lahat Regencies. As a company engaged in the exploitation and production of oil and gas, the main performance of the Limau Field organization is certainly very closely related to the volume of achievement of oil and gas production over a period of years.

The achievement of targets for oil production in 2017 and 2018 still did not meet the targets set by the company, while the achievement of gas production in 2017 was quite good, which is 195.9% above the target, but in 2018 gas production did not meet the target, which is only 96.2%. In the other side the achievement

of employee performance in Limau Field in 2017 and 2018 had relatively little change where those who get less ratings are more dominant than those who get good ratings.

The manager as the highest leader in the field plays an important role in mobilizing all available resources in the company so that the target at Limau Field can be achieved. Managers also give instructions to their subordinates to complete findings at work. In 2017 the tasks given by Limau Field manager were 567 assignments with the percentage of completion completed on time about 91.7%. In 2018 the number of assignments given was fewer, 258 assignments but the percentage of completion of timely assignments dropped to 48.1%.

Organizational culture in PT. Pertamina EP is guided by 6C values, namely: Clean, Competitive, Confident, Customer Focused, Customer Focus, Commercial, Capable. Other cultures launched by the company to improve employee performance in achieving organizational goals are a culture of innovation and knowledge sharing from employees

In 2017 the number of innovations carried out was 12 innovations while the target set by the company was 18 innovations or only reached 67%. In 2018 there was increasing in the number of employee innovations, about 14 innovations while the set targets were still the same as the previous year which was 18 innovations or achieving 78%. Number of employee innovations in 2017 and 2018 despite an increase but still not able to meet the set targets.

Based on the background of the problem described above, the research problem formulation is obtained, how the effects of leadership and organizational culture on the employees performance at PT Pertamina EP Limau Field.

Research Purposes

1. To know whether leadership influences the employees performance at PT. Pertamina EP Limau Field.
2. To know whether organizational culture influences the employees performance at PT. Pertamina EP Limau Field.
3. To know which variables of leadership and organizational culture have a dominant influence on employees performance at PT. Pertamina EP Limau Field.

II. LITERATURE REVIEW

Leadership

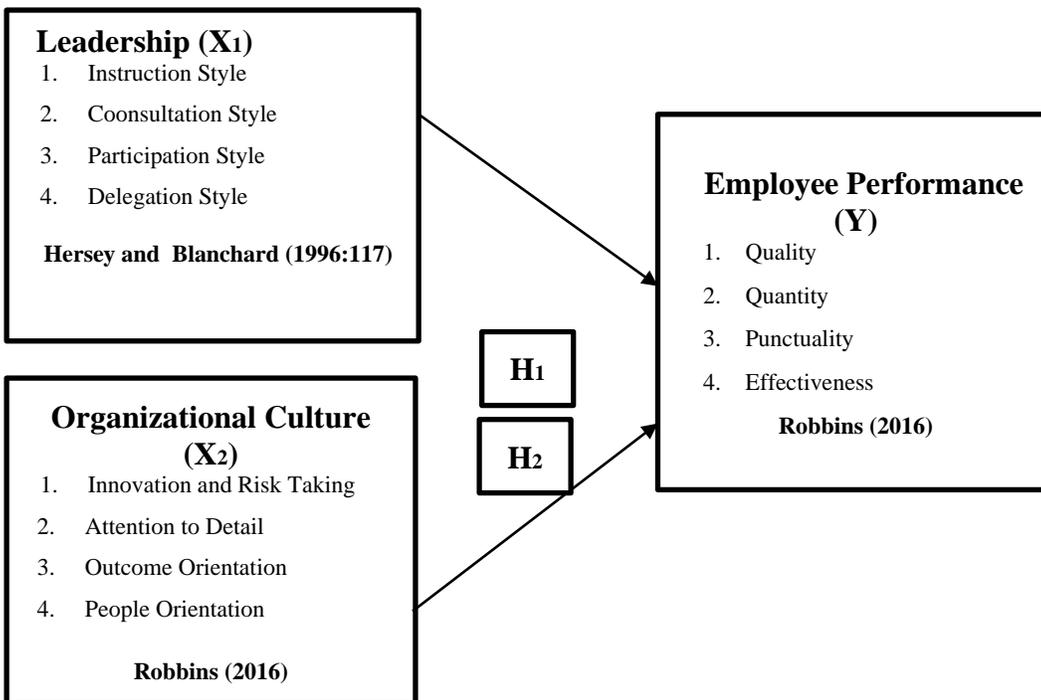
Leadership is the most important factor in an organization. According to Achmad Sanusi and M. Sobry Sutikno (2014: 15), leadership is the ability to influence and mobilize other people to achieve goals. Hersey and Blanchard (2014: 27), focused on the characteristics of subordinate maturity as the key point of the situation that determines the effectiveness of a leader's behavior. According to them, subordinates have different levels of readiness and maturity so that leaders must be able to adjust their leadership style, to fit the situation of readiness and maturity of subordinates.

Organizational Culture

According to Robbins and Judge (2013: 512) organizational culture refers to a shared guided system of organization members that distinguish the organization from other organizations. This system, if observed more closely, is a set of main characteristics that are respected by the organization. The dimensions of organizational culture according to Robbins (2016) are Innovation and Risk Taking, Attention to Detail, Outcome Orientation, People Orientation, Team Orientation, Aggressiveness and stability.

Employee performance

Conceptual Framework



Research Hypothesis

The hypothesis proposed in this study are :

- H1 : Leadership has a positive and significant effect on Employee Performance at PT. Pertamina EP Limau Field
- H2 : Organizational Culture has a positive and significant effect on Employee Performance at PT. Pertamina EP Limau Field
- H3 : Organizational Culture has the most dominant influence on Employee Performance at PT. Pertamina EP Limau Field

Performance is a work ability or work performance that is shown by an employee to obtain optimal work results. Performance is also an accumulation of three interrelated elements, namely skills, efforts, and characteristics of external circumstances. The basic skills that a person brings to work can be in the form of knowledge, abilities, interpersonal skills and technical skills (Fatah, 2012: 127).

Several factors that influence employee performance are stated by Armstrong and Baron (1998: 15) :

1. Personal factor, indicated by the level of skill, competence possessed, motivation and individual commitment.
2. Leadership factor, indicated by the quality of encouragement, guidance and support made by managers and team leaders.
3. Team factors, indicated by the quality of support provided by co-workers.
4. System factor, indicated by the work system, facilities and infrastructure provided by the organization, compensation and organizational processes and performance culture in the organization.
5. *Contextual/situational factor*, indicated by the level of pressure and changes in the internal and external work environment.

Research Methods

Data Source

The data sources used in this study are primary data. Primary data is data obtained directly from observation and the results of questionnaires given to respondents (Sekaran, 2013). Primary data is collected by researchers when conducting research by distributing questionnaires.

Research Population and Samples

The population in this study were all employees of PT. Pertamina EP Limau Field totally 115 employees. The sample used in this study is to use the census method which means that all study populations are used in this study.

III. RESULTS AND DISCUSSION

Validity Test Results

Based on the results of the study it is known that each indicator (item) on each leadership, organizational culture (independent variable) and employee performance (dependent variable) has the result of Product Moment Pearson's with a significance value of 0.006; 0.011; 0,007; 0,000 <0,05, so that the indicators (items) used in this research variable can be declared appropriate or relevant and can be used as items in data collection.

Reliability Test Result

Table 1. Reliability Test Result

Variabel	Cronbach's Alpha	Cutt Off	N of Item	Information
Leadership (X1)	0,728	> 0,60	10	Reliabel
Organizational Culture (X2)	0,720	> 0,60	10	Reliabel
Employee Performance (Y)	0,702	> 0,60	10	Reliabel

Data Source : Processed from Questionnaire, 2019

Based on the results of the instrument variable reliability test in Table 1 above, the results show that independent variables of leadership (X1) and organizational culture (X2) indicate that the data obtained is reliable because the value of Cronbach's Alpha is 0.728, 0.720, while dependent variable of employee performance (Y) shows that the data obtained is also reliable because the value of Cronbach's Alpha is 0.702

Normality Test Result

Table 2. Normality Test Result

Test of Normality	Kolmogrov-Smirnov		
	Sig.	Cutt Off	Information
Leadership (X1)	0,112 >	0,05	Normal
Organizational Culture (X2)	0,124 >	0,05	Normal
Employee Perfomance (Y)	0,137 >	0,05	Normal

Data Source : Processed from Questionnaire, 2019

Based on the results of Table 2 above, it can be seen that the probability value or significance for each variable is greater than 0.05, so that it can be stated that the data in this study are normally distributed.

Multicollinearity Test Result

Table 3. Multicollinearity Test Result

Test of Multicollinearity	VIF	Cutt Off	Information
Leadership (X1)	1.230 <	10	No multicollinearity indicated

Organizational Culture (X2) 1.230 < 10 No multicollinearity indicated

Data Source : Processed from Questionnaire, 2019

Based on the results of Table 3 above, it shows that there is no multicollinearity between independent variables because it shows a VIF value that less than 10.

Heteroscedasticity Test Result

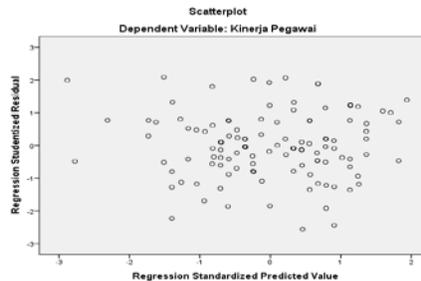


Figure 2
Heteroscedasticity Test Result

Based on Figure 2 above, it shows that there is no heteroscedasticity, because the spread of data forms a certain line or there is no clear pattern, and the points spread above and below the zero on the Y axis.

Multiple Linear Regression Analysis

Table 4. Multiple Linear Regression Result

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	23.637	3.690		6,406	0,000
Leadership	0,198	0,077	0,250	2,577	0,011
Organizational Culture	0,201	0,100	0,195	2,012	0,047

Data Source : Processed from Questionnaire, 2019

Based on the results of Table 4, the results of multiple linear regression analysis can be expressed by the following equation :

$$Y = a + b_1X_1 + b_2X_2 + e$$

$$Y = 23.632 + 0,198X_1 + 0,201X_2 + e$$

The above linear regression equation can be explained as follows :

1. The constant value of 23,632 indicates that if there is no leadership and organizational culture variable then the employee's performance is 23,632.
2. The regression coefficient of the leadership variable of 0.198 shows that if the leadership variable is increases one unit, the employee's performance will increase by 0.198.
3. The regression coefficient of the organizational culture variable of 0.201 shows that if the organizational culture variable is increases one unit, the employee's performance will increase by 0.201.

Model Feasibility Test Results (Test F)

The feasibility test of the model or more popularly referred to as the F test in this study was conducted to identify a feasible or improper regression equation model used to explain the effect of independent variables on the dependent variable. Based on the results of testing and processing data, the test results are obtained as follows :

Table 5. Model Feasibility Test Results (F Test)

Model	ANNOVA ^b				
	Sum of Squares	Df	Mean Square	F	Sig.

1	Regression	343.269	2	171.632	9.323	.000^a
	Residual	2061.901	112	18.410		
	Total	2405.165	114			

Data Source : Processed from Questionnaire, 2019

Based on the results in Table 5 above, a significance value of 0,000 is obtained. Because the significance value is $0,000 < 0,05$, it can be concluded that the linear regression model obtained is feasible used to explain the influence of leadership and organizational culture on employee performance.

Correlation Coefficient (r) and Determination Coefficient (R²) Test Results

The strength of the relationship and the magnitude of the influence between the independent variable and the dependent variable can be seen in the following table:

Table 6. Correlation Coefficient (r) and Determination Coefficient (R²) Test Results Model Summary^b

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	0,378	0,143	0,127		1.348

Data Source : Processed from Questionnaire, 2019

Based on Table 6, it can be seen that the value of the correlation coefficient (r) between the independent variables and the dependent variable is 0.378 or 37.8%. This shows that the correlation or relationship between independent variables and the dependent variable is weak (in the range of 0.20-0.39).

The coefficient of determination (R²) of 0.143 shows that the independent variables namely leadership (X1) and organizational culture (X2) can explain the dependent variable, which is employee performance (Y) of 14.3%, while the remaining 85.7% is explained by other factors not included in this study such as motivation, compensation, skills, competence, motivation, commitment, facilities and infrastructure, stress level and work environment (Armstrong and Baron, 1998: 15).

Significance (t) Test Results (Partial)

Significance test (t test) aims to find out how far the influence of independent variables individually on the dependent variable. This study has a significance of 5% or $\alpha = 0.05$. The results of the t test can be seen in Table 4.7 as follows.

Table 7. Significance (t) Test Results (Partial)

Coefficients						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1						
	Constant	23.637	3.690		6,406	0,000
	Leadership	0,198	0,077	0,250	2.577	0,011
	Organizational Culture	0,201	0,100	0,195	2.012	0,047

Data Source : Processed from Questionnaire, 2019

Based on the data in Table 7, the value of Degree of Freedom (df) = $n - k = 115 - 3 = 102$ and 0.05, the t table value for this research data obtained is 1.98350. The results of the analysis can be explained as follows:

1. The value of t count leadership variable (X1) is greater than t table which is $2.577 > 1.98350$ and the significance value is smaller than 0.05, which is $0.011 < 0.05$. Positive t value indicates that leadership has direct influence on employee performance. These results indicate the hypothesis that leadership has a positive and significant

- effect on employee performance at PT. Pertamina EP Limau Field can be accepted.
2. The value of t calculated organizational culture variable (X2) is greater than t table which is $2.012 > 1.98350$ and the significance value is smaller than 0.05, which is $0.047 < 0.05$. Positive t value indicates that organizational culture has direct influence on employee performance. These results indicate the hypothesis that organizational culture has positive and significant effect on employee performance at PT. Pertamina EP Limau Field can be accepted.

3. Variable organizational culture (X2) has a greater coefficient of value than the leadership variable (X1) which is $0.201 > 0.198$. This means the hypothesis that organizational culture has the most dominant influence on employee performance can be accepted.

Discussion of Research Results

1. The Effect of Leadership (X1) on Employee Performance (Y)

The results of the analysis obtained in this study indicate that leadership has a positive and significant effect on employee performance so that the hypothesis can be accepted. Employee performance will decrease if a leader in implementing his leadership is not appropriate with the level of readiness and maturity of the subordinates. This is in line with the theory of Hersey and Blanchard (1996: 117) which suggests that the most effective leadership style varies with employee readiness. Readiness is a desire for achievement, a willingness to accept responsibilities and abilities related to tasks, skills and experience.

The results of the frequency of respondents' questionnaire answers that indicate that leadership has a strong influence on the performance of employees of PT. Pertamina EP Limau Field is also in accordance with previous research conducted by Priscilia (2019); Ahmad (2018); Denny (2018); Yahya (2018); Andi (2017); Budi (2017); Destu (2017); Djuremi (2016); Isnan (2016); Syafei (2016); Riana (2016) which shows that leadership has a positive and significant effect on employee performance.

Statements from respondents' answers, most of which agree with the consultation and participation leadership style, need to be considered by leaders at Limau Field in carrying out their leadership style so that employee performance can improve. The leaders at Limau Field also need to understand the profiles of their diverse subordinates so that the applied leadership style can be appropriate.

Employees at Limau Field with a low level of education and relatively short working period but have a strong desire to complete assignments are more suitable to consultative leadership style that provides a lot of direction and support. Employees with a higher education level and a longer working period will be appropriate with the participation leadership style that does not give too much direction but still provides support. In addition, the level of difficulty of the work provided by the leadership to subordinates also needs to be considered because employees with higher education levels and long working period still need direction and support from the leader if the work provided is quite difficult to complete.

2. The Effect of Organizational Culture (X1) on Employee Performance (Y)

Based on the results of the study indicate that organizational culture has a positive and significant effect on the employees performance at PT. Pertamina EP Limau Field so the hypothesis can be accepted. This is in accordance with the theory of Robbins and Judge (2013: 512) that organizational culture refers to a shared guided system of organization members that distinguish the organization from other organizations. Strong culture will have a large influence on the behavior of its members because the level of togetherness and intensity will create a climate of high behavioral control.

Research from Mega (2018); Rizki (2018); Trias (2018); Yahya (2018); Alphonso (2017); Andi (2017); Budi (2017); Destu (2017); I Gede (2017); Djuremi (2017); I Gede Sudha (2017); Syaiful (2016); Fauzi (2016); Syafei (2016); Personal (2016); Budi (2015); Mita (2014); Miftahul (2013); Emmy (2013) also shows that organizational culture has a positive and significant effect on employee performance.

The statement from the respondent's answers, most of which agree with the people-oriented organizational culture and give attention to detailed matters, should be considered by management at Limau Field regarding to extend implementation the culture. The culture is in principle in line with the culture that has been implementing at Limau Field such as comply the standard operating procedure and job description culture, knowledge sharing culture, innovation culture, and briefing before starting the work culture.

3. Variables that Have the Most Dominant Influence on Employee Performance at PT. Pertamina EP Limau Field

Based on the results obtained in this study it is known that organizational culture has the most dominant influence on employee performance so that the hypothesis can be accepted. The Limau Field management team needs to continue to pay attention to the culture of the organization and socialize the culture so that awareness of each employee is built to implement it in the work environment. The application of the organizational culture requires unequal time for each individual because of the different backgrounds. In this case the management team at Limau Field needs to act as a role model of subordinates and can be started from a smaller scope such as each function or part.

Employees who apply organizational culture consistently and able to be role models for other employees need to get appreciation from management, for example job promotion or other awards, while those who does not implement the organizational culture need to be given guidance and other consequences.

IV. CONCLUSIONS AND SUGGESTION

Conclusion

1. Leadership has a positive and significant effect on employees performance at PT. Pertamina EP Limau Field
2. Organizational culture has a positive and significant effect on employees performance at PT. Pertamina EP Limau Field
3. Organizational culture has the most dominant effect on employees performance at PT. Pertamina EP Limau Field

Suggestion

1. To improve employees performance, leader must be able to understand the level of readiness and maturity of different subordinates and leaders must be able to adjust their leadership style to be appropriate with the situation of readiness and maturity of their subordinates. Based on the results of analysis, what is expected from the leader at PT. Pertamina EP Limau Field in this case Field Manager to be more inclined to use consulting and

participation leadership styles in order to be able to improve the employees performance at PT. Pertamina EP Limau Field.

2. Limau Field management team should maintain and socialize the organizational culture in the company to improve employee performance such as culture of innovation in the work environment, culture of paying attention to detailed matters such as caring for regulations, safety and work environment. People-oriented culture also needs to be improved such as giving appreciation to employees that have good performance.
3. For further researchers, it is expected to add other variables that affect employees performance such as motivation, compensation, skills, competence, motivation, commitment, facilities and infrastructure, stress level and work environment.

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Activities of aldehyde oxidase, Lactate dehydrogenase, aspartate aminotransferase and alanine aminotransferase in brain, heart and liver of rabbits exposed to cadmium and aqueous leaf extract of *Bryophyllum pinnatum*

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DOI: 10.29322/IJSRP.9.08.2019.p92135

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92135>

Abstract- This study examined the potency of aqueous leaf extract of *Bryophyllum pinnatum* on cadmium toxicity in the brain, heart and liver of rabbits through the assessment of the activities of aspartate aminotransferase and alanine aminotransferase for three weeks.

Fifteen male rabbits were used for this study. They were divided into three groups of five animals each. Rabbits in group I were administered 2mg/kg body weight of deionised water subcutaneously, rabbits in group two were administered 2mg/kg body weight of cadmium subcutaneously and rabbits in group three were administered 80mg/kg body weight aqueous leaf extract of *B. pinnatum*. At the end of three weeks of feeding, all the rabbits were weighed sacrificed and dissected. The brain, heart and liver tissues of each rabbit was excised and used for analysis.

The results obtained for the mean activities of aspartate aminotransferase and alanine aminotransferase showed a significant difference ($p < 0.05$) relative to the control in brain, liver and heart tissues. These results show the potency of *B. pinnatum* extract in reducing cadmium toxicity.

I. INTRODUCTION

Interest on the role of complementary and alternative drugs for the treatment of diseases has increased in recent time. Different types of herbs due to their high concentration of antioxidants have exhibited high potential for use in the treatment and management of certain clinical alteration. One of such herbs is *bryophyllum pinnatum* whose extract is known to be rich in alkaloids, triterpenes, glycosides, flavonoids, cardienolides, steroids, bufadienolides and lipids (Marriage and Wilson, 1971; Costa et al, 1995). The leaves contain a group of chemicals called bufadienolides which are very active. Bufadienolides like bryotoxin A, B, C are very similar in structure and activity to two other cardiac glycosides, digoxin and digitoxin and possesses antibacterial, antitumorous, cancer preventative and insecticidal actions (Steyn, and Van Heerden, 1998; Rastogi, and Mehrotra, 1994). *Bryophyllum pinnatum* contain fatty acid fractions including palmitic acid (89.3%), stearic acid (10.7%), traces of arachidic and behenic acid (Takashi et al 1988, Almeida et al,

2000).The plant also contains HCN, oxalic acid (Siddiqui et al,1989), citric acid, isocitric acid, oxaloacetate (Almeida et al, 2000) , malic acid

(Sutton and Osmond,1972) and succinic acid. The plant is rich in vitamins and aminoacids; ascorbic acid, riboflavin, thiamine, niacin, pyridoxine, glycine, cysteine, casein hydrolysate, glutamic acid, protein hydrolysate, methionine, tyrosine, phenylalanine (Okwu, and Josiah, 2006). It is a perennial herb growing widely and used in folkloric medicine in tropical Africa, tropical America, India, China and Australia (Kamboj and Saluja, 2009), classified as a weed (Oliver-Bever,1983) the plant flourishes throughout the Southern part of Nigeria (Gill, 1992). It is astringent, sour in taste, sweet in the post digestive effect and has hot potency. *B. Pinnatum* has been extensively used in herbal medicine not only for their oxytoxic, analgesic, anti-inflammatory antimicrobial properties but also provide relief in the treatment of human gastrointestinal, hypermobility and peptic ulceration (Shrivastava and Patel, 2007; Okwu and Iroabuchi, 2009). In traditional medicine, the leaves of the plant have been reported to possess antimicrobial (Akinpelu, 2000; Okwu and Uchenna 2009), anti-inflammatory, antifungal (Misra and Dixit, 1979), and anti-hypertensive (Ojewole, 2002) activities.

Cadmium is a lustrous, silver white ductile, very malleable heavy metal. It is soft enough to be cut with knife but tarnishes in air. (Cadmium Ass,1991). It is toxic at very low exposure levels and has acute and chronic effect on health and environment. It is extremely toxic to humans and in chronic exposure, it accumulates in the body, particularly in kidney and liver (Fasset, 1972). Acute poisoning from inhalation of fumes and ingestion of cadmium salt can result to death (Baldwin and Marshall 1999). Cadmium has been one of the most toxic and recognized environmental and industrial pollutant due to its ability to induce severe alterations in various organs by reducing the biosynthesis of enzymes of energy metabolism and also increasing the rate of oxidative destruction of membrane polyunsaturated fatty acid of these organs following either acute or chronic exposure. Because cadmium is a naturally occurring component of all soils, all food stuffs will contain some cadmium and therefore all humans are exposed to natural levels of cadmium. Therefore, the essence of this study is to ascertain the

potency of *bryophyllum pinnatum* extract on cadmium toxicity in various organs via the assessment of the activities of aspartate aminotransferase and alanine aminotransferase.

II. MATERIALS AND METHODS.

EXPERIMENTAL ANIMALS

Fifteen male Rabbits of 1.31 ± 0.05 kg and about six to seven months old purchased from Aduwawa cattle market Benin-city, Edo-State, were used for this study. The rabbits were weighed and assigned comparable weights in all groups (± 0.05 kg). The animals were acclimatized with their respective diets for a period of one week after which the animals were weighed again and then divided into three groups of five (5) rabbits each: group 1, the control (N); and two test groups tagged cadmium group which is the group 2 (CD) and *Bryophyllum* group which is the group 3 (B). Rabbits in group I were administered 2mg/kg body weight of deionised water subcutaneously, rabbits in group two were administered 2mg/kg body weight of cadmium subcutaneously and rabbits in group three were administered 80mg/kg body weight aqueous leaf extract of *B. pinnatum* subcutaneously. The rabbit were fed with pellet finishers from Top feeds and tap water supplied by Uniben water board. The weights of the animals were taken at the end of every week for the period of three weeks and on the day the animal were sacrificed. The cages housing the rabbits were kept in an environment with free supply of air and light. Water and feed were changed daily.

PREPARATION OF BRYOPHYLLIUM PINNATUM EXTRACT

The leaves of *Bryophyllum pinnatum* were obtained from Santua garden, Ugbowo, Benin City, Edo state and identified at botany department, Ambrose Ali University, Ekpoma. They were washed with distilled water to remove dust and other particles and allowed to dry for about ten minutes. The leaves were blended into paste without adding water. Thereafter, 4 g of the paste was dissolved in 20 ml of distilled water to give *Bryophyllum pinnatum* with 0.2 mg/ml concentration.

COLLECTION OF SAMPLE

At the end of three weeks of feeding, all the rabbits were weighed sacrificed and dissected. The liver, kidney and brain tissues of each rabbit was excised and kept separately in sample bottles (10ml) and then stored at -4°C for analysis.

PREPARATION OF TISSUE SAMPLE

1g of the brain, heart and liver tissue was homogenized separately in 5ml of 0.9% normal saline for 10 seconds. The cytosolic fraction was obtained from the homogenate by successive centrifugation at 9000g for 20 min and 105,000g for 60 min. The supernatant was used as source of sample.

Biochemical assay

ALANINE AMINO TRANSFERASE (ALT)

PRINCIPLE: ALT was measured by monitoring the concentration of pyruvate hydrazone formed with 2,4-dinitrophenylhydrazine. The colour intensity was measured against the blank at 546nm (Reitman and Frankel, 1957).

METHOD: The blank and sample test tubes were set up in triplicates. To these were added 0.25ml buffer solution containing phosphate buffer, L- alanine and alpha ketoglutarate. The mixtures were thoroughly mixed and incubated for exactly 30minutes at 37°C and pH 7.4. Exactly 0.25ml of reagent containing 2,4-dinitrophenylhydrazine was later added to all tubes while 0.25ml of sample was added to sample blank tube. These tubes were mixed thoroughly and allowed to stand for exactly 20 minutes at 20°C to 25°C . Exactly 0.025ml of sodium hydroxide solution was then added to all tubes and mixed. The absorbance was read against the blank after 5 minutes at 546nm.

ASPARTATE AMINO TRANSFERASE

PRINCIPLE: Aspartate amino transferase was assayed spectrophotometrically in a coupled reaction with malate dehydrogenase in the presence of NADH (Karmen et al,1955, Amador and Wacker, 1963). The reagent mixture contained 134mM of aspartate, 5.64mM of 2-oxoglutarate, 0.24 mM of NADH, 5u/ml of lactate dehydrogenase, 1.25u/ml of malate dehydrogenase and 50mM of phosphate buffer at pH 7.4 The enzyme was diluted by dissolving the enzyme at a concentration of 1mg/ml in 0.1 M potassium phosphate of pH 7.4. and then diluted further in the buffer to a concentration of 0.05 to 0.25 u/ml. METHOD: The spectrophotometer was adjusted to 340nm at 25°C . Exactly 2.9ml of the reagent mixture was put into cuvette and incubated for four minutes. To this, 0.1ml of the appropriately diluted enzyme was added at zero time and the decrease in absorbance at 340nm for five minutes was recorded.

CALCULATION

Change in absorbance at 340nm/minute

62 x mg enzyme in reaction mixture

III. STATISTICAL ANALYSIS

Statistical analysis was carried out using the mean, standard deviation and standard error of mean respectively. The data obtained were subjected to analysis of variance (ANOVA). The mean differences were separated by Duncan's multiple range test at 0.05 level of significance (Sokal and Rohlf, 1969).

IV. RESULTS

Results are as presented in table 1. Results showed that *B. pinnatum* significantly ($P < 0.05$) increased the activities of aspartate aminotransferase and alanine aminotransferase when compared with the control in brain, liver and heart tissues.

Table 1: The effect of cadmium and aqueous leaf extract of *Bryophyllum pinnatum* administration on the activities of aspartate aminotransferase and alanine aminotransferase in rabbits.

Tissue	Groups	Aspartate aminotransferase (u/l)	Alanine aminotransferase (u/l)
BRAIN	Control	16.60±1.12	32.60±6.31
	Cadmium	15.40±0.60	31.00±9.95
	Bryophyllum	17.80±1.74	45.20±3.88
HEART	Control	49.73±14.19	35.00±.87
	Cadmium	26.80±6.71	21.40±9.16
	Bryophyllum	70.75±18.25	53.20±1.72
Liver	Control	42.00±6.81	6.00±1.16
	Cadmium	13.20±5.89	4.00±0.00
	Bryophyllum	43.20±9.74	7.00±1.00

V. DISCUSSION

Cadmium is extremely toxic to humans and in chronic exposure, it accumulates in the body, particularly in kidney and liver (Fasset, 1972) and adversely affect the functions of these organs (Yang and Shu, 2015). Enzymes play vital roles in the existence and functioning of various organs and tissues. aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are two widely used and well-established enzymes to detect diseases of the liver, heart, skeletal muscle, brain, and kidney as well as damage caused by toxicants to these organs (Lum, 1995). AST catalyzes the transfer of amino group of aspartic acid to α -ketoglutarate which eventually results in the formation of

oxaloacetic acid and glutamic acid respectively. ALT catalyzes the transfer of an amino group from alanine to alpha ketoglutarate to yield glutamate and pyruvate as a part of amino acid metabolism.

Aspartate aminotransferase and alanine aminotransferase activities are used as indicators of hepatocyte damage. In earlier stages of liver damage, these enzymes of hepatocyte penetrate the cells and enter the blood stream (Kallies et al, 1964). In this present study, treatment of rabbits with cadmium significantly ($P < 0.05$) decreased the activities of aspartate aminotransferase and alanine aminotransferase in the brain, heart and liver. The reduction in these enzymes may be due to oxidative injury in liver causing these enzymes to leak out of the liver into the blood. This is in agreement with report by Renugadevi, and Prabu who found

that the levels of serum hepatospecific enzymes such as aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), and the level of total bilirubin were significantly increased in cadmium treated rats. The decrease in the activities of these enzymes following the treatment of rabbits with cadmium was highest in the liver and least in the brain showing that the liver is most susceptible to cadmium damage compared to the heart and brain while the brain is the least susceptible.

Herbal medicine has been explored and proven to be effective in the management of health requirement locally and internationally (WHO, 2002). The activities of plant extracts in effecting any therapeutic or biological changes in ailing or diseased animals or living tissues are direct functions of the chemical constituents present in them after extraction (Ayinde and Agbakwuru, 2010). The extract of *bryophyllum pinnatum* is known to be rich in alkaloids, triterpenes, glycosides, flavonoids, cardenolides, steroids, bufadienolides and lipids (Marriage and Wilson, 1971; Costa et al, 1995). Which are known for their antioxidant activities. Therefore the finding from this study that *bryophyllum pinnatum* significantly ($P < 0.05$) increased the activities of aspartate aminotransferase and alanine aminotransferase when compared with the control in brain, liver and heart tissues may be as a result of its rich phytochemicals which may have caused an increase in the activity of the antioxidant-defense system there by having a protective effect on hepatic tissues. Thus, the results suggest that *bryophyllum pinnatum* extract acts as a potent hepatoprotective agent against cadmium induced hepatotoxicity in rabbits.

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Smart City Service Monitoring Using Twitter Analytics

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DOI: 10.29322/IJSRP.9.08.2019.p92136

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92136>

Abstract—Smart City domain has multiple verticals like Water Management, Garbage Management, Power Management, Transportation Management etc. Such services will have to find problems in their respective domain and react to it in less time. An application is proposed in this paper to collect the relevant information from social network data, to process and filter the received relevant information and to communicate about it to the relevant department to handle the issues. The proposed application is scalable and fault tolerant.

Keywords- Smart City; Twitter Analytics

INTRODUCTION

Smart city has multiple services. There is a need for an automated system to monitor the service failures and to report them to respective personnel. One such source for this task is from user complaints. Always users will not complaint to respective departments. It may be of many reasons like, lack of information about where to, whom to and when to complaint or the complaining mechanism may not be user friendly, or it may be of any other reason. Thus people may not complain about it directly to the respective departments always. But it is so common that people will talk about it with friends, and post about it in their favorite social network.

So the information regarding service failure may not be available directly to the respective departments. Departments need to extract relevant information from other sources where such information exists.

Social networks are important such information sources. People more frequently post information regarding smart city service failures in social networks. Most famous such social networks are Twitter, Facebook, and WhatsApp .etc. Extracting and processing data from such social networks will help to monitor and report the smart city service failures.

This paper proposes a method and application to read data from twitter and extract information relevant to smart city service failures and to report them to respective departments of smart city. So each department will receive the information (which is extracted from twitter data) regarding their service failures on their dashboard and they may take necessary action.

Section 2 describes some of the related work done in this area. Section 3 describes the technology selection details to

realize the proposed work. Section 4 describes approach of the proposed work. Section 5 describes the system architecture and design methodology of the proposed system. Section 6 provides the implementation details of the proposed system.

RELATED WORK

This section describes some of the related work done by the research community.

Angel Martin, et al. proposed a method to analyze the tweets to depict events in the city and to discover their spatiotemporal characteristics [1].

Sugimiyanto Suma, et al. proposed a model to analyze twitter data to detect and validate spatiotemporal events in London. With their method they could find congestion around the city, they could also detect the occurrence of cultural events happening inside the city without having prior information [2].

Arthur Souza, et al. proposed a case study for real time capturing of crime event information from social media messages. They have also proposed a platform for fast processing and visualization of crime data from Twitter tweets [3].

Li Mengdi, et al. proposed a framework for sentiment analysis. It collects, preprocesses, analyses and maps sentiment of people from Twitter. It helps the Government to monitor their citizens' moods [4].

Many researchers have analyzed the twitter messages and brought insights in different applications. In this paper, twitter messages are analyzed for monitoring the services of smart city.

TECHNOLOGY SELECTION

The scope of this paper is to design and implement an application to monitor smart city services from social network data and to report the relevant information to the appropriate departments. In order to do it we need to choose appropriate data source and technologies to implement it.

Choosing Social Network Data Source:

For any data analytics application choosing the appropriate data source will be the key differentiator to its success. V's of big data have to be examined while choosing the data source.

Volume: It should be able to provide huge volumes of data

Velocity: It should be able to generate data with higher rate

Variety: It should be able to produce heterogeneous data types: text, image, audio, video etc.

One more major requirement to select the data source is that that data source should be freely available to the developers. It means it should be open source.

Another major requirement is that there should be a handy API or Connectors to capture the data from that data source.

By considering several social network data bases and by examining their suitability to the above requirements, we have chosen "Twitter" as our data source [7]. Twitter is a popular social network. It generates huge volumes of different varieties of data with high velocities. It provides open source APIs and connectors to capture its data. It also provides APIs to capture the real time streaming of tweets. It also provides pluggable connectors to fit into big data frameworks. Twitter analytics has rich developers as an added advantage. Moreover it has been widely used by many researchers to solve other interesting problems. These features of twitter encouraged us to select it as our data source.

Choosing Big Data Processing Framework:

In order to address the 5 V's (volume, Velocity, Variety, Value and Veracity) of big data, it is decided to use big data processing framework to implement the core business logic. Current requirement needs stream processing capability, complex event processing capacity and a handy interface to consume tweets. Big data processing frameworks like hadoop map-reduce, apache spark and apache flink are explored. Apache Flink got little edge over the other two because of its following features.

- Distributed Processing Capability
- Stream Processing Capability and Strong Data Stream API
- Complex Event Processing Capability
- Open Source Nature
- Fault Tolerance and High Scalability
- Low Latency and High Performance
- Handy Connector to consume data from Twitter
- Handy Connectors to read / write data to messaging applications like 'Kafka'

Because of the above features, Apache Flink [5] is chosen as the data processing framework for current application.

Choosing the Message Broker:

Message brokers play an important role in big data frameworks. In the current application, we need to store huge number of tweets coming with high velocities. So the message queue should be capable of storing the messages in distributed way across all the nodes of the cluster. As already specified twitter produces variety of data (text, image, audio and video). So the message queue should be capable to store messages with heterogeneous schemas. The messaging system should also have the capability to logically segregate the messages into different topics. It should also facilitate efficient publish-subscribe mechanism to write / read messages to relevant

topics. It should read /write message with low latency. The messaging framework should work hand in hand with the data processing framework. Some of the message brokers are examined and Apache Kafka [6] is chosen for its following unique features.

- Better Throughput
- Built-in Partitioning
- Replication
- Fault-Tolerance

Choosing Web Technologies:

Following web technologies are selected for the current application

- Web Server: Apache
- Application Server: Tomcat
- Web UI: HTML5, JavaScript
- Communication protocol: Web Sockets

Current application mainly focuses on real time analysis of tweets and alerting appropriate personnel with relevant information through its web UI. It does not store the messages in the persistence data base. For that one can use one of the NoSQL databases.

APPROACH

Identify the various smart city verticals whose services have to be monitored. Create a Kafka topic for each of them. Prepare a set of relevant keywords for each of those verticals.

To get access to the tweets, one has to enroll for twitter developers [8]. Once it is done, credentials will be provided to access twitter data. Flink has a twitter source which is a handy connector to consume tweets. Using that connector get the twitter streams. Then Flink will be able to receive tweet streams. For each tweet in the stream, extract the location and text information. If the location is within the smart city region, then examine the text of the tweet. If the text of the tweet contains any keywords which are of relevance to any of the smart city verticals, then select that tweet and treat it as relevant tweet. Twitter has a Kafka sink which facilitates to write flink data streams to Kafka topics. Those relevant tweets will be written into appropriate Kafka topics. Thus the flink jobs acts like publishers to Kafka topics.

On the other side, java application running inside server will act like consumer to Kafka topics. It continuously monitors the Kafka topics and consumes messages from them. The consumed messages will be sent to the appropriate WebUI which is tied up with that corresponding Kafka topic. It will send these messages over web sockets. From the client side, each smart city department will have a web UI developed in HTML5 and JavaScript. It will display the messages received through web socket.

Thus the flink job first filters the relevant tweets by matching location of the tweet and tweet text. Filtered relevant tweets will be written into relevant Kafka topics based on the keywords in the text of the tweet. Java application running inside web server continuously consumes those Kafka messages in respective Kafka topics and streams them to appropriate departments using web sockets. Thus each

department gets the tweets of its relevance. The user interface will display the messages it has received through web socket on its web page.

display them on the respective department’s dash board. The dashboards are depicted in bottom module.

Actual implementation details and results are described in the following section.

SYSTEM ARCHITECTURE

IMPLEMENTATION DETAILS

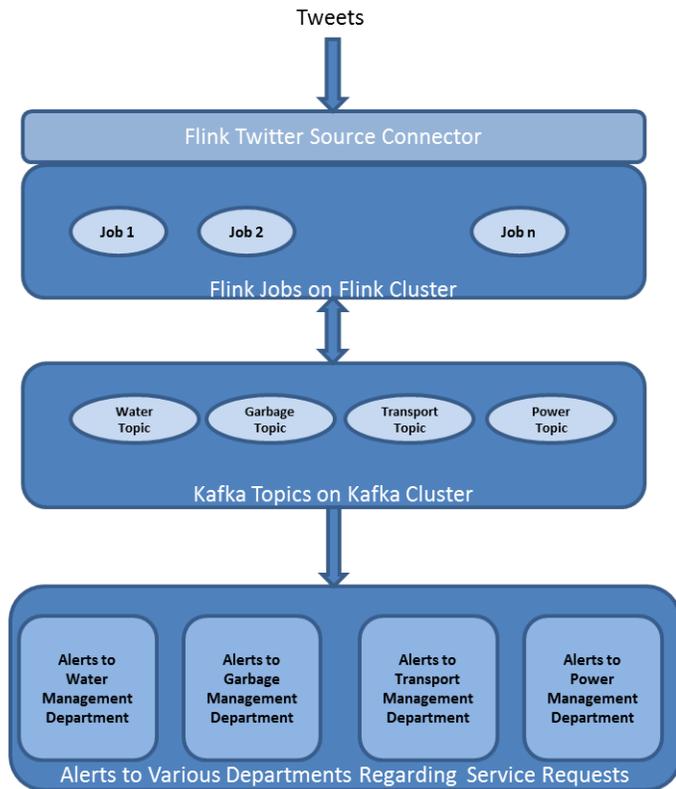


Figure 1: System Architecture

In this section, architecture is proposed to monitor smart city service failures and to alert appropriate departments about the failure. The system architecture will be as shown in Fig 1.

First developer has to register with “Twitter Developer Account” to get access to tweets. Flink has a Twitter Connector. It helps flink to read data streams from twitter source. Top module in figure 1 describes the capturing of twitter data using Flink’s Twitter Connector.

Different verticals of smart city are depicted as different kafka topics. For example, Water Management, Traffic Management .etc. Each Kafka topic is intended to store messages relevant to that department. Kafka topics on kafka cluster is described by the middle module in figure 1.

Every department of smart city services will have its own dashboard to visualize the service failure related information. Flink jobs will first consume the twitter data from twitter connector, analyze them, filter them based on the location of the tweet and keyword exists in the tweet. Then it segregates the tweets based on their relevance to different departments of smart city and writes them to their corresponding kafka topics. Web technologies will read from those kafka topics and

This section focuses on the implementation details of the application.

Registering for Twitter Developer Account:

Twitter provides controlled access to its APIs and tools. To access its APIs and tools, developers have to register for Twitter Developer Account at “https://developer.twitter.com”. Once it is done, twitter will provide following access credentials to the developer.

- CONSUMER_KEY
- CONSUMER_SECRET
- TOKEN
- TOKEN_SECRET

Developer has to specify those access credentials in their program. If the credentials are valid then twitter will allow that program to read tweets from internet.

Kafka Cluster Setup:

Apache Kafka is a distributed stream platform. It is used for building real time data pipelines and streaming apps. Kafka can scale horizontally on multiple nodes. In this experiment, multiple virtual machines with Ubuntu 16.04 are taken and Zookeeper and Kafka is installed in them. Kafka cluster setup is described in [kafka cluster setup]. Multinode Kafka Cluster is setup by configuring zookeeper and kafka properties as described in [kafka cluster setup]. Once the Kafka Cluster setup is done, sample topics are created in that. The cluster is tested with console producers and console consumers. It has produced messages into kafka topics and consumed those messages as expected.

Creation of Kafka Topics and Relevant set of Keywords for Smart City Services:

Once the Kafka Cluster is setup, next job is to create appropriate topics which are of relevance to the smart city services. Topics for Water Management, Traffic Management, Power (Electricity) Management and Garbage Management are created in the kafka. Each of these topics will contain messages relevant to its domain.

Every domain will have some keywords and phrases which are of relevant to that domain. For example, for Traffic domain, “traffic jam”, “accident”, “road block” .etc are relevant. If text contains some of these keywords, it may be relevant to that domain. Relevant set of keywords are prepared for each smart city domain.

Setup of Flink Cluster:

Apache flink is a framework and distributed stream processing engine. Flink can scale horizontally on its cluster nodes. The first step before working with flink is to setup the flink cluster. In this experiment, multiple virtual machines with Ubuntu 16.04 are taken and flink is installed in them. Multi node flink cluster is been setup. Once the flink cluster

setup is done, we can see the information about the cluster like the health status of the cluster, worker node details, running, completed and failed jobs .etc through its portal. Setup is tested by verifying the portal. Sample flink application is submitted through its portal and made sure that it is working on the cluster as expected.

Integration of Flink and Twitter:

In our experiment, twitter will have tweets and we need them in flink environment to process them. Flink has a Twitter Source Connectors to bridge this gap. In this experiment, we used "TwitterSource" connector of flink to address this requirement. Sample example is run in the presence of internet and flink is able to read the tweets as expected.

Integration of Flink and Kafka:

Flink is a data processing platform. Kafka is a message broker. A big application can be designed as multiple flink jobs working together each gets its own input and processes it and produces its own output. There is need for a message broker to provide input and output to these flink jobs. Kafka is a good fit for this requirement. Flink have multiple source connectors whose purpose is to provide input to flink. Flink have multiple sink connectors to consume the flink output. Flink has "FlinkKafkaConsumer" and "FlinkKafkaProducer" for this purpose [9]. So flink can easily read from kafka topics and write to kafka topics. Sample flink job is done to read from kafka topic and to write to kafka topic and it worked as expected. Flink Kafka Connectors are used in this experiment.

Development of Flink Jobs:

Flink is basically a stream processing engine. It has a powerful Data Stream API which is useful to develop stream processing jobs. It is available in Java and Scala languages. Java is chosen for this experiment. Twitter messages are consumed into flink environment using "TwitterSource" connector of flink. The credentials obtained from "Twitter Developer Account" are specified in the program. Thus the tweets are consumed into flink and they are available as a flink data stream. Tweet is represented as a JSON file. It has multiple fields representing different types of information about that tweet. For example, "created_at", "id", "text", "coordinates", "hashtags" .etc. The fields that are important to this experiment is "coordinates" and "text". These details are extracted from the tweet message. If the "coordinates" of the tweet are in the geographical range of smart city, then that tweet is selected for further analysis. Otherwise it is dropped. "text" field of the tweet represents the actual textual message of the tweet. That text content is extracted for the selected tweets. We have already discussed that set of keywords and phrases are formed for every vertical of smart city. For every domain, get its set of keywords, check for their availability in the text content of the tweet. If it contains any of those keywords, then treat that tweet is relevant to that respective smart city vertical and write that message to the respective kafka topic. Do this processing for every vertical of the smart city. Do it for every tweet that has the coordinates in the

geographical range of smart city. Flink Jobs are developed to perform this work.

Deployment of Flink Jobs:

Once the flink jobs are developed, they are deployed on the flink cluster using flink portal. Flink portal will have an option to submit the jobs. It will have the provision to upload the jar files of flink jobs. Flink programs developed as above are exported as jar files. Those jar files are submitted to flink through its portal. Then the flink master will deploy them on the flink cluster.

Development of Web Technology to Stream the Kafka Messages to Respective Smart City Departments:

Flink jobs will read the tweets, filters them and write relevant messages to respective kafka topics. But the client needs those messages on his dashboard. To bridge this gap, we have chosen web technologies. Apache Tomcat is used as a web server.

At server side, servlet application is used to continuously read message in kafka topics. If some new message come to kafka topic, immediately it will be streamed to the browser. For that it is good to have a permanent http connection. For that we have chosen websockets. Once websocket is created between client and server it will be used to send multiple messages. Whenever a new message comes to kafka topic, that will be sent to appropriate client through web socket.

Every vertical of smart city will have a webpage with dashboard. Consider that web page as client. The messages it received from the respective kafka topics will be visualized in it. First as explained above, client initiates the websocket connection. So client will be receiving the kafka messages relevant to its domain. Those messages are displayed on the webpage. The respective personnel observing those messages may take appropriate action.

Thus current application extracts the information regarding smart city service failures and displays that information on the department's dashboard. With this application, it will be easy to monitor the service failures.

CONCLUSION

Smart city has multiple verticals like water management, garbage management, traffic management, power management .etc. It will be good to have an automated system to monitor the failure of smart city services. One way to build such system is to analyze the data coming from social networks because people will react to those service failures through their favorite social networks. In this paper, an application is designed and implemented to analyze the twitter data and find the tweets that are relevant to smart city service failures and alert appropriate departments by sending those messages to take further action. Thus each smart city department will get the tweets that are talking about that service failure on their dashboard.

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Improving student collaboration skills: the influence of the STAD learning model

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DOI: 10.29322/IJSRP.9.08.2019.p92137

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92137>

Abstract- This study aims to see positive changes in skills in collaboration with students through the STAD learning model. Taking this theme is because students are still weak in collaboration in class so that it inhibits the transfer of information from the teacher or with other students. This study uses a posttest only control group design. Comparing two research classes at three meetings so that they will show the development of student collaboration skills. Data collection techniques were carried out by using a cooperation skill observation sheet. Data analysis using independent sample t-test. The results showed that there was a change in the skills of student collaboration from the first meeting to the third meeting. The test results of the independent sample t-test showed $0.001 < 0.005$, which means that there was a significant effect of the STAD learning model on student collaboration skills. Skills increase from the first meeting to the third meeting is 37%. So it can be said that STAD is able to change the skills of collaborating with students. This means that STAD is very effective in dealing with student problems related to difficulties in collaborating in class.

Index Terms- STAD, Collaboration skill

I. INTRODUCTION

Collaborative skills have a very important role for students because students who have these skills will have a positive impact on communication skills (Barneva, et al, 2017), increasing learning achievement in schools (Ronfelt, et al, 2015), making individuals stronger (Johnson, et al, 2010), and develop mutually beneficial social relations (Usman, 2018). So cooperation skills are a must for every student. When students have cooperative skills, students will be able to solve complex problems when compared to working alone (Barneva, et al, 2017). Collaborative skills can be formed if trained in daily life (Balmer, et al, 2016).

Efforts to form collaborative skills can be done through social studies learning. IPS education has an important goal in developing students' attitudes, knowledge and skills (Jarolimex, 1977). Social studies learning in the classroom always directs students to have these competencies. Through social studies learning, students will learn to live and work in small groups (Johnson, et al, 2010), mutual respect, respect, learn to control themselves, share information and experiences with others (Jarolimex, 1977). Through collaboration in social studies classes, students will have an effort to achieve common goals, positive interpersonal relationships, and psychological health (Johnson, et al, 2010).

The development of student collaboration skills in this study is based on 4 pillars of UNESCO's education, namely learning to know, learning to do, learning to be, learning to live together. Directing students to be able to collaborate in groups becomes a focus in skill development because students still show less cooperative skills at previous meetings. The effort to overcome the problem was experimented with the STAD learning model. STAD is a learning model that emphasizes the process Student Team Learning (Huda, 2013). The group learning process will direct students to work together because the important point of collaboration is organized involvement to solve a problem (Hinyard, et al, 2018).

In previous studies, it discussed the influence of STAD on social skills, especially student collaboration. Tiantong & Teemuangsai (2013), states that through the STAD model, students really enjoy working with moodle in achieving group achievements. In line with Tiantong, Bektiarso, Yuliyanti, Subiki, (2017) research which describes that social skills problems that exist in the classroom such as students do not want to collaborate and collaborate with group friends and tend to group only. So the model is STAD considered appropriate for improving social skills in the form of cooperation, tolerance, accepting diversity, and developing social skills (Arends, 2008). Through the learning model STAD students experience changes in skills. Students learn to understand the meaning of togetherness, collaborate and collaborate as shown by the achievements of the work division, and socialize with each other in groups that are able to change students in a better direction. The essence of the learning process itself according to Morgan is that there are permanent behavioral changes as a result of experience (Suprijono, 2017).

Slavin's view (1995) suggests two reasons for using the model STAD. First, some of the results of the study prove that the use of type cooperative learning STAD can improve student learning outcomes while increasing the ability of social relations, fostering an attitude of accepting shortcomings of self and others, and increasing self-esteem. Second, cooperative learning type STAD can realize students' needs in learning thinking, solving problems, and integrating knowledge with skills (Harahap, 2013).

STAD is a learning model that emphasizes the process Student Team Learning , which is learning based on the principle that students must be able to be responsible when learning together on their own learning or learning group members. The basic concept of the student learning team includes individual responsibility, group awards, and opportunities for equal success (Huda, 2013, p. 115). The success of applying the STAD model must be supported by the optimal role of the teacher. Through the role of a good teacher, it is expected that students can learn groups and work together to help learn from one member to another (Slavin, 2017).

II. THEORITICAL FRAMEWORK

2.1 Student Team Achievement Division (STAD)

STAD is one of cooperative learning model developed by Robert Slavin. STAD is considered the most simple and easily understood cooperative approach (Arends, 2008). STAD consists of 5 main components which include class presentations, teams, quizzes, individual progress scores and team / group award recognition (Slavin, 2005).

Material Presentation Stage. In the early stages of using the method STAD, the teacher starts by presenting indicators and providing motivation to students. The next step, the teacher performs apperception in order to remind students so that students connect between the material to be presented with the knowledge they already have. The next step, the teacher presents new academic information to students. Information presentation is led by the teacher and carried out through audiovisual displays.

Stage of Group Activities. In this second stage, the teacher has divided students into small groups of four or five people. The division is based on several things, namely 1) who are considered high, medium, and low achievers, 2) where possible, the team can consist of a mixture of race, culture, and gender. At this stage it means that cooperative learning, especially STAD teaches about meaning in social life or community.

The main function of group activities is to ensure that all group members have fully learned and the specific goal is to prepare group members to face individuals / quizzes with the best skills. At this stage, learning often involves discussing shared problems, comparing answers, and correcting any misunderstandings between group members. Every student receives worksheets and integrates in his group and works together, shares duties, and helps each other so that all members in the group are able to understand the material that has been delivered by the teacher. Then one worksheet is collected which is considered as the result of group performance. The teacher in this case acts as a facilitator and motivator of activities in each group.

Teams or groups are important aspects of type learning STAD. The most important thing is emphasized, making group members the best for their team. The team provides support group for members to get academic performance. At this time there is a relationship between groups, a sense of self-esteem, and acceptance of members of groups with different backgrounds. At this stage there is interaction in one group.

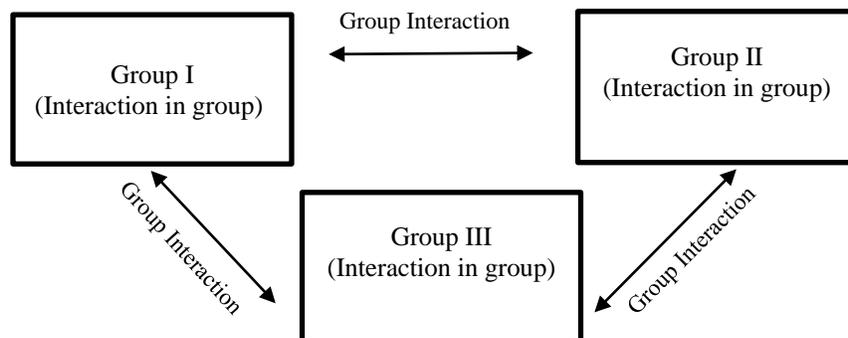


Figure 1
Interaction during the group activities

Stage Individual / Quiz Test. At this stage an individual test of learning outcomes is carried out with the aim to determine the extent of the learning success that has been achieved by students in understanding the material discussed earlier. Tests or quizzes can be carried out at the end of the second, third, or fourth meeting. In the quiz the work of students is thoroughly assessed about the material learned during group learning. Other members in one group are not allowed to help.

The stage of calculating the individual development score. Each student can contribute to giving maximum points through this stage. Each student will be given an initial score, which is obtained from the value of the evaluation or the final semester odd assessment. Based on these initial values, each student has the same opportunity to give a maximum score.

Table 1
 Guidelines for Giving Scores for Individual Learning Outcomes Development

Test	Score
Value more than 10 points below the initial score	5
Value of 10 to 1 point below the initial score	10
Initial score up to 10 points above	20
More than 10 points above the initial score	30
Perfect score (not based on initial score)	30

(Isjoni, 2013)

Stage of group awards. At this stage it is the team recognition stage that is giving awards to the three best groups. Awards refer to the value of the average score categorized in good groups, great groups, and super groups. The criteria used in awarding the group are 1) groups with an average score of 15 as a good group, 2) groups score an average of 20 as a great group, 3) groups score an average of 25 as a super group.

Table 2
 Group Assessment

Score	Predicate
15	Good
20	Great
25	Super

(Isjoni, 2013)

2.2 Collaborative Skills

Humans are social beings who in their life need each other. To achieve a common goal, people need to build cooperation so that the achievement of results is more effective. Collaborative skills (Cooperative skills) according to Johnson and Johnson (2009) are the ability of students to behave cooperatively with other people in the group in completing joint tasks. Collaborative skills are one of the important skills possessed by students. Anita Lie (2005), states that cooperation is a very important thing and is needed in human survival. If it is associated with the learning process in school, it can be said that without cooperation between students, the process of forming social relations skills both with peers and the school environment will not be formed.

Cooperation occurs between students with each other and is assisted by the teacher. According to Huda (2011), that when students work together to complete a group task, they provide encouragement, advice, and information to their group friends who need help. In the process the teacher as a facilitator directs students to work together to achieve common goals. Referring to this opinion, it can be seen that during the discussion process in the class, interactions occur in the form of cooperation to complete common goals. This process directs students in forming social skills.

III. METHOD

This research is an experimental research using posttest only control group design. The use of the design is based on several factors. First, the forwarding of posttest in both the experimental and control classes. Second, giving treatment to the experimental class and the control class. The treatment in the experimental class used the learning model STAD and the control class using the direct learning model. The design can be described as follows.

Group	Treatment	Posttest
R	X	O ₂
R		O ₄

Figure 2

Posttest Only Control Group Design

(Campbell & Stanley, 1968)

The sample in this study was 48 students in Al Fatich Junior High School Surabaya, East Java, Indonesia which were divided into 2 classes namely the experimental class and the control class. The data collection technique of collaboration skills is observation using a collaborative observation sheet instrument. Data analysis techniques using independent sample t-test.

IV. RESULT AND DISCUSSION

The step taken by the researcher before taking data in the research class is to test the validity of the research instrument. The observation sheet skill instrument shows an average of 3.35 with good or valid criteria. At the stage of research or field data collection,

research is going well. The implementation in the experimental class was 90.82% and in the control class 87.08%. The criteria for conducting research with these values can be said to be very good.

The results of observations of student collaboration skills in the class are divided into 3 meetings. At each meeting showed a significant increase in the experimental class when compared to the control class. The data, can be seen based on the following table.

Table 3
Average Results of Collaborative Skills

Class	Meeting 1	Meeting 2	Meetings 3	Percentage Increase
Experiments	2.90	3.08	3.23	37%
Control	2.71	2.83	2.87	16%

Data on the development of the collaboration shows changes in the experimental class and the control class. In the experimental class changes occur more significantly when compared to the control class. The increase in collaboration skills in the experimental class was 37% and in the control class an increase of 16%. At the first meeting, the value of cooperative skills showed a not significant difference. This means that at the first meeting, students only experienced small changes in collaboration skills. At the second meeting, the change in student collaboration skills grew but it did not show significant changes. At the third meeting, significant changes occurred in student collaboration skills

The increase in collaboration skills in research can be seen based on the following graph.

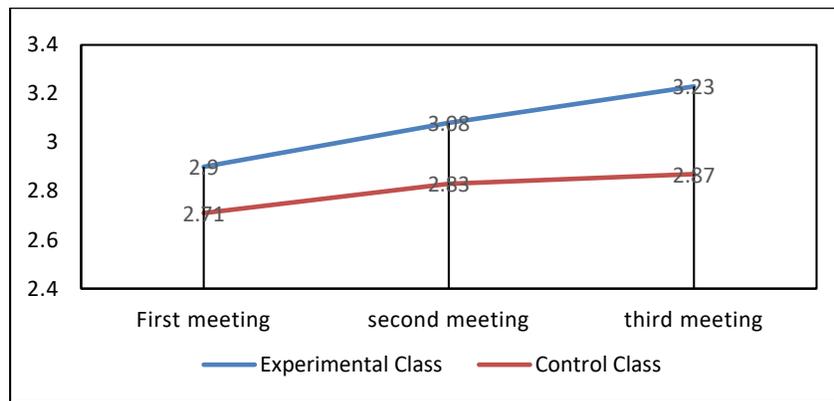


Figure 2
Graph of development of cooperation skills

In the picture, it shows that the increase in collaboration skills in the experimental class is higher and sustainable. Whereas in the control class, changes occur at the second meeting, and the third meeting tends to be lower. Both research data were then tested using an independent sample t-test to determine whether or not there were differences in skills produced from the model STAD and direct learning.

Before conducting the t test, the data must be normally distributed and homogeneous. Data normality testing using the Shapiro-Wilk test. The results of the normality test are as follows.

Table 4
Tests of Normality

	Group	Statistic	Shapiro-Wilk	
			df	Sig.
Collaboration	experiment	.913	20	.073
	control	.953	28	.237

a. Lilliefors Significance Correction

The results of the normality test show > 0.05 , which means that the data are normally distributed. The next step is to test the variance homogeneity. Test data for variance homogeneity as follows.

Table 5
Test of Homogeneity of Variances

Collaboration			
Levene Statistic	df1	df2	Sig.
.737	1	46	.395

The results of variance homogeneity test show numbers > 0.05 , which means homogeneous data. Both parametric test conditions are met, then the independent sample t-test is used. The results of the test are independent sample t-test as follows.

Table 6
Test for Independent Sample t-test Collaborative Skills
t-test for Equality of Means

Mean		t	df	Sig. (2-tailed)
Experiment	Control			
3,23	2,89	3,599	46	0,001

Statistical calculations using SPSS 24 show Sig. (2-tailed) $0.001 < 0.05$. This means that there are significant differences between the experimental class and the control class after being given treatment. These differences indicate that there is a significant effect of the STAD learning model on student collaboration skills.

Significant differences in the experimental class and control class were due to team work and quizzes on the STAD model. Students tend to be more willing to achieve so that they work together as well as possible so that they give big points to the group. There was no difference between high achievers and high achieving students in the STAD group. Students learn mutual respect, mutual respect with other friends in accordance with the pillars of education UNESCO learning to know, learning to do, learning to be, learning to life together. Understanding differences to work together to achieve group achievements. That makes STAD better than the direct learning model.

V. CONCLUSION

The selection of the right learning model will increase students' motivation to make them able to work together to achieve academic achievement. Based on learners to life together in peace, students respect each other in their social life, in accordance with the objectives of social studies. STAD has a significant effect on student collaboration skills. These skills can be formed gradually with the guidance of the teacher. Giving stimulus continuously to students becomes an important factor to guide students to be able to work in groups. Group achievement is the reason students can collaborate well through the STAD learning model. So it can be said that STAD is very effective in improving student collaboration skills.

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Understanding The Nexus Between Power Sector Reforms and Development of Agro-Industries in Post-Colonial Nigeria

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DOI: 10.29322/IJSRP.9.08.2019.p92138

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92138>

Abstract- In the developing African societies, electricity has continued to pose greater threats due to lag in its supply. As a driver of economic development especially in the advanced countries, Nigeria has been at the receiving end in the global competitiveness for energy resources. In her quest to catch up, Nigeria state has in the recent past initiated public policy and reforms in the power sector in order to resuscitate her ailing economy. However, it is based on this established backdrop that the thrust of the paper seeks to appreciate the unbundling and privatization of Power Holding Company of Nigeria (PHCN), and Agro-manufacturing industry, the linkage between National Electricity Regulatory Commission (NERC), and quantity of energy supply to agro-industries in Nigeria. Methodologically, the paper adequately utilized documentary method. Data were generated through the secondary sources of data collection and analyzed in content. The theoretical framework of analysis is strictly anchored on the Marxian theory of post-colonial state which informs how the post-colonial tendencies shape the character and nature of Nigerian state, its politics and economy. The finding of the study reveals the significant ways, other than electricity, that can boost the economy through agricultural activities. The paper recommends among others; partnering of government with the private operators and stakeholders in funding of energy sector.

Index Terms- Agriculture, Development, Electricity, Industry, Manpower

I. INTRODUCTION

The history of electricity development in Nigeria is traced to the end of the 19th century when the first generating power plant was installed in Marina, Lagos in 1898, fifteen years after its introduction in England (Claudius, 2014). It was after the swift amalgamation of the Northern and Southern protectorates by the colonial masters and overlord in 1914 that other towns and areas started to shape and develop their electric power supply system on individual scale. According to Adeyemi, Opeyemi & Oluwatomisin (2016), government and national owned electricity system remained separate operational entity for several years until 1946. In the same year, Public Works Department was ceased to

have control over the operation of the electricity generating plants and distribution in Nigeria.

However, by 1950, a central regulatory body was established to take over all the various electric supply outlets within the country, and were referred to and addressed as the Electricity Corporation of Nigeria (ECN). Likewise, in 1962, an Act of Parliament which established Niger Dams Authority (NDA), was entrusted for dam construction. Though, both ECN and NDA became defunct and were merged to form a unified National Electric Power Authority (NEPA), on 6th of January 1973. Moreover, in order to deregulate the power sector, an Act of parliament was established to institutionalize Power Holding Company of Nigeria (PHCN), as government effort to revitalize power sector. This was aimed for the privatization and transfer assets and liabilities of NEPA to PHCN which was officially commissioned on the 5th of May 200, and mandated to carry out business of NEPA (Claudius, 2014).

It is interesting to note that despite the philosophy behind the reformation of power sector in Nigeria, plausible evidences had reveal that manufacturing industries in Nigeria have for a very long period of time faced with serious challenges leading to its unsatisfactory performance, most especially in the agricultural industry. Buttressing the above, the perennial low electricity supply in Nigeria has got worse in the first quarter of 2018 as cumulative power supply reduced to 114,556 megawatts, MW as against 114,054.92MW recorded in the last quarter of 2017. Data from the power generation fact sheet of the Presidential Task Force on power showed N37.88 billion was also lost in the first quarter of 2018, as against N38.94 billion recorded in the last quarter of 2017, while gas constraints stood at N55.66 as against N32.51 billion within the period respectively. Electricity month by month statistics of the quarter showed that January recorded the highest power sent out which stood at 63,138MW, while the sum of N21.63 billion was lost. Power loss stood at 1,966MW, while gas constraint of 30,622MW was recorded. February, 2018 followed in terms of power sent out, as it recorded 36,222 MW and amount loss of N119.91billion, while power loss stood at N236.85 with a gas constraint of 16,526.5MW.

In January 2018, power distribution out stood at 15,196MW, as N4.33 billion was recorded as amount loss, while power loss stood at 251MW, with gas constraint of 8,520MW. In the last quarter of 2017, the month of December had the highest

power sent out of 77,577MW, with amount loss of N20 billion, while power loss stood at 724.59, with gas constraint of 17,784.6MW. This was followed by the month of October 2018, which recorded power distributed at 35,570MW, while amount loss stood at N11.08billion, with power loss and gas constraint of 2,406.17 and 5,084MW respectively (Udeme, Obasi & Ochayi, 2018).

The above outcomes implicate poor electricity supply which is the greatest problem confronting the agricultural sector in Nigeria. More so, the situation is exacerbated by a gross inefficiency, poor maintenance culture and unsystematic distribution of electric power. According to Adenikinju, (2011), the transmission of electricity networks in Nigeria has always been characterized by several outages leading to disruption of joy the citizens derive from consumption of electric power. The implication of the ills of energy sector in Nigeria is a function of dependence of people on electric power which is not even enough to meet the demands of the users, leading to constant load-shedding and blackouts.

However, following the National Electric Power Authority (NEPA), Technical Committee Reports of 2004, the last transmission line in Nigeria was built in 1987 while none of the ongoing ones have been completed. This has affected the performance of some industries especially manufacturing industries like the agro-industries. It is ironical that in spite of the enormous power generating potentials, about sixty percent of Nigerians still have no access to electric power supply (Ajanaku, 2007 & Adegbamigbe, 2007). The erratic nature of power supply cripples the agro-allied industries which lead to economic difficulties. On the same note, Kaseke & Hosking (2013), maintained that lack of reliable energy supply cause problems for agricultural development as most irrigation lines are run by electricity.

Moreover, despite the effects of power supply in every other sector, the agricultural sector in Nigeria has undergone different phases since her independence. The sector in the 1960s contributed 85% of Nigeria foreign exchange earnings, 90% employment generation, and about 80% to gross domestic product (CBN, 2010). On the other hand, the agricultural sector since the discovery of oil has witnessed lots of neglects from the various successive governments. At present, agriculture accounts for only 35%, and below the real Gross Domestic Products, while crude oil accounts for about 55% and above (Noko, 2016). Although, agriculture seems no longer serve as the leading foreign exchange earnings due to phenomenal growth in oil sector of the economy as observed, but still dominating economic activities in terms of employments leading to greater Gross National Product. While accounting for one-third of the GDP, agriculture remains the leading employer of the vast majority of the Nigerian population as it employs two-third of the labour force (Ekpo & Umoh, 2012).

The principal constraint to the growth of the agricultural sector is the fact that the structure and method of energy production has remained the same since independence as epileptic power supply ceases not to supply. The Transformational Agenda of the former Administration of President Goodluck identified agricultural sectors as the main growth driver among water resources, solid minerals, manufacturing, oil and gas, trade and commerce as well as culture, and tourism. The decision was prompted by the fact that the performance in these sectors had

been constrained by several challenges including low productivity, low level of private sector investment, non-competitiveness, inadequate funding, poor regulatory environment, poor quality of goods and services, and high cost of doing business (FGN, 2011).

Despite the various energy reforms by Nigerian government which aimed at providing regular power supply to urban and rural areas across the nation, it is still a dream yet to come through. Consequently, the current status of electricity generated in Nigeria with regard to the population is grossly inadequate. This challenge has been into existence since the 1970s when the Udoji's Federal Government awards improved the economic life of the workers. This has made the workers to increase their electricity consumption by purchasing several sophisticated and automating machines that consumed quite a lot of energy. The power utility company, on the other hand was not prepared for this increase in consumption, and thus, leading to consistent imbalance in demand and supply of electricity.

Furthermore, the inconsistencies in public policy and lack of political will have been identified as the driver for power sector reforms in Nigeria which started under the aegis of National Electric Power Authority (NEPA). The major aim is to harness and utilize the financial, human and other resources for the development of the electricity supply across the country. As noted by Aliyu, Ramli & Salem (2013), the electricity industry has suffered from high technical losses and less availability of power generating plants. This has necessitated the power sector reforms initiated in 2000 (Oyeneye, 2004). By this development, NEPA was unbundled into 7 generation companies (GenCos), one transmission company (TransCos) and eleven distribution companies (DisCos). This arrangement is expected to encourage private sector investment particularly in generation and distribution (Okafor, 2005).

The reform bill approved by the Nigerian Federal Executive Council (FEC) is intended to achieve the following five objectives:

- Unbundle NEPA.
- Privatize the unbundled entities.
- Establish a regulatory agency.
- Establish a rural electrification agency.
- Establish a power consumer assistance fund.

However, despite power sector reforms in Nigeria, it has poses great challenges not only to the government that initiated the programme but also the populace who are the consumers of energy and to the new born PHCN which parades itself as a better alternative to the moribund NEPA. The importance of a stable power supply to the development of the agricultural sector in Nigeria cannot be over-emphasized. With the increasing food demand in Nigeria, the country has available natural resources and potential for increasing the volume of crop production towards meeting the food and nutritional requirement of the rapidly increasingly population and guarantee food security in the country. However, this is not to be the case of the Nigeria populace due to inadequate power supply.

It is important to note that modern agriculture requires an energy input at all stages of production such as direct use of electricity supply in water management, irrigation, cultivation, milling, land preparation and so on (Okoro, Govenda & Chikuni, 2006). Hence, the role of adequate electric supply in food processing for agro-industries cannot be neglected. Agriculture is

an important, but not dominant user of energy in Nigeria. Nevertheless, improving energy services for the populace especially in the rural areas in Nigeria should include increasing the energy input to agriculture so that gains in productivity, enhanced food security and rural economic development can be made. However, this is not the case. Most agro-industries depend on the use of generators for production, and this at the end of the day leads to the cost of production of goods far outweighing the profit accrued. Onakoya, Onakoya, Jimi-Salami & Odedairo (2013), asserts that the commercialization and privatization reform act which is aimed at addressing the acute power shortages has not yielded the desired result. As a result, majority of Nigeria's power plants are working below sixty percent of their total installed capacity. So far, this large scale blackout across the country has actually contributed to low productivity and in some cases the shutdown of some agro-industries in Nigeria.

II. UNBUNDLING AND PRIVATIZATION OF PHCN AND AGRO-MANUFACTURING INDUSTRY

In emerging democracies, reforms are predicated upon the needs for reorientation and repositioning of an existing status quo in order to attain an effective and efficient state. Besides, the fact that global economies are now private sector driven, inefficiency in Nigeria's power sector, occasioned by actions and inactions of the federal government and necessitate for the reforms in energy sector. Like other sectors in Nigeria, the story of the country's energy sector since the emergence of Electricity Corporation of Nigeria, ECN, ordinance No. 15 of 1950, has been punctured by operational failures (Udeme, Obasi & Ochayi, 2018).

According to Olaoye (2014), advantages abound when effective policies through reforms are enacted and implemented in the agricultural sector. The effective implementation of agricultural reforms has remained a huge problem in the development of the agro food industry in Nigeria. He also observed that the required processing techniques to convert crops and tubers into Value added Products (VAPs) are usually hampered because of non-availability of necessary processing facilities, and when available the electric power required to run them is lacking or grossly inefficient. Meanwhile, Orya (2015), observed that to unlock the potential for agricultural production, expansion of agro-industries is an essential pre-condition. Accordingly, he noted that the major factors that constrict the agro- processing sector is epileptic power supply. He put the decline of agro-industry to total manufacturing over the period of 1995 to 2006 according to a UNIDO2013 report, the level of loss for grains at 15-25 percent, post- harvest losses for fruits and vegetables at 35-50 percent of total production.

However, Osakwe (2017), posited that the agro-sector total 'Value Added' fell from 36% between 1980-89 and 26% in 2008-2014. Notwithstanding some positive developments in the sector,

the contribution of agro-manufacturing to total value added remains very low and this should be of concern because Nigeria depends heavily on agro- imports, which indicates that there is a huge domestic demand for agro- manufactures that is not being met through domestic production. He concluded in his report that the main challenges facing agro-industry is lack of access to stable and affordable power supply. Power supply to him, is unstable and expensive due to the unbundling and privatization policy of PHCN. According to his report finding, in 2013, the electrification rate in Nigeria was 45% compared to other developing countries with average of 78%, and the North African average of 99% (IEA, 2015).

Furthermore, Jacobs (2015), noted that the Manufacturers Association of Nigeria estimates that in 2014, an average agro-manufacturer experienced power outages 5 times per day, and was supplied electricity for just six hours per day. A study by the World Bank found that power outage is a more serious problem in Nigeria when compared to countries such as Brazil, China, Cote d' Ivoire, Ethiopia, Ghana, Kenya, Russia and South Africa. An average agro- firm in Nigeria loses about 17% of its sales due to power outages compared with less than 1% for agro-firms in China, 1% for those in South Africa and 5% for those in Ethiopia (Udeme, Obasi & Ochayi, 2018).

To Ganiyu, Adebayo, Oluwatomi, Ahmed Sulaimon & Lukman (2018), poor power situation in Nigeria is attributed to the incidence of privatization of PHCN. He maintained that about 70% rise in cost of operations was recorded as power generation which rose to above 4,500 megawatts, and suddenly dropped to less than 1,200 megawatts, resulting in load shedding by the power distribution companies. Getting electricity evenly distributed to the real sector has become a task the DisCos have not found funny. Accordingly, a report from the Manufacturers Association of Nigeria (MAN), members' companies in the past three years spent 20.8 billion naira monthly on power generation to run production process.

Also Jacobs (2015), noted that the effects of the power shortages and constant outages were numerous, range from cut down in production, job loss to outright closure or relocation to other countries by industries. He added that agro -firms had bear so much loss as the outage often occurs when goods are in the middle of production. Most firms like Coca cola, Nigeria flour mills self-generate their power. They don't rely on the national grid. Corroborating this, the Director General of the Nigeria Employers Consultative Association (NECA), Mr. Oshinowo, said generating alternative power to run the agro-manufacturing industry is expensive and invariably increases the cost of production. Oshinowo said as Nigerian companies operate in the global market, the consequence of incurring high cost on power generation undoubtedly would make the nation's agro-industries less competitive.

Table 2: Electricity Distribution Companies and their Networks

Name of company	Owner*	Purchase Value (\$ Million)	Coverage	Length of lines							Distribution losses (%)	Capacity (MW)	Peak Load Demand (MW)	Customer based (as at 2008)
				Overhead			Cables			Total				
				33KV	11KV	LV	33KV	11KV	LV					
Abuja	Kann Consortium Utility Company Plc	164	FCT, Niger, Kogi and Nasarawa	3,312	3,804	3,520	0	355	262	11,253	35	515	835	469,306
Benin	Vigee Power Consortium	129	Edo, Delta, Ondo and Ekiti	4,133	5,168	12,576	11,146	132	150	33,305	21	392	100	529,341
Eko	West Power & Gas	135	Lagos South	545	2,347	3,980	317	462	262	7,913	18	796	1105	266,075
Enugu	Interstate Electrics Limited	126	Enugu, Abia, Imo, Anambra and Ebonyi	4,092	3,210	20,558	4	178	213	28,255	6	612	1017	545,103
Ibadan	Integrated Energy Distribution and Marketing Company	169	Oyo, Ogun, Osun and Kwara	8,088	4,594	11,401	0	462	407	24,952	8	878	1193	812,000
Ikeja	NEDC/KEPCO	131	Lagos North	7,711	2,730	25,742	12	110	262	36,567	18	854	1335	535,692
Jos	Aura Energy Ltd	82	Plateau, Bauchi, Benue and Gombe	3,930	1,395	12,152	0	20	56	17,553	22	378	507	277,826
Kaduna	Sahelian Power SPV Ltd (Not fully privatized yet)	58	Kebbi, Doka, Gusau, Mak	1,533	1,614	6,535	5	145	93	9,743	25	344	520	285,736
Kano	Sahelian Power SPV Ltd	137	Kano, Jigawa and Katsina	3,583	1,253	2,351	4	156	17	7,364	40	365	596	489,655
Port Harcourt	4 Power Consortium	124	Rivers, Cross River, Bayelsa and Akwa Ibom	6,109	9,747	n.a.	n.a.	n.a.	n.a.	15,856	n.a.	486	773	347,789
Yola	Integrated Energy Distribution and Marketing Company	59	Yola, Adamawa, Borno, Taraba and Yobe	8,761	1,407	21,485	0	2	25	31,680	22	138	176	189,347

*State governments are shareholders in the DISCO that operates in their territory. Ikeja also counts with a private stakeholder: Sahara Energy
**Table created only for indicative purposes. The information included might not be complete or up to date

Source: Nigeria Energy Situation (NES, 2018)

The table two above shows the discrepancy between total energy demanded and the total supply by distribution companies. Ekpo & Umoh (2015), posited that hope were dashed following the inability of the power generating companies (GenCos), and distribution companies (DisCos) to provide the power supply needs of agricultural industries years after the privatization implementation. He observed that the role of agriculture in a developing country like Nigeria cannot be trivialized. In a recent press conference in Lagos, the leaders of Food, Beverage and Tobacco Senior Staff Association (FOBTOB), called on the federal government to intervene and save the industry and over 3 million jobs that are under threat. Likewise, the National Bureau of Statistics put the total number of Small and Medium Enterprises (SMEs) in the country at over 17 million, many of which rely on generators to run their businesses as the country continues to grapple with abysmal power generation. Also, speaking in the same vein, the National President of Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA), Bassey Edem, posited that despite the privatization of the power sector, there is still epileptic power supply in Nigeria. The country generates less than 5,000 megawatts of electricity for over 170 million people. Likewise, the president of Erisco Foods Limited, Umeofia Eric observed that the high cost of running manufacturing plants on generators was one of the reasons most local industries had remained uncompetitive; high cost of electricity most importantly have wreak havoc on the Nigerian manufacturers. In a survey carried out by the Manufacturers Association of Nigeria revealed that 130 billion naira was spent on self-generated energy in 2016. In as much as most scholars, writers, presidents of associations have much attributed the

decline in the agro-manufacturing sector to the incidence of the unbundling and privatization exercise of PHCN. They merely did a surface critique of the major factor(s) militating against growth in the agro-manufacturing sector, which will be addressed in our gap in literature.

III. NIGERIA ELECTRICITY REGULATORY COMMISSION AND QUANTITY OF ENERGY SUPPLY TO AGRO-INDUSTRIES

According to Okoromadu (2015), he asserts that while Nigerian electricity consumers continue to bear the burden of estimated billings, the sector regulator, Nigeria Electricity Regulatory Commission (NERC), and distributing companies have continued to use technical jargons to dribble consumers on directives concerning prepaid meters. The Nigerian Electricity Regulatory Commission (NERC) is empowered by the Electric Power Sector Reform (EPSR) Act, 2005 to ensure an efficiently managed electricity supply industry that meets the yearnings of Nigerians for stable, adequate and safe electricity supply (NERC, 2015).

Accordingly, the Acts mandate the commission to ensure that electricity operators recover costs on prudent investments and provide quality service to customers. Meanwhile, Okolo (2004), noted that insufficient energy generation and poor distribution in Nigeria is attributable to policy and regulatory barriers. According to him, majority of people residing in rural areas that house traditional agro-industrial processes, and usage of electricity is very pronounced in cases of milling operations dried yam, cassava cubes or slices and energy intensive operations, including pulping of vegetables and fruits. He noted that these activities could be

reasonably accelerated if access to energy is available to run modern equipment to provide effectiveness in their production. To him such low electrification constrains both agro-industrial production and the consumption of processed food products, since many agricultural raw materials especially highly perishable food raw materials, need to be processed within a few hours of

harvesting in order to ensure food conservation, safety and marketability. Therefore, he concluded that the amount of energy supplied to the agro-sector most especially in rural areas is extremely limited, too expensive or of low quality.

Table1: The table below shows the trends in Eletrification, 1997, 2006-2020

No.	State	No. of Households as of 1997 (*1)	% of Household with Electricity as of 1997 (*2)	No. of Households with Electricity as of 1997	Annual growth rate of consumers (%)	% of Household with Electricity			No. of Household with Electricity		
						2006	2010	2020	2006	2010	2020
1	Taraba	432,880	12	50,301	7.80	17	21	34	98,888	133,542	283,012
2	Jigawa	823,164	12	99,685	7.77	18	22	35	195,520	263,766	557,554
3	Zamfara	593,479	13	77,924	7.71	20	23	37	152,101	204,752	430,492
4	Sokoto	686,178	13	90,095	7.71	20	23	37	175,859	236,734	497,734
5	Kebbi	592,137	13	77,807	7.71	20	23	37	151,866	204,431	429,794
6	Katsina	1,074,392	14	145,902	7.69	20	24	38	284,184	382,194	801,663
7	Gombe	426,284	17	72,553	7.49	25	30	46	139,031	185,628	382,367
8	Bauchi	819,259	17	139,438	7.49	25	30	46	267,198	356,753	734,857
9	Benue	788,111	17	135,003	7.49	25	30	46	258,565	345,146	710,537
10	Yobe	400,682	19	75,729	7.39	27	32	50	143,826	191,270	390,098
11	Ebonyi	416,196	25	102,759	7.06	39	46	69	189,857	249,413	493,343
12	Enugu	608,334	25	150,198	7.06	39	46	69	277,505	364,554	721,096
13	Cross River	547,224	29	159,954	6.80	40	47	68	289,196	376,273	726,572
14	Nassarawa	345,773	31	108,607	6.68	43	49	71	194,326	251,669	480,372
15	Plateau	602,456	31	189,231	6.68	43	49	71	338,583	438,495	836,973
16	Kano	1,663,337	32	538,256	6.62	44	51	72	958,709	1,239,106	2,353,218
17	Borno	725,970	34	248,935	6.51	46	53	75	439,310	565,469	1,062,926
18	Adamawa	601,745	35	210,069	6.48	47	54	76	369,621	475,140	890,189
19	Akwa-Ibom	689,703	36	246,638	6.43	47	55	77	432,200	554,578	1,034,327
20	Niger	693,215	42	288,932	6.10	54	61	83	492,124	623,542	1,126,789
21	Kaduna	1,126,632	43	479,607	6.05	55	62	84	813,402	1,028,655	1,850,037
22	Kogi	614,828	50	309,996	5.60	62	70	90	506,218	629,499	1,085,526
23	Bayelsa	321,102	52	167,069	5.51	64	71	91	270,706	335,469	573,511
24	Rivers	912,575	52	474,813	5.51	64	71	91	769,348	953,408	1,629,926
25	Abia	547,888	52	287,587	5.48	53	58	75	464,946	575,611	981,623
26	Imo	711,551	61	433,833	5.00	72	78	96	673,132	818,258	1,333,107
27	Delta	741,568	62	462,294	4.92	73	79	96	712,530	863,590	1,396,589
28	Edo	621,770	63	388,855	4.91	73	79	96	598,757	725,382	1,171,814
29	Kwara	443,257	68	299,509	4.63	77	83	98	450,021	539,288	847,795
30	Osun	617,802	71	436,539	4.45	80	85	99	646,094	769,082	1,188,952
31	Abuja	106,397	71	75,436	4.44	80	85	99	111,517	132,676	204,841
32	Ogun	668,065	72	483,813	4.35	81	86	99	709,928	841,842	1,289,056
33	Ekiti	439,644	72	318,698	4.35	81	86	99	467,484	554,265	848,386
34	Ondo	643,968	72	466,812	4.35	81	86	99	684,748	811,860	1,242,673
35	Anambra	800,534	78	621,295	4.06	85	88	99	888,786	1,042,097	1,551,263
36	Oyo	988,395	78	771,541	4.03	85	89	100	1,101,286	1,289,986	1,915,566
37	Lagos	1,638,903	96	1,577,936	3.00	96	96	97	2,058,848	2,317,252	3,114,193
	Total Nigeria	25,475,400	44	11,263,648	6.04	53	58	75	17,776,220	21,870,672	37,168,770

(Remarks)

(*1) No. of Households as of 1997 was extrapolated based on the result of 1991 Census.

(*2) % of Household with Electricity as of 1997 was quoted from the result of General Household Survey 1997/98.

Average number of persons per household 4.13

Annual growth rate of consumers (Highest) 7.80 %

Annual growth rate of consumers (Lowest) 3.00 %

Source: Nigeria Energy Situation (NES, 2018)

The above table clearly depicts the sorry state of energy distribution in Nigeria as affects microeconomic and agricultural activities. Adah (2017), observed that the coming onboard on the president Muhammadu Buhari administration in 2015 brought an unprecedented hope of improved and steady power supply to Nigerians. However, in the face of all these efforts by the Minister of power, Babatunde Fashola and other stakeholders, the sector is not seen to be better than what it has been years ago in terms of power supply. There seems not to be any significant departure from what it used to be as the power delivered still hovers around the daily average of 3,000 to 3,500 megawatts. According to him,

accusing fingers are keenly pointing in a particular direction by stakeholders and experts. They believe that the Nigerian Electricity Regulatory Commission (NERC), which is at the center with the mandate of providing the operational framework for the industry which is the backbone of the country and ensuring compliance with all regulatory measures in line with government policies has not been living up to its billings, hence the one- step-forward- two-steps-backward journey of the sector.

Also, Ogaji (2018), maintains that lack of vibrant leadership in the sector is largely responsible for the setback being suffered at the sector amidst all orchestrated efforts at bringing about incremental and stable power. She observed that since

NERC was not standing up as a regulator, that some stakeholders flagrantly flout the contractual terms knowing that nothing will happen. According to Madu (2017), NERC as a regulator was a fundamental requirement for the achievement and advancement of what the power sector reform aims to achieve, which is stable power supply to all including the manufacturing industries. He observed that energy is required to power agro-processes in order to produce goods. Thus, insufficient, unreliable or costly access to electricity has remained a binding constraint to the development of agricultural sector in Nigeria. He noted that over the years, the limited growth of Nigeria's electricity supply industry, combined with the high cost of diesel and petrol generation has crippled the growth of the country's productive industries.

A report by Overseas Development Institute (ODI, 2015), states that half of all businesses in sub-Saharan Africa report lack of reliable electricity as a major constraint. Accordingly, power outages cost African countries an estimated 1-2 percent of their GDP annually. It is estimated by the World Bank that the total loss in GDP to Nigeria over the last few years, due to poor electricity supply can be put at approximately 71 trillion naira. A review of the World Bank data on electric power consumption, for Nigeria and China between 1971 and 2015, indicates that the widening gap between China and Nigeria in terms of agricultural growth could be strongly correlated to the widening gap for electric power consumption. Scholars like Olaoye (2014) and Osakwe (2017), examined critically the benefits of privatization and the linkage between unbundling and privatization of PHCN and decline in the agro-sector; the numerous problems of the privatization policy. They disregarded other contributing factors to the decline in the agro-industry. To these writers, they argue that the privatization policy, and the unbundling of PHCN has led to the incidence of irregular power supply and an expensive cost of electricity was a major constraint to the growth of the agro-sector. However, they failed in their analysis to consider other restraints to the development of the agro-sector like problem of policy incapacity and implementation inefficiency. This therefore questions skills and appropriate use of required manpower in both policy formulation and implementation processes. Also, another contributing factor to the decline of the agricultural sector which was disregarded is the problem of lack of storage, transportation and processing facilities which has caused wastage. For instance, the demand for tomatoes is put at 2.2m tonnes while supply is 0.8m tonnes. However, actual production is 1.5m tonnes, with 0.7m tonnes lost per harvest. Nigeria spends 1 billion dollars importing tomato paste (Africa Business Insight, 2016).

Examining the effects of NERC on the quantity of power supply to the agro-sector, Okoromadu (2017) and Adah (2017), examined the compromised character of NERC. They argued that the major challenge hindering the unlimited amount of power supply was nothing but corruption, inefficiency and greed of operators. However, they neglected to bring to bear the interference of government in their activities. More so, a lack of incentives in the form of financial support and matching grants from state governments to the 11 distribution companies (DisCos), to extend their services to rural areas of the country. Hence, such financial incentive should be given through an independent regulatory body such as NERC to ensure proper supervision and monitoring. Therefore, this will in turn ensure adequate power

supply to manufacturing sectors like agro-industries. Although, these scholars were logical in their analysis, they however overlooked the above contributing factors in the implantation of the power sector reforms and its impact on the development of the agricultural sector in Nigeria

IV. THEORETICAL FRAMEWORK

This study employs the Marxian post-colonial state theory as the explanatory tool of analysis as post-colonial tendencies have shaped the character and nature of the Nigerian State, its politics and policies. As explained by Alavi (1975). The argument is premised on the historical specificity of post-colonial societies, which arises from structural changes brought about by the colonial experience and alignments of classes through superstructures of political and administrative institutions. Secondly, the work considers the radical re-alignments of class forces which have been brought about in the post-colonial situation. Thus, it was in order to secure their economic interests that colonial governments discouraged the emergence of a strong indigenous capitalist class. The specific manner in which the colonialists produced the indigenous elite turned the competition for the control of state power into a do-or-die affair hinged on corrupt practices and inefficient service delivery. This was so because control of state power provided the only access to primitive accumulation of capital – the process by which a class of capitalists is produced. Consequently, state institutions became the main instruments for perpetuation of class interests and for willful alienation and self-reproduction.

Furthermore, the feature of the socio-economic formation in post-colonial states and the contemporary peripheral formations generally is that the state has very limited autonomy (Alavi, 1972). That is, the state is institutionally constituted in such a way that it enjoys limited independence from the social classes – particularly the hegemonic social class – and so is immersed in class struggle instead of rising above it. This is why the post-colonial state is incapable of mediating the class struggle. The above explains why the power sector reforms have continually been a struggle for government to deal with despite all the efforts that have been going on in the sector since Nigeria's independence. Those who have benefitted from the inadequate power supply have ensured that successful reforms never take place. This is because of the weak economic base of the class that inherited post-colonial Nigeria, which has made the state a major instrument of investment and development of personal-regarding interests, thereby making the class wholly reliant on the state for wealth accumulation. This framework of analysis helps in understanding how the instrumentalist nature of the Nigerian state constitutes to state of inefficient service delivery in the power sector and the resultant effects of this disaggregated action on the agricultural sector.

V. CONCLUSION AND RECOMMENDATIONS

The study exposes the capability of electricity consumption to move the nation from this undesirable state to better and more desirable state by being able to catalyze the so called agricultural growth and socio-economic development. The

study captures the present electricity status in Nigeria viz a viz the agricultural growth. Further consideration of strong granger causality shows its capability to turn the nation's economy around. This is due to the fact that Sunlight, Wind, Rain, Tides and Geothermal heat (renewable(s) are abundant in Nigeria and should be exploited to generate electricity required to spur the development in Nigeria.

The unbundling of the PHCN which has been taken over by private individuals is a right action in the right direction. The establishment of National Electricity Regulation Commission as institutional framework that is saddled with monitoring and regulation of the sectors is in line with the best practices. Therefore, the body must be strengthened and made to be independent in decision making as far as this privatization is concerned in order to avoid the situation where public monopoly would be turned to private monopoly.

The sector is a promising one, which is capable of bringing about the success story to Nigeria if it is properly harnessed. In the light of this, Federal government should continue to partner with the private operators in the area of funding as we all know that the project concern is capital intensive and a very long gestation period.

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The Structure and Function of Heavy Syllables in the Phonology of English Language

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DOI: 10.29322/IJSRP.9.08.2019.p92139
<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92139>

Abstract

This paper examines the place of heavy syllables in relation to syllable structure in English language. Drawing from examples in the literature, it is seen that syllable weight plays a vital role in the placement of stress in English. It is noted that although nouns, adjectives and verbs display different stress patterns, in all of these, it is always the heavy syllables that attract stress. Apart from the issue of stress assignment, the paper looks at other prosodic phenomena in which syllable weight is paramount. These include metrical scansion, compensatory lengthening, language acquisition and the syllable weight in tone languages. All of these indicate the indispensability of heavy syllables in the prosody of human languages.

Key words: Syllable Heavy Weight Phonology English

1.0 Introduction

The syllable in many languages of the world is an essential unit that forms the basis of phonological representation and analysis. In spite of its importance however, it has remained difficult to define. Even though phonologists agree (depending of course on a number of factors which will not be mentioned in this paper) that it is easy for even the 'naive' speaker to recognise the number of syllables in any given word (Kahn 1976; Goldsmith 1990; Giegerich 1992; Ladefoged, 1993) there is equally a convergence of views on the difficulty in defining it. Here, one is faced with a paradox – easy to recognise even by a layman, but hard to define even by a phonologist.

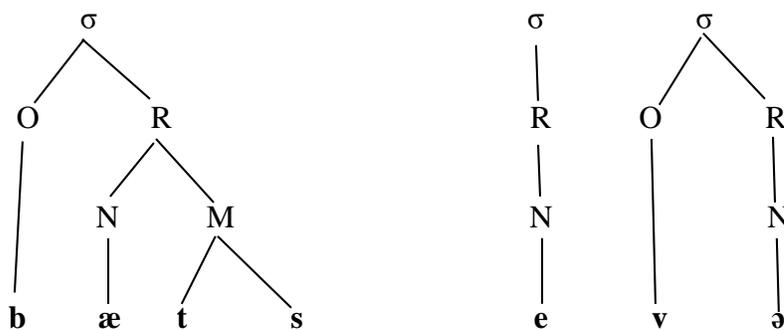
For this reason, the syllable is defined either from the perspective of the Chest Pulse or Sonority theories which in themselves are not fully satisfactory. This paper does not intend to go into the shortcomings of these theories in order not to go out of scope; it will all the same not be out of place to mention that Ladefoged (1993:247) questions the wisdom behind the Chest Pulse theory by refuting its claim thus: "... it is clearly untrue to say

that every syllable is initiated by a chest pulse". Giegerich (1992:137) on the other hand, impugns the Sonority theory by posing some questions that the theory has not yet answered, for example, the categorisation of the word *sticks* as monosyllabic when it contains three peaks of sonority. Consequently, this paper concurs with Ladefoged's description of syllable as "the smallest possible unit of speech" (1993:248).

1.1 Syllable structure

Katamba (1989:153) reports that there are a number of syllable models. This paper however limits its discussion to a brief examination of a branching hierarchical syllable structure. A syllable according to Hyman (1975:188) consists of three 'phonetic parts' – "the onset, the nucleus or peak and the coda". It is a unanimous position of phonologists that an English syllable must at least contain a nuclear segment which constitutes its rhyme – either a vowel or a syllabic consonant. This is because other syllable components such as the onset and coda are said to be optional (Katamba, 1989:155). But is a caveat not necessary here? Is the optionality of the onset particularly absolute? This is because it could be argued that in the second syllable of the word *helping* for example, the onset is necessarily obligatory.

The basic syllable types are exemplified below:

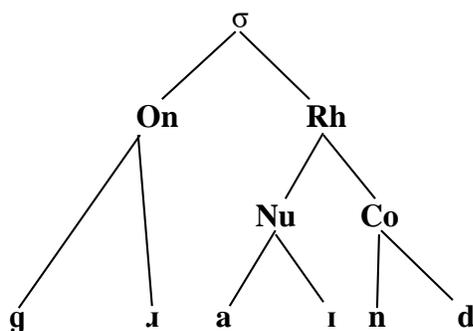


Source: Katamba (1989:154).

The syllable in the word *bats* (first left), has both an onset and a rhyme consisting of a nucleus and a coda. The word *ever* is a disyllabic word containing a single syllable with neither onset nor coda whereas the last syllable has an onset but without a coda.

1.2 Syllable template

From the foregoing illustrations, it is possible to consider what constitutes a syllable template in English. The concept of syllable template is important in the understanding of syllable structure. It provides a fit to which every acceptable English syllable must conform. The most promising way of organising a syllable template is by recourse to the Sonority theory, notwithstanding its shortcomings as highlighted by various scholars. English syllables are made of structures that may be seen as maximal (Hogg & McCully 1987; Giegerich 1992) but these are often violated both in onset and coda positions by some 'non-compliant' segments. /s/ for example is notorious for violating not only the maximal onset requirements but also that of sonority. Fortunately, or so it may seem, it is the only 'offender' in the onset position (/ʃ/ is reported to occur rarely in Yiddish loan words), so it is easy to handle. This is because it has been identified that there are selectional restrictions imposed on which segments should become its immediate neighbours to the right in syllable onsets – the voiceless obstruents: /p/, /t/, /k/. In the coda position, /s/ again violates the phonotactic constraints of English, but here, it has some 'allies' such as /t/, /d/, /z/, /θ/ and /dʒ/ (Giegerich 1992:150). Consequently, a normal English syllable template looks like this:



Source: Hogg & McCully (1987:41).

However, with the admission of 'appendices' that violate both the maximal projection and sonority (Giegerich, 1992:150), a more elaborate syllable template emerged to accommodate three 'X' positions in the onset and six 'X' positions in the rhyme (two in the peak and four in the coda).

Notwithstanding the above, there is again a consensus among scholars that a CV type syllable is the most natural. Hyman (1975:188) citing Malmberg (1963:29) contends that this type of syllable is the 'most primitive' as well as the earliest in addition to being present in all languages. Hyman (ibid) himself is of the view that it is difficult to establish syllable boundaries in syllables with complex structure.

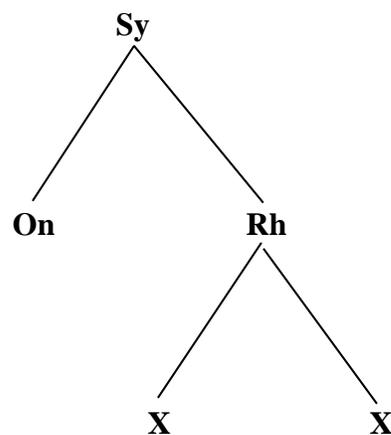
2.0 Syllable weight

The preceding discussion is aimed at providing a snippet of what a syllable is and how its structure looks like. In this and subsequent sections, syllable weight (which is the focus of this paper), is discussed. Gussenhoven & Jacobs (2011:173) view syllable weight in terms of the presence or absence of moras (morae). A mora is understood to refer to a phonological unit which is beyond the segment but below the syllable. They call it "intermediate level structure between segments and the syllable". Weight therefore according to them represents the "opposition between monomoraic and bimoraic syllables". This implies that any syllable with a single mora is light while the one containing two moras is heavy. Giegerich (1992: 47) considers weight from the perspective of the 's-nodes' that a syllable dominates in a structure; hence, the distinction between a heavy and light syllable is thus: the "root" of a heavy syllable "dominates an 's' which in turn dominates an 's' (the nucleus)" while that of a light syllable only "immediately dominates the nucleus". Katamba (1989:176) equally contends that "a syllable is heavy if it contains a branching rhyme" and light if otherwise. A heavy syllable will therefore necessarily contain a tense vowel or a diphthong whether or not followed by a consonant; or at least a short vowel followed by a consonant. The difference between the two proposals above seems to be that Gussenhoven & Jacobs adopt a moraic model while Giegerich opts for the skeletal slot model in their

representations of weight. The discussion that follows dwells on the role of heavy syllables in the phonology of English.

3.0 Function of heavy syllables in the phonology of English language

In the preceding section, an attempt was made to identify heavy and light syllables. This section is devoted to a discussion of the functions of heavy syllables. It is however considered important to look at the structure of a heavy syllable below:



Source: Giegerich (1992:146).

The tree diagram above indicates that a heavy syllable dominates two 'X' nodes in its rhyme as opposed to a light syllable which dominates one. Having seen this, the paper now proceeds to discuss the functions of heavy syllables.

3.1 Stress placement

It can be argued that stress placement is about the most noticeable function that a heavy syllable performs. English stress placement is said to be dependent on a number of variables. Loudness in itself does not determine where stress falls; other parameters such as "duration, pitch variation and vowel quality" are of tremendous importance (Fudge 1984; Gussenhoven & Jacobs, 2011). A stressed syllable will therefore

naturally be more prominent relative to other syllables in the same word. As the focus of this paper is on syllable weight generally, the discussion of stress is limited to lexical stress only.

The function of heavy syllables is seen in the basic rules of stress placement as outlined by Fudge (1984:29). Monosyllabic words he observes, offer no choice as they are usually stressed. (This statement should be selective because function words, most of which are monosyllabic, are not stressed except for effect). Two-syllable words take penultimate stress while three and longer syllable words receive either penultimate or antepenultimate stress "depending on a number of factors: if the final syllable is strong, stress falls two syllables back from that syllable", otherwise "if the penultimate syllable is strong, then it is stressed". Alternatively, the syllable preceding the penultimate is stressed "if the penultimate is weak". This however, applies only to nouns. Verbs and adjectives have different stress patterns as shown in the examples below, taken from Davenport & Hannahs (2010:81-83 emphasis added):

(1) e.le.phant

wa.la.by

al.ge.bra

oc.to.pus

(2) hy.e.na

com.pu.ter

po.ta.to

ko.a.la

(3) ve.ran.da

u.ten.sil

con.vic.tion

pen.tath.lon

The examples above, show the relevance of heavy syllables in the assignment of stress in English nouns. The nouns in (1) have antepenultimate stress because those are the syllables that are heavy relative to the remaining ones in each of the words. In the examples in (2) and (3) however, the penultimate syllables are the ones bearing stress because they are heavy. The following examples from verbs show a different pattern:

(4) a.**ppeal**

en.ter.**tain**

con.**fuse**

de.**ny**

(5) in.**tend**

co.**llapse**

re.pre.**sent**

su.**ggest**

In both the examples in (4) and (5), all the verbs have final heavy syllables and they are the stressed ones unlike in the examples in (1), (2) and (3) for nouns. It should be noted however, that verbs in which the stressed syllables are not the final ones exist. Examples are in such words as con.**si**.der, a. **sto**.nish, i.**ma**.gine, **pro**.mise, etc. which all have penultimate stress because those are the heavy syllables in the words. This inconsistent occurrence with respect to verbs is outside the scope of this paper and is therefore not discussed further.

The last examples are from adjectives as in the following:

(6) **won**.der.ful

in.cre.di.ble

con.fi.dent

(7) en.**thra**.lling

u.**ni**.ted

a.**ma**.zing

(8) a.**ttrac**.tive

tri.**um**.phant

a.**ttack**.ing

In the examples above, all the adjectives show a stress behavior that is similar to the one exhibited by the nouns in (1), (2) and (3) above. The antepenultimate syllables are stressed in (6) because they are heavy while only the penultimate syllables in (7) and (8) are stressed as they are the heavy ones. In (9), (10) and (11) below, the adjectives display a different pattern of stress.

(9) **so**.lid

sim.ple

ur.gent

(10) in.**sane**

com.**plete**

ob.**tuse**

(11) co.**rrupt**

un.**kempt**

in.**tact**

In all the examples in (9), (10) and (11), the adjectives behave like verbs in their stress patterns. A learner of English would be excited that stress placement in the language is not only predictable but indeed has a set of rules, only to become disappointed by realising that "the stress rules of English are ... riddled with exceptions" (Kahn, 1976:85). English nouns for example, are "extrametrical". The final syllables in nouns are therefore invisible to the rules of stress. However, the -ee in the nominalisation of 'detain' by suffixation, i.e. detainee, attracts stress but suffixes like -ity pass stress to the penultimate syllable (Katamba, 1989:255). Words like *badminton*, *calendar* and *cylinder* (all containing heavy penultimate syllables) are stressed on the antepenult

whereas the penults of *vanilla*, *Madonna* and *confetti* which are light, take stress by resorting to "ambisyllabicity" (Giegerich, 1992:188-189). What an inconsistency!

3.2 Metrical scansion

Metrical phonology developed out of the analysis of the traditional verse structure in poetry although Gussenhoven & Jacobs (2011:15) are quick to point out that the concept of foot in metrical phonology is "similar" to that of metrical poetry but they are not "identical". The applicability of this theory to syllable weight is restricted only to English language in this discussion. Goldsmith (1990:169) posits that the theory was propounded on "two formalisms: the metrical tree and grid" using S(trong) and W(eak) notations either by adjoining lines on trees or 'X' notations on grids. The concern of this paper is in the construction of feet in English.

Hogg & McCully (1987:65-70) posit that the S/W notation implies "stronger than" or "weaker than"; meaning that since the constituents are "binary branching" a node is either stronger or weaker than its sister node. Thus, any node that is S-dominant is considered "the most prominent" and identified as the "Designated Terminal Element (DTE)". Archibald (1993:46) gives a summary of English metrical parameters as:

- The word tree is strong on the right.
- Feet are binary.
- Feet are built from the right.
- Feet are strong on the left.
- Feet are quantity-sensitive.
- Feet are QS to the [RIME].
- There is an extrametrical syllable; and it is extrametrical to the [Right].

Two issues are of utmost interest to this paper: feet are binary and that feet are quantity-sensitive. Why? Because feet are binary suggests that a foot is made of two syllables (except where there is a degenerate foot):

strong and weak, in which one, the strong, dominates and therefore decides where stress falls. Feet are quantity-sensitive means "branching rhymes are stressed while non-branching rhymes are not". This takes us back to our description of heavy syllables where it was indicated that heavy syllables, contain branching rhymes and herein lies the relevance of Metrical Phonology to the function of heavy syllables in the phonology of English.

3.3 Compensatory lengthening

This paper does not intend to go into the controversy surrounding compensatory lengthening, but it is just being mentioned in view of its relevance to syllable weight. Goldsmith (1990:73) contends this process involves the "lengthening of a segment – most commonly a vowel, but not always" triggered by the removal or taxing of a "segment" that is otherwise "present". A segment he says "makes up" for what is lost by another segment in speech. This paper, except in Old and Middle English examples (and of course in non-rhotic English dialects in which the dropping of /r/ leads to the lengthening of the preceding vowel, for example *art* becoming [ɑ:t] rather than [ɑ:rt]), has not come across any literature on this process in English, but it is found in many languages such as the Turkish deletion of /h/ at the end of a syllable "before a continuant or a stop" forcing the vowel before it to lengthen in compensation, e.g. [kahya] → [ka:ya] (Goldsmith, 1990:76) and Fula in which following the prohibition against /h/ in the coda, it deletes while the vowel preceding it lengthens. Examples are in the words for *build* "mah-" but *maadi* 'building' and *walk* "yah-" but *yaadu* 'way of walking' (Paradis, 1992). In both examples, the deletion of /h/ triggers the lengthening of the preceding vowel (long vowels are represented by two letters in Fula orthography). The essence of this illustration is to show the role of syllable weight in languages generally and specifically the indispensability of heavy syllables in all languages.

3.4 Language acquisition

A passing comment on language acquisition is made in this paper to demonstrate the function of heavy syllables. Archibald (1993:58) notes that children's incipient use of language involves only heavy syllables because they "find it easier to produce and perceive words with initial stress" than otherwise.

3.5 Syllable weight in tone languages

Gordon (n.d) indicates that most languages permit level tones on all syllable types regardless of their weight but selectively assign contour tones to some heavy syllables. Gussenhoven & Jacobs (2011:151) indicate that depending on the language, either a syllable is the "tone-bearing unit (TBU)" in which case tense vowels constitute one TBU or the mora serves as the TBU; in which case, tense vowels represent two TBU's. The sum total of what is being implied here is that even in tone languages, heavy syllables are crucial in the assignment of tones.

4.0 Conclusion

The paper has examined the structure and functions of heavy syllables in the phonology of English. Heavy syllables are those syllables dominating two 'X' positions in the syllable structure (i.e. that contain a branching rhyme) and are therefore absolutely necessary in every language. The weight of a syllable also, manifests not only in the structure of its rhyme, but also in the configuration of its coda.

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Analysis and design for a Real Estate Inc. Agent System by using security control

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DOI: 10.29322/IJSRP.9.08.2019.p92140

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92140>

Abstract- This paper intends the effectiveness of all living things and also to develop the businesses of cities. Today, the nature of environment and businesses has changed worldwide. And so all businesses became necessary for marketing, agency are always giving services for the properties to the customers by helping to coordinate between the buyer and owner signing the transaction treats are also served by agency for the customers. For faster property transactions, contact to agency. Customer's satisfaction is agency's first priority. The required data for analysis and design specifications for structured elements are kept in UML to develop A Real Estate Inc. Agent system. The paper focuses on creating a unified modeling language (UML) structure by specifying the use case, classes, and activities in the client-server application. This paper also implements the key to the protection of data and information in organization familiarity for data security. Due to improving technologies, data security is popular in many areas. This paper intends the authorization access control for information security by combining security and integrity issues and then the data security consisting of an authorized and unauthorized access. The security control uses of GRANT and REVOKE to control which users have privileges over the objects.

Index Terms- Unified Modeling Language, Object-Oriented-Systems Development, Customer Relationship Management, Integrity, Security

I. INTRODUCTION

In our country, A Real Estate Agent is also a competitive business. And so it becomes necessary for agents to adopt a business model. A business model is a plan for the successful operation of businesses, identifying sources of revenue. Most real estate agents work under a broker. Real estate agents are licensed professionals who negotiate and arrange the buying and selling in real estate. In order to have a life-long living, humans are trying to live conveniently with population growth and an increase in housing for living. This system is based on the achievement of activities of AREA. The requirement specification produced at the start of a development can take many forms. A written specification may be either a very informal outline of the required system or a highly detailed and structured functional description.

The Unified Modeling Language (UML) is a visual modeling language dominant in object-oriented software development. UML defines nine diagram, Object diagram, Class diagram, Component diagram, Development diagram, Use Case diagram, State Chart diagram, Activity diagram, Sequence diagram and

Collaboration diagram. There is need to re-think and re-design a few of the UML graphical constructs. In addition to the use of lines and overheads to represent various* relations, we propose other visual cues, such as color, be employed in UML to better represent relationships [1].

The Unified Modeling Language (UML) comprises a set of tools for documenting the analysts of a system. UML is generally used to describe and evaluate the functioning of a complex systems and its application to the A Real Estate Agent. The purpose of this research is to serve the literature on the application of UML tools to the analysis and modeling of A Real Estate Agent [2].

There are many different topics in object-oriented system development. Any three main aspects are (1) A general introduction to object-orientation, so that the reader will have an idea of what it is all about, where it came from and how it differs from traditional software development. (2)An illustration, by means of a case study, of how initial requirements for a software system are eventually in code. (3) Instructions on how to construct the models that is central to the object-oriented development process. It is important to remember that all models incorporate some element of natural language and that no software development can take place without a basic reliance on spoken language and extensive use of its written form [3].

The initial interest in object-orientation focused on programming language issues OO ideas have been applied to the whole software development process analysis, design and implementation. Object-orientation has its own specialized vocabulary. One of the main claims of O-O approach to developing systems is a seamless transition from real-world to software objects [4].

And so security management needs to allow access only when authorized and necessary need to prevent access when authorized. It does not allow for the specification of the operations that authorized users are allowed to execute against those pieces. The task is performed by the GRANT statement. The purpose of RESTRICT vs. CASCADE operation is to avoid the possibility of abandoned privileges. To be specific, RESTRICT causes the REVOKE to fail if it would lead to any abandoned privileges: CASCADE causes such privileges to be revoked as well [5].

II. BACKGROUND AND RELATED WORK

The purpose of this paper is to serve the literature on the application of UML tools to the analysis and modeling of A Real Estate Agent system.

The Unified Modeling Language (UML) is a graphical language. The UML gives a standard way to write a system's blue-prints, covering conceptual things, such as business processed system functions as well as concrete things, such as classes written in a specific programming language, database schemes, and reusable software components. The Unified Modeling Language is a general purpose visual modeling language that is used to specify, visualize, construct and document the architecture of a software system. It is used to understand design, browses, configure, maintain and control information about such systems. It is intends for use with all development methods, life cycle stages, application domains, and media. The UML captures information about the state structure and dynamic behavior of a system [6].

Changing economic conditions and promotional dependence through the use case of intimate customer knowledge are become competitions. Knowledge gained through relationship development and past marketing programs. Customer relationship management is an approach to manage a company interaction with current and potential customers. It uses data analysis about customer history with a company to improve business relationship with customers, specifically focusing on customer retention and ultimately driving sales growth [7].

The main purpose of UML is object-oriented software design. Nowadays, UML is widely used and is one of the most powerful and feasible notations available for software modeling and design. It helps to manage complexity, reduce manufacturing time and improve system quality [8].

The mission of the Estate Agency Affairs Board of South Africa is to ensure that the integrity of the transaction between the estate agent and consumer is of a high standard by regulation, protection, guiding and enhancing the conduct of the estate agent's profession in South Africa through registration and issue of fidelity fund certificates and practical experience required by estate agents and instituting disciplinary proceeding against offending estate agents; conducting regular inspections of estate agencies; management preservation and control of the Estate Agents Fidelity Fund; and action as the supervisory body for the estate agency sector [9].

III. APPLICATION DESIGN

A. Unified Modeling Language

The UML is a graphical notation of a software system that helps in describing the designing software systems, particularly software systems built using the object-oriented (OO) style. UML defines a number of primitive data types and also provides a mechanism whereby new types can be defined. Data types represent simple, unstructured kinds of data such as numeric, character and Boolean values. Data types are commonly used to specify the type of an attribute or an operation parameter in a class.

B. Use Case

A use case is a description of a set of sequences of actions, including variants that a system performs to yield an observable result of value to an actor. Use cases are the different tasks that a system is users can perform using the system. Every use case must have a name that distinguishes it from other use case. A name is a textual string. Actor may be connected to use case only by association. An association between an actor and a use case indicates that the actor and the use case communicate with one another, each are possibly sending and receiving messages. The included stereotype is used in the case where one use case 'calls' another at some point in its execution. The direction of a <<include>> relationship is to the use case. A use case is more than simply a description of part of the systems functionally. The extra is sometimes described by saying that a use case describes what the system can do for a particular user. Use cases are the different tasks that a system's users can perform using the system.

C. Use-Case-Driven

Use Cases are used as a primary artifact for establishing the desired behavior of the system, for verifying and validating the system's architecture, for testing and for communication among the stakeholders of the project. This use case driven, architecture-centric, and iterative/incremental process can be broken into phases. A phase is the span of time between two major milestones of the process, when a well-defined set of objectives are met, artifacts are completed, and decisions are made whether to move into the next phase. To identify objects of a system and their behaviors, the lowest level of executable use cases is further analyzed with a sequence and collaboration diagram pair. By walking through the steps, you can determine what objects are necessary for the steps to take place.

D. Customer Relationship Management

There are many definitions for CRM, and the best-practice companies adopt are that is shared across the organization. Otherwise, the very term "CRM" will conjure up many things to different people and lead to confusion. These companies see CRM as a series of strategies and processes that support and execute a relationship vision for the enterprise. In their eyes, CRM is a series of strategies and processes that create new and mutual value for individual customers, builds preference for their organizations and improves business results over a lifetime of association with their customers.

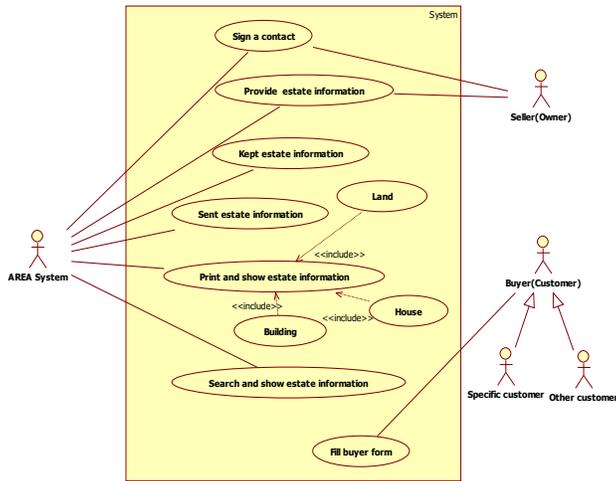


Figure 1. Use Case Diagram for a Real Estate Inc. Agent System

In the use case diagram, there are three actors: AREI agent, seller and customer. When the seller wants to sale the house, he can sign a contact and provide house information to AREI agent. This formation is kept in a database by AREI, and subset of this information is sent to citywide multiple listing services used by all real estate agents. AREI works with two types of potential buyers. Some buyers have an interest in one specific house. In this case, AREI prints information from its database, which the real estate agent uses to help show the house to the buyer. Other buyers seek AREI’s advice in finding a house that meets their needs. In this case, the buyer completes a buyer information form that is entered into a buyer database and AREI use its information to search AREI’s database and the multiple listing services for house that meet their needs.

Multiplicities	Meaning
0..1	Zero or one instance
0..*or *	No limit on the number of instances(including none)
1	Exactly one instance
1..*	At least one instance

Table1. Multiplicities and Association for the Class Diagram

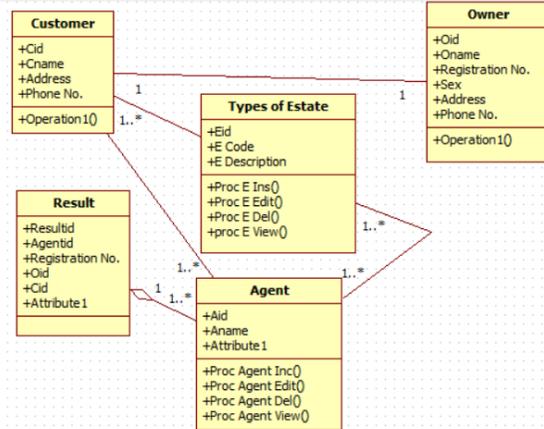


Figure 3. AREI Class Diagram

In the class diagram, one or more customer contact to Agent. One or more agent has many types of estate. One owner owns many types of estate. The agent also joins the customer and owner. When the customer and owner are convenient, they make registration for the estate.

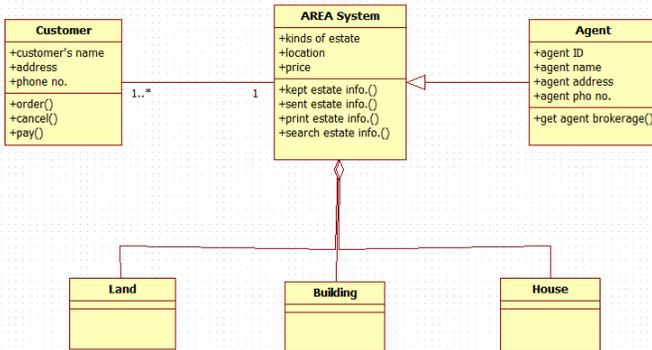


Figure 2. Class Diagram for a Real Estate Agent System

In the class diagram, there are six classes: Customer, AREI system, Agent, House, Building and Land. House, Building and Land are included in AREI system. One or more customers contact to AREI system when they want to buy house. AREI system organized many agents.

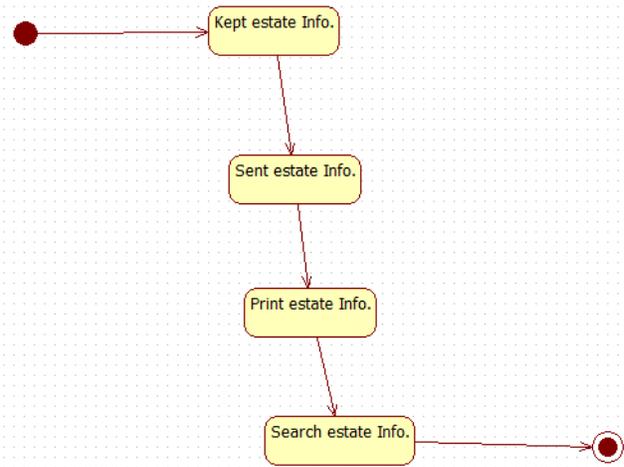


Figure 4. State Diagram for a Real Estate Agent System

AREI system kept, sent and print house information and then search and show house information. The customer contact to AREI easily.

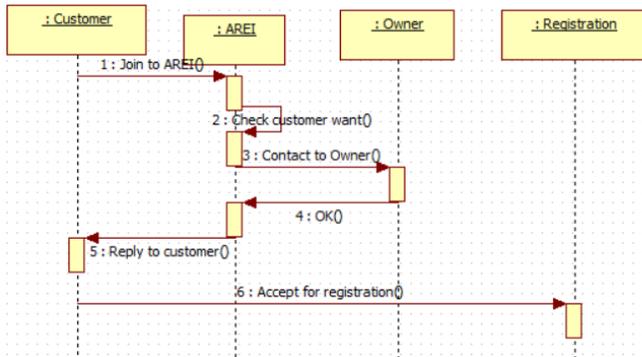


Figure 5. Sequence Diagram for a Real Estate Agent System

When the customer contacts the AREI, AREI checks for itself for the type of estate and then inquires the owner. If OK, reply to customer. And then customer prepares data for registration.

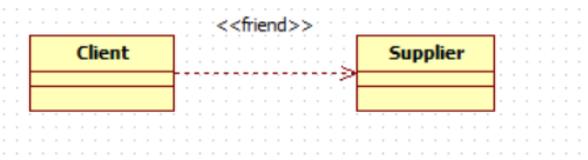


Figure 6. A dependency between two classes

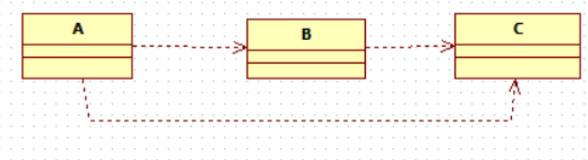


Figure 7. The transitivity of usage dependencies

IV. RELATIONAL DATABASE

A. System Description

MySQL: MySQL is an open source relational databases management system (RDBMS). SQL language is a domain specific language used in programming and designed for ranging data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS). It is particularly useful in handling structured data where there are relations between different editions variables of the data. SQL offers two main advantages over older read/write APLs like ISAM or VSAM. First, it introduced the concept of accessing many records with are single command; and second, it eliminates the need to specify how to reach a record, eg. with or without an index.

Database: Database systems focus on basic such as data models, especially the relational data model, query languages, query optimization and processing, indicates and other specialized data structures, as well as transactions and concurrency control.

B. Integrity and Security

In the system, using permission control with “GRANT” and “WITH GRANT OPTION” controls commands keys which

Dependencies are really defined in UML by what they are not: a dependency depicts a relationship between model elements that is not an association or a generalization or realization relationship.

. The Unified Process defines a similar categorization of objects, by distinguishing boundary, control and entity objects. Entity objects, like model objects in MVC, are responsible for maintaining data, but boundary and control objects are characterized slightly differently from views and controllers.

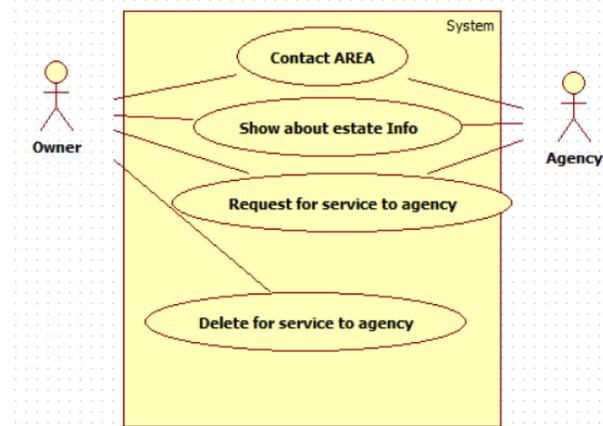


Figure 8. Owner don't permit for service to AREI

When owner don't want to service, the agency cannot service for owner's estates.

privileges over which objects. "REVOKE" option is to control which users have which privileges over which objects base tables and views. There are two classes asset sensitivity such as restricted and unrestricted. So, asset characterization helps data appropriately to ward protection assets. If specified, refers to that INSERTS and UPDTE on the view will be rejected if any integrity constraint implies by the view-defining expression. The view is also the chosen method to grant privileges on selected

row and column subsets, or to grant access, the user may define a view of the table and grant that view.

Grant Command

GRANT privileges ON object TO users [WITH GRANT OPTION].

The following privileges can be specified.

SELECT: can read all columns (including those added later via ALTER TABLE command)

INSERT: (col-name): can insert tuples with non-null or non-default value in this column.

DELETE: can delete tuples

REFERENCES (col-name): can define foreign key (in other tables) that refers to this column.

If a user has a privilege with the GRANT OPTION, he can pass privilege on to other users.

(With or without passing on the GRANT OPTION)

Only owner can execute

CREATE, ALTER and DROP

Revoke Command

If users A grants some privilege to some privilege to some other user B, user A can subsequently revoke that privilege from user B. Revoking privileges is done by means of the REVOKE statement- syntax.

REVOKE GRANT OPTION FOR] <privilege commalist>

ON <object>

FROM <user ID commalist><option>

Security refers to the protection of data against unauthorized disclosure, alteration, or destruction. Integrity refers to the accuracy or validity of that data. Security is enforced by the DBMS's security subsystem, which checks all access requests against the security constraints stored in the system catalog.

In particular, the use of views to hide information, and the use of **GRANT** and **REVOKE** to control which users have which privileges over which objects base tables and views.

V. IMPLEMENTATION OF SECURITY CONTROL

Table 1. Estate

EID	Street	Address	Price
E1	Main Street	Monywa	\$10000000
E2	San Pya Street	Monywa	\$0000000
E3	Yinmar Street	Monywa	\$30000000
E4	Thazin Street	Monywa	\$25000000

Table 2. Owner

OID	Oname	Address	EID
O1	U Tin Myint	Monywa	E1
O2	U Min Kyi	Mandalay	E2
O3	Daw Win Nu	Yangon	E3
O4	U Tun Aung	Myinmu	E4

Table 3. Buyer

Buyer ID	Bname	Address	EID
B1	U Hla New	Yangon	E2
B2	Daw San San	Monywa	E1
B3	Daw Yamin	Mandalay	E4
B4	U Tun Min	Magway	E3

Table 4. Agency

AgencyID	BuyerID	Owner-ID	EID
Agency1	B3	O1	E1
Agency2	B1	O4	E4
Agency3	B2	O3	E3
Agency4	B4	O2	E2

```

Create table Insert_log(Action_type
char(10), modified date timestamp)
Delimiter //
Create trigger Owner_trigger
After insert on Owner
For each row
Begin
Insert into insert_log(Action_type)
values('insert');
    
```

Eg. Insert into Owner values ('OID',
'Name', 'City', 'EID,');
SELECT*
FROM Insert_log; //

Action_type	Modified_date
insert	2019-05-06 20:58:17

Create the user with given passwords: user name 'Agency' and password access.

```
CREATE USER Agency identified by 'Agency';
```

Set privileges for that user over 'Owner' table as follows:
User 'Agency' has access privileges (SELECT, INSERT, UPDATE).
GRANT SELECT, INSERT, UPDATE
ON Owner
TO Agency;

In the system, using permission control with "GRANT" and "WITH GRANT OPTION" controls commands keys which privileges over which objects. If authority grants to permit, agency can service.

```
REVOKE SELECT, INSERT, UPDATE  
ON Owner  
FROM Agency;
```

"REVOKE" option is to control which users have which privileges over which objects base tables and views If authority revoke to permit, agency cannot service.

VI. CONCLUSION

One of the aims of this paper is to provide information about A Real Estate Agent and activities for businesses in citywide. The system implementation is performed by the

GRANT permission for data security for the owner in this paper. This system is suitable for checking of integrity and security for the owner. Agency also can service between the seller (owner) and the customer (buyer).

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Contribution Of Village Savings And Loan Association To Economic Empowerment Of Women: A Case Study Of Stromme Foundation Supported Groups In Terekeka County, South Sudan.

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DOI: 10.29322/IJSRP.9.08.2019.p92141

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92141>

CHAPTER ONE

INTRODUCTION

This study set out to assess the contribution of Village Saving and Loan Association to economic empowerment of women in Terekeka County, South Sudan. The overall objective of the study was to investigate the contribution of village savings and loans association toward the economic empowerment of women in Terekeka County. The specific objectives sought to examine VSLA empowerment of women towards increase in business income; to assess VSLA empowerment of women in decision-making process at household and community level; to find out VSLA empowerment of women towards assets ownership at household level; and to identify gaps in relation to the VSLA program in the supported groups in Terekeka County. This study was guided by two theories, the VSLA model which states that microfinance whose objective encompasses the provision of financial services, including loans, savings and insurance, to low-income clients who generally lack access to more formal banking services and the three pillars to economic empowerment. The study focused on the VSLA members under the support of Stromme Foundation, thus the study site selection was chosen based on the intervention area of SF. A sample determination formula was used to establish a sample size of 300 respondents but actual one reached was 297. The study findings indicate that through VSLAs, 93.9% of the women were able to increase their business income, 97.6% of the women experience improvement in decision making at household and community level, while 99.3% of the women own assets either alone or together with husband. The findings also identified gaps related to the VSLA operations including lack of training opportunities, limited supervision from the project staff, insecurity, high taxation and high commodity prices. The study concludes that through VSLA, women were able to increase their income, participate actively in decision making at household and community levels and confer ability to own assets. However, purchase and ownership of productive assets such as cattle and machinery are still minimal. The study, therefore, recommends that Stromme foundation should also introduce a wide range of financial services apart from savings and credit which could increase women's ability to generate and control income. The study also recommends that the government should invest in time-saving infrastructure and enhance women's ability to access input and output markets as well as increase women's access to resources, technology and information.

1.0 Introduction

Chapter one contains the study background, statement of the problem, research objectives, specific objectives, research questions, research assumptions, justification of the study, significance of the study, scope and delimitations of the study, limitation of the study, conceptual framework and operational definition of terms.

1.1. Background to the Study

The problem of women's access to credit was given emphasis at the first International Women's Conference in Mexico in 1975 as part of the emerging awareness of the importance of women's productive role both for national economies and for women's rights. This led to the setting up of the Women's World Banking network and production of manuals for women's credit provision in 1976. Women's organizations world-wide set up credit and savings components both as a way of increasing women's incomes and bringing women together to address wider gender issues. From the mid-1980s, there was a mushrooming of donor, government and NGO-sponsored credit Program in the wake of the 1985 Nairobi women's conference (Mayoux, 2000). South Sudan attained independence in 2011 after two decades of brutal war with North Sudan, which ended in 2005 through signing of the Comprehensive Peace Agreement (CPA). An assessment carried out by Stromme Foundation in Terekeka County in 2012, indicated that the County has the highest poverty rate of 80% especially among women based on SF baseline assessment report in 2012. The historical background of Terekeka County also indicated that tribal conflicts and cattle rustling disrupted economic growth in the area. Thus, empowering women through a quality program of Village saving and Loan Association (VSLA) will strengthen their economic independence, occupational skills and critical thinking, this will reduce possibilities of the women in to falling back to a state of emergency. This finding resulted in the initiation of the socio-economic empowerment project which targeted 80% of women in Terekeka County from 2013-2018.

In Terekeka County, the participation of women in VSLAs has had impact basing on SF monitoring report in 2015, though there is little documentation indicating the exact extent. Women were actively participating in the VSLA program; therefore, many were able to have small business activities, and this created a positive change in household empowerment. Ability to afford household items was evident because the women were able to access credit facilities through the VSLA program, which they used to purchase household items like utensils, beds and mattresses. Consumptive expenditures and behaviors have also changed, and food accessibility enhanced through increases purchases due to women participating in VSLAs. However, the economic contribution of VSLA in relation to women economic empowerment has not been homogenous among the participating women. There are cases where the women seem to be disempowering because of increased workload, control, and misuse of loans and savings by spouses, thus plunging the women into indebtedness and erosion of the gains of economic empowerment (SF monitoring report, 2013).

1.2. Statement of the Problem

Stereotyping of women is a major cause of gender inequality according to World Food Program report (2009), further, lack of women involvement in decision-making process at household and community level and seeing women as properties in a community contributing negatively towards women empowerment. Economic empowerment can be a major concern for people who are incapable of or denied access to participating in formal sectors like owning assets and inclusivity in decision making at various levels which is very common in Terekeka. In 2009, the United Nations (U.N.) in South Sudan estimated that 60% of the people living in Terekeka County are poor and 85% are women (UNMISS, 2009) despite interventions like VSLA program by other actors, however it didn't come out clearly how the VSLA program by SF contributed towards the economic empowerment of the women.

Women in Terekeka County have long suffered powerlessness, discrimination and gender inequality in terms of access, use and ownership of vital resources despite their key role in enhancing better livelihoods at household level and development in general (UN Poverty assessment report, 2012). Based on Stromme Foundation approach, the socio-Economic empowerment project aimed at enhancing access to affordable credit for women through VSLAs, however, VSLA has had some little contribution through the

monitoring reports but the exact extent to which the VSLA contributed towards the economic empowerment of the women was not clear. One of the core objectives of Village Savings and Loans Association models is to empower women in various areas like household food security, access to market, assets and leadership skills. This has however, not always been the case. Women being clients of MFIs does not mean they will automatically become empowered. Hulme (2010) made this point when he refers to the “naivety of the belief that every loan made to a woman contributes to the strengthening of the economic and social position of women”. Economic empowerment is a major concern for women in the County of Terekeka because they are incapable of or denied access to actively participating in formal decision-making process. Monitoring reports by SF revealed that women members in the VSLA in Terekeka were not fully empowered economically, for example accessibility to market, education and governance, asset ownership and consumption/expenditures. The involvement of women in Village Savings and Loans Association found to be disempowering to women. Some of the negative impact of VSLA includes unchanged poverty levels, increased income inequality, increased workload, high interest rates and loan repayment, which created dependencies and barriers to sustainable local economic and social development. It is not obvious that the VSLAs empower women towards household economic stability, thus there exist great gap in knowledge as to what extent has VSLA contributed towards women economic empowerment under the SF supported groups in Terekeka.

1.3. Research Objectives

1.3.0. General Objective

To investigate the contribution of village savings and loans association toward the economic empowerment of women in Terekeka County.

1.3.1. Specific Objectives

- 1) To examine the extent to which VSLA have influenced empowerment of women towards increase in business income level in Terekeka County.
- 2) To establish the extent to which VSLA have empowered women in decision-making at household and community levels in Terekeka County.
- 3) To determine the relationship between involvement in VSLA and assets ownership in the household by women in Terekeka County.
- 4) To identify gaps associated with VSLA program in the supported groups.

1.3.2. Research Questions

1. To what extent has VSLA empowered women towards increase in business income at household level in Terekeka County?
2. What do VSLA empower women towards inclusive decision-making at household and community level in Terekeka County?
3. What do VSLA empower women towards asset ownership at household level in Terekeka County?
4. What are the challenges experienced by VSLA members in Terekeka County?

1.4. Research Assumptions.

This study assumes that women who participate in VSLA had some benefit and there is direct linkage between women benefiting from the Village Savings and Loans Associations and their ability or inability to ensure household economic empowerment like increase in business income, improved decision making at various levels and ownership of resources such as cattle. The other study assumption was that women participating in the VSLAs would be willing to give information on how individuals in the groups have benefitted in enhancing their livelihoods. It was further assumed that the responses given by the women were accurate and a true reflection of the influence of VSLA in empowering women economically towards better livelihoods.

1.5. Justification of the Study

The study has contributed to the body of knowledge on the influence of VSLA with emphasis on its economic contribution towards women empowerment and poverty reduction. Sharing of the result of this study with the government authorities basically to inform VSLA management policy in the country especially the directorate of cooperative and rural development contributing to improved policies for better credit accessibility and utilization for informal savings groups. Further, the study aimed at informing Stromme Foundation, other NGOs and donors in improving the VSLA practices in the state as well as the whole country towards effective operation of the VSLA methodology.

1.6. Significance of the Study

It is anticipated that the results of this study have provided documented evidence on the milestones made by the VSLAs of the Sustainable Development Goal (SDG): Promoting Gender Equality and Women Economic Empowerment for enhanced household income, in rural South Sudan with specific focus on Terekeka County. Moreover, the researcher hopes that the study has provided opportunities for development practitioners and existing micro-financial institutions targeting the rural poor to make informed decisions on how best to empower the rural women economically. This is expected to have enabled the development practitioners to establish workable models that would ensure sustainable women economic empowerment towards increased income, asset ownership and increased decision-making level. The researcher hopes the study has contributed to the existing body of knowledge on socioeconomic protection and empowerment models by the government targeting the rural poor. Finally, researcher look forward to the study to offer suggestions for improvement of VSLAs and recommend areas that would demand further inquiry.

1.7. Scope and Delimitations of the Study

The study was conducted in 2018 and the scope of this study was limited in terms of coverage and depth owing to financial and time resources availability. The research focus was limited to VSLA members only as a microfinance model and Terekeka County in terms of area coverage. On the other hand, VSLA is a group business however, this study examined empowerment at individual members' level, and it did not cover the collective economic empowerment status of the non-association members. The other aspect not covered in this study was the sustainability of the saving groups.

1.8. Limitations of the Study

This study was limited by the fact that very little literature exists on the milestones so far made by the Village Savings and Loans Associations in empowering women towards ensuring economic empowerment. This was overcome by keenly perusing through literature on women economic empowerment to get the relationship between the VSLA and economic empowerment. Furthermore, the study was limited by the extent to which the findings of the study could be generalized beyond the study area. This was however overcome by the fact that the VSLA methodology is uniform and women's economic empowerment is a common phenomenon, hence findings was generalized based on VSLA having the same principal of operations. Another limitation was that it was not possible to link all the milestones made on women economic empowerment towards ensuring increase in business income, inclusive decision making process and increased ownership of assets at household level in the study area to Village Savings and Loans Associations since there were other microfinance initiatives that promote women's well-being. This was overcome by limiting the question to VSLA and ensuring that the milestones were not a contribution of other microfinance initiatives.

1.9. Conceptual Framework

The conceptual framework adapted from the conceptual microfinance impact model (Sebstad, 1995). Women’s membership in village saving and loan associations intervention improves their empowerment status. Improvement in economic empowerment status by women in the VSLA manifested through increase in business income because of accessing market, increased participation in household and community decision making and increase in asset ownership. Further, increase in income because of accessing market seen through scale up in small business, ability to buy and transport goods and ability to determine business profitability. Increase in household assets and ownership by women seen through enhanced purchasing power and inclusive-decision-making through increase in knowledge and communication skills and ability to participate actively in discussions at the household and community levels. Women economic empowerment through village saving and loan associations, among others, can be influenced by political environment, security situation and economic environment. Women participation in village saving and loan association can improve their saving and loan use behavior.

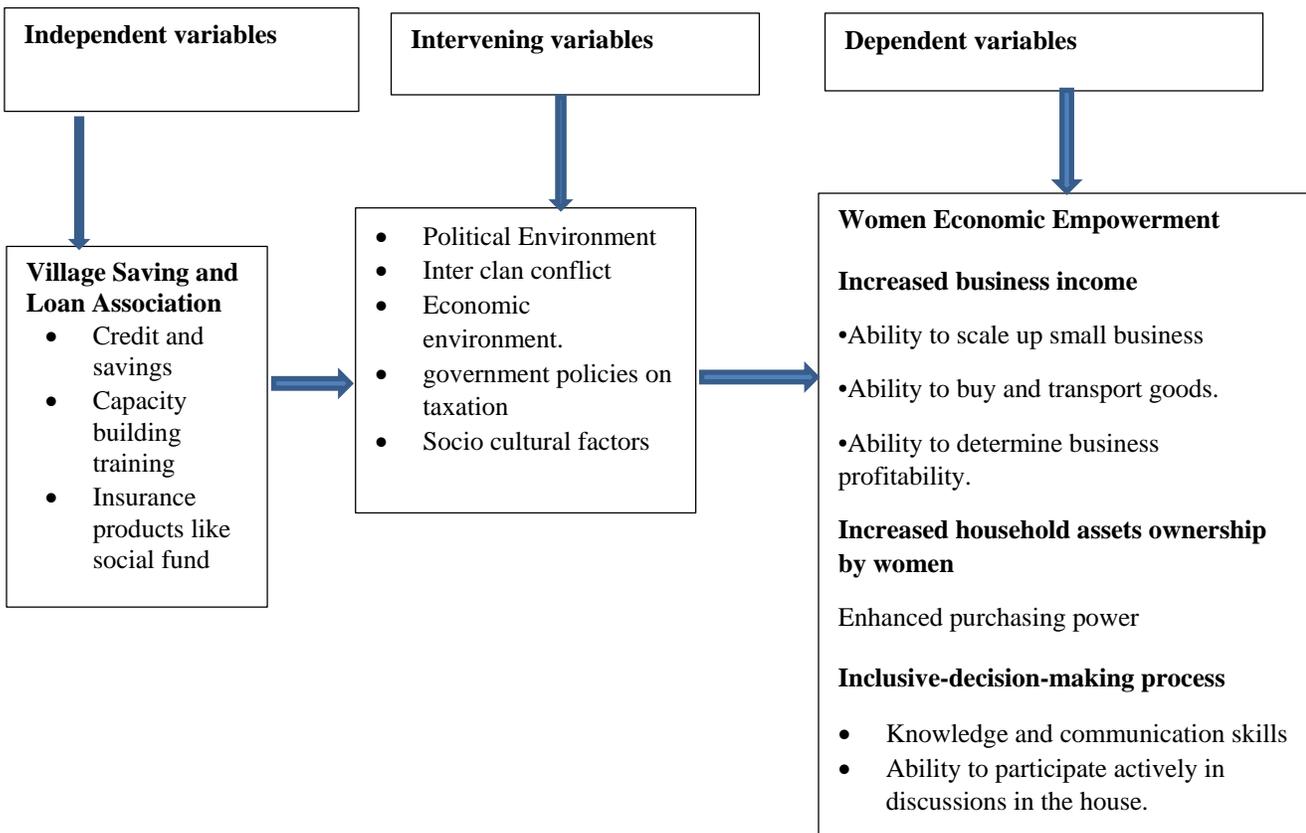


Figure 1: Relationship between VSLA and women economic empowerment.

1.10. Operational Definition of Terms

Assets: An asset here means a resource with economic value that women in the VSLA owns, more importantly ownership by women themselves not by their husbands or any male members of their community or family.

Decision-making: refers to women VSLA members’ ability to make independent decisions at household and community levels without interference from their husbands or male counterparts.

Economic empowerment: This refers to ability of women to participate in, contribute to and benefit from growth processes in ways that recognize the value of their contributions, respect their dignity and make it possible to own business that results to increased income for women, make own decisions and ability to own assets in their names.

Empowerment: Empowerment means access to basic needs like food, shelter, clothing, confidence gaining which is, associated with success in life for example women able to make informed decisions alone without their husbands or men interference, able to own assets by themselves not in the name of their husbands or men and have income increased because of the businesses they engage in.

Income: Income in this study refers to ability of the VSLA women members to increase the amount of money they get as a result of establishing small business from the loan borrowed from the savings.

Village Savings and Loans Association: in this study, it means group of women coming together in 15-30 members with 80% women to save. The purpose of the saving is to raise fund for the group to loan out among members for the purposes of business and share out the money at the end of every year.

Women's Economic empowerment: Women's economic empowerment in this study refers to the ability for women to enjoy their right to control and benefit from resources they own like assets, ability to increase their income and make independent decisions at household and community level.

CHAPTER TWO

Literature review

This chapter has three main sections: a critical review of the relevant theories, a review of empirical studies from global to regional, national and local levels. It ends with highlighting of the arising research gaps from the reviews and a chapter summary.

2.1. Critical Review of Relevant Theories.

This study was guided by an interweave of two models. The first one was the Village Savings and Loans Association model, which according to Daley (2010), is a microfinance model whose objective encompasses the provision of financial services, including loans, savings and insurance, to low-income clients who mainly lack access to more formal banking services. The strength and success of VSLA lies in its ability to empower people to work their own way out of the poverty trap economically while avoiding dependency and the 'hand out' shame of conditional aid. An assessment conducted by FAO in 2005 on women empowerment observes that closing the gender gap in economic empowerment or increasing women's contribution to increased income, asset acquisition and decision making process by providing equal access to resources and opportunities could reduce the level of poverty in the world by 12 to 17 per cent, or by 100 to 150 million people. Women need increased access to financial services and labor markets, and the right to own land and property in order to increase their economic productivity and secure their basic human rights according to Daley (2010). The second model, key to this study, is the three pillars to economic empowerment originated and modified by Mercy Corps in 2009 in Vietnam. According to this model, for a household or community to be economically empowered, it must sustainably participate in the increased income, access to assets and constructive decision-making process at all levels. These qualities are interrelated, and all are necessary for long-term women economic empowerment. For example, having ample availability of assets is not enough for living a healthy and productive life unless one has both the financial access to the income and knowledge. In this study, therefore, the question is, do Village Savings and Loans Associations model empower the women economically towards the three pillars of income, access to assets and decision-making process.

2.2. Empowerment of women by VSLAs in increasing business income

Rogaly (1999) in an empowerment theory support that in sub-Saharan Africa, VSLA has positive benefits for the poor but not for the poorest, helping the poor to manage the money they have but not directly or sufficiently increasing income and empowering women. Money spent on VSLAs could be better used for other interventions and a case example in supporting large labor-intensive

industries for job creation is much less effective as an anti-poverty resource than simultaneous efforts that combine microfinance, health and education. Rutherford (2017) point out that negative impacts, such as the exploitation of women, unchanged poverty levels, increased income inequality, increased workloads, high interest rates and loan repayment, creating dependencies, and creating barriers to sustainable local economic and social development. Duflo (2015) in an empowerment message pointed out that women “empowerment” has increasingly become a policy goal, both as an end to itself and to achieving other development goals and further urged that intra household bargaining power has exogenous increases in female share of income at household level and was attributed to provision of free space for women to express themselves fully in relation to their preferences, thus empowerment.

Thomas (2012) indicated that empowerment is related to change and VSLA has changed women status socially, economically and politically. Village Saving and Loan Association is a mechanism of provision of credit to the poorest of the poor on a group liability basis instead of any collateral and this finding concurs with the views of (Littlefield, 2008) that microfinance clients around the world demonstrates access to financial services which enables poor people to increase their household incomes further ensuring women economic empowerment. Mayoux (2000) discussed that women in developing countries have faced many difficulties in delivering on this role of women empowerment because of inadequate credit facilities, however women participation in many economic activities at household and community level like marketing has to some extent contributed positively towards income increase. Mayoux (2000) study in Vietnam indicated that there was a considerable expansion in the share of female owned enterprises from around 20% in the 1990 to around 45% in 2009 of which 1% increase attributed to being in VSLA groups.

Women make up approximately 43% of the business market force in developing countries, ranging from 20% in Latin America to 50% in Africa and Asia and women are primarily responsible for financial activities, particularly of small businesses to gain income yet throughout the developing world, women in business and financial sector have access to fewer businesses compared to men based on CARE result impact study in Zambia in 2009. Programs aiming to increase market value productivity need to determine women's roles in financial services, marketing and service provision in order to increase their income level and participation in market labor force. Study conducted by CARE in Zimbabwe in 2009 indicated that women lives have completely changed after joining the saving groups due to increase in business income, 80% of the group members have small businesses and use part of the income earned to buy food and other household items at home. Women participation in income generating activities had some negative impact like gender based related violence especially when their financial support is very minimal as seen by their male counter parts because of VSLA according to World Bank/FAO/IFAD joint assessment in 2009 in Uganda.

Data from Ethiopia shows significant difference in household income increase among the VSLA operating groups in the evaluation report OXFAM in 2011, with additional analysis showing that female client households were more successful in maintaining quality business with high profitability. In Kenya, micro-savings impacts report by CARE in 2008 suggest that household income increased significantly for women clients participating in the VSLA because they were so much engaged in small business activities, which was attributed to the availability of the loans fund from the saving. Pronyk (2009) pointed out that increasing access to and use of quality financial products and services is essential to inclusive economic growth and poverty reduction because of increase in income at household and community level and further shows that when women participate in the financial market system, they are better able to manage risk, start or invest in a business, and fund large expenditures like education or a home improvement.

Dean (2012) stated that women have less access to income because of lack of credit and access to information related to market opportunities, therefore they are less likely to benefit from entrepreneurship and extension services, and therefore they have less access to improved technologies in business ideas. Educational achievement for most women in Terekeka was low and tends to lack skills for running small business, good record keeping, profit and loss information and these contributed negatively towards increase in business income. Such constraints are not only costly to business profitability but also to economic growth. If

businesspersons in South Sudan and Terekeka had the same access to skills and training knowledge, education, and experience as their male counterparts, their business sizes, profitability and incomes would increase profitably. Study conducted by CARE in Terekeka in 2010 indicated that increasing women's incomes has a disproportionate effect on household economic empowerment compared to increasing men's incomes. Women tend to spend their income earned from various sources like business on food, education, and other productive means.

2.2.2. Empowerment of women by the VSLAs in decision-making process at household and community levels.

Holme (2010) argued that women are mostly involved in repetitive and monotonous household work irrespective of the fact that they share most of family responsibilities and perform a wide range of duties in and outside home. On the other hand, men perform activities, which require skills, but there is a gap which shows a clear, although slow shift of stereotype sex roles. In early societies, decision making was predominantly done by men, mainly considered the breadwinner in the family. With modernization and education, women have been empowered to make the best use of human and nonhuman resources in management of the family with respect to efficient use of time, energy and working women were found according to (Holme, 2010) to be involved more in household decision making process. Holme (2010) further pointed out that in Tanzania, one male stakeholder interviewed said that women in Tanzania "want to be submissive to fit the requirements of a 'good wife,' as explained by priest on her wedding day." He added that because of this, women give all their decision-making power to their husband. Another stakeholder from Ghana which appeared on Ghana daily mail in 2011 noted a pervasive "cultural challenge, where men were seen as superior and women as subset." This stakeholder said that women must work extra hard to be heard. "Even in the house have to do all the cooking and cleaning," she said. "Ghana is too much of a male-dominated society and is not yet at the level where men appreciate women as career women. The Beijing conference, held in Beijing (China) in 2015, known as the Platform for Action, dubbed women in power and decision-making process and it made two essential commitments to change, it called for measures to ensure women's equal access to and full participation in power structures and decision making through reserving seats or candidacies for women in various forums including VSLA and the Platform urged steps to increase women's participation including leadership roles, this further led to scaling up training on leadership, public speaking and political campaigning, for instance, grooms women to compete, win and be good leaders who can inspire others (Cheston, 2016).

In a study conducted in Haiti, Malawi and Nigeria by the United Nation Capital Development Fund (UNCDF) in 2004, self-esteem, decision making at household level, decision making at enterprise level and decision making on the use of program loans are used as indicators of empowerment. Cheston (2016) also suggested individuals' control over resources, involvement in household and community decision-making, levels of participation in community activities and social networks and electoral participation as indicators of empowerment. Women's ability to influence or make decisions that affect their lives and their future choice is considered as one of the principal components of empowerment. It is much less clear, however, what types of decision and what degree of influence is classified as empowerment in different contexts. Cheston (2002) in a study on women's empowerment in Nepal shows 68% of women experience an increased confidence in their decision-making roles. This confidence increase in the decision-making process is in the areas of family planning, child marriage, buying and selling property, and sending their daughters to school.

Study conducted in Nepal by Global Micro finance in 2014, as in most parts of South Asia, women commonly have less power and autonomy than men in making decisions about their own health care. Moreover, women often have unequal access to food, education, and health care, limited opportunities to earn incomes, restricted access to, and control over productive resources, and very few effective legal rights Women's autonomy in decision making is associated with ethnicity, deprivation level, urban/rural

classification, education, and number of living children. Nepalese women are further disadvantaged by a lack of awareness of opportunities and their legal rights (Cheston, 2016). Scott (2016) showed that overall, women's participation in the decision-making process is critical when assessing women's empowerment, gender equality, and other developmental goals.

A study done in Uganda (Wakiso) in 2004 suggests that VSLA contributes to a women's decision-making power at both community and household levels. This is considered a symptom of status within the household and controls in their economic businesses as much as an impact of VSLA and it confirms that women's decision making in the household was increased as women were able to support their husbands because of the small business created from the VSLA loans. Study conducted by (Rogaly, 1999) shows that members in the VSLA groups were able to learn leadership skills to the point of formulation of councils and ministries in the local community settings in Tanzania and this has given women to monitor progress through relevant governance indicators, gives women responsibilities for planning, making decisions, recommending policies, and coordinating empowerment efforts and this allocation of responsibility has been useful in initiating adjustments to laws and national plans to include a gender component in decision making at various levels. The Small Enterprise network study done in 2000 in Mozambique suggested positive contribution of VSLA towards women involvement in decision level at household by 60% because of the financial support they offer at household. In South Sudan especially in Terekeka County, women are less important in major decision-making process and thus not involved by men, over 90% of the decisions a household and community level are done by men without seeking consents from the women according to the UNDP, 2011 report. The high rate of illiteracy in Terekeka County especially among women causes immense vulnerability through exclusion by men in major areas of concern. Girls married at tender age, are without access to decision-making, and are denied their basic human rights as citizens. Impact evaluation report by Norwegian People Aid, 2004 revealed that Women's ability to make household decisions is enhanced while contributing financially. Traditionally, women in Terekeka not expected to participate in any activities that will make them contribute ideas and even in community meetings, they are supposed to keep quiet and sit behind unless permitted by the men.

2.2.3. Empowerment of women by VSLAs in assets ownership.

Panetta (2010) stated that in East Africa (Ethiopia, Tanzania, Rwanda, and Kenya) Village Savings and Loans Associations contributed immensely to household access to assets like cattle, goats, sheep, chicken, agricultural tools. Evidence from Tanzania suggests that participation in the Village Savings and Credit Association is associated with a significant positive increase in number and ownership of assets by women. Evidence from Rwanda shows that women participation in the Red Cross credit program is associated with a significant positive increase in ownership of assets like cattle by women. Hashemi (2012) indicated that women participating in the groups have increased ownership of property and assets at the household level compared to members who are not participating in groups. Mayoux (2000) show that the households of VSLA clients especially women have, on average, better empowerment status through asset ownership compared to non-client households but on contrary, a study by (Conner, 2010) in Tanzania reveals VSLA participation has little effect on asset ownership by women, but has a substantial positive impact on quality, evident through an increase in assets numbers and further shows participating members in the VSLA group have their productive asset base ownership by women (linked mainly to household items) increased compared to non-participating members.

According to Corner (2012), Poor women participating in VSLA invest in income generating activities that increase their economic security, provide more assets for their families and this has positive contributions towards the happiness of their husbands leading to respect of views of the women hence 60% of the women able to own many assets like land, shops and business in their names without spouse complaints. Corner (2010) further note that participation in VSLA has a substantial positive impact on assets acquisition and ownership by women. It can be deduced that participation in VSLA has empowered women towards ownership of

assets in the household. Also supporting this view from Tanzania indicated that women participation in the Village Savings and Credit Association significantly had positive increase in asset ownership because of enhanced financial ability (Holme, 2010). In South Sudan, women are less likely than men to own and control assets, especially productive assets based on the impact assessment done by CARE in 2011, this is associated with culture where men do most of the work, provide for their wives and own most of the assets. In South Sudan, most of the productive assets are owned by men according to study done by FAO in 2014 and this ownership of assets by men attributed to practices in the area as men are considered to be heads of household and have the right for everything at home and women have to listen to them without any question. SF baseline assessment report in 2012 show that women are the most vulnerable groups in Terekeka with less than 5% ownership of assets at household level. Men own most of the assets at home, as women have no right in everything, they are only married to take care of the domestic work like grazing cattle, cooking, looking after the children. Goetz (2009) Critics, by contrast, claimed that women's loans often controlled and invested by male relatives and thus losing control of resources by women, this undermine household survival strategies, forcing women to mobilize repayment funds from resources which would otherwise be used for consumption or saving purposes or in some cases to borrow more money from other sources, thus falling into vicious cycles of debt. Accordingly, loans given to women do little to alter their subordinate position within the household and may lead to heightened levels of violence against women due to conflicts over control of resources and decision making at various levels.

2.2.5. Chapter summary

The literature review shows mixed impact of VSLA towards women economic empowerment. Several studies revealed that women were empowered by participating in the VSLA groups through increasing business income, asset ownership by women and inclusive decision making at home and in the community. However, on the other hand, studies in the literature also revealed that there was no significant increase in business income, asset ownership and inclusive decision making of women through participating in the VSLA groups. Studies done in Terekeka County did not bring out and direct contribution of VSLA towards women economic empowerment in terms of business income increase, asset ownership and inclusive decision-making. Women in Development Service (2005) Recognition of Saving-led approaches is at global stage as one of the most effective means of reaching poor rural households and especially women. This has a potential of improving the household incomes and empowering the women economically. With the improved income, women will be able to ensure availability, access, proper utilization and buffer their resilience to adverse negative conditions. The number of VSLAs as a form of microfinance institutions has increased across the globe, so has an interest in understanding the nature of the clients and how program participation influence them. Although impact studies face a variety of methodological limitations, numerous studies have found substantial positive impacts of participation in microfinance programs, specifically in the areas of eradicating poverty, promoting children's education, improving health outcomes for women and children and empowering women (Conner, 2010).

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

This chapter discusses comprehensively how data were sourced, processed, analyzed interpreted and presented to meet the research objectives. The chapter dwells on research design, the site description, study and target population, the sample size and sampling procedures, description of data collection instruments and methods of data collection used, measures taken to maintain validity and reliability, data analysis techniques and ethical considerations in the study.

3.1. Research Design

A cross-sectional and descriptive survey design was used. It provided an accurate account of the characteristics, for example behavior, opinions, abilities, beliefs, and knowledge of an individual, situation or group. Both quantitative and qualitative data collection methods were used. Quantitative method was used since it is a formal, objective, systematic process to describe and test relationships and examines cause and effect interactions among variables of the study. Qualitative approach enabled the researcher to focus on the examination of characteristic traits or properties of certain activities, groups and situations, not dwelling in the frequency of appearance but on the underlying factors behind the figures, 6-8 members from each of the 20 VSLA group selected to participate in the FGD. Three (3) Focus group discussions conducted from among the 20 VSLA groups randomly selected. A Key informant interview targeted project staffs (Community based facilitators, Manager and the supervisor).

3.2. Site description

This study focused in Terekeka County, under Terekeka State, South Sudan. According to the South Sudan 2008 census, Terekeka County is the second largest of the six (6) counties in Terekeka State. Stromme Foundation has been implementing the VSLA project in Terekeka County since 2014 with total of 60 VSLA groups and membership of 1,500, 80% female. The people of Terekeka are mostly cattle keepers with few people practicing crop production and Fishing activities carried out along the Nile River in Terekeka.

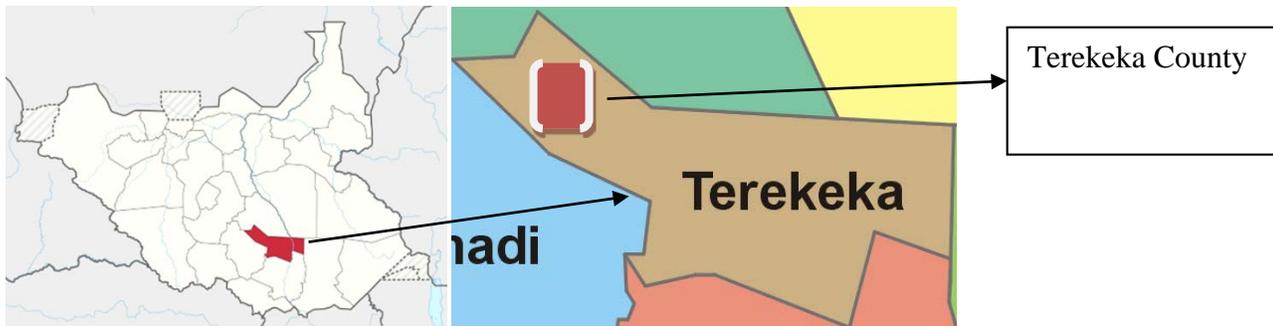


Figure 2: Map of Terekeka County, in Terekeka State, South Sudan. (UNDP 2016)

3.3. Study and target Population

The population of the County is 140,390 people (2008, Census) and it is located about 85kms North of Juba City. The county is divided into nine (9) administrative units (Payam); Terekeka, Rego, Muni, Nyori, Tali, Rejang, Tombe and Tindilo and Mangala payams. The study population consisted of all female members of the saving groups comprising 100% women who were considered for the study since the study was about women economic empowerment.

3.4. Sample size and Sampling Procedure

According to Gay (2003) sampling is a process in which several individuals are selected for a study in such a way that the larger group from which these individuals were selected to represent them.

3.4.1. Sample size

The 60 VSLA groups in Terekeka County are homogenous and have an average membership of 30. Statistics from the group membership at Stromme Foundation office in Juba indicated that there are 1,500 members with 85% women. Sample size for quantitative data collection was determined using the standard formula by Yamane (1967) as shown below;

Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample size for the study. A 95% confidence level and $P = 0.5$.

$$n = \frac{N}{1 + N * (e)^2}$$

Where n – the sample size

N – The population size

e – The acceptable sample size

* =95% confidence level and $p = 0.5$ assumed.

From the above formula,

Population size N is 1,500

Thus, Sample size n is $1500 / 1 + 1,500(0.5)^2$

Therefore, sample size for this study was 300 VSLA members.

A randomized list of names of all the 300 women members in the 60 VSLAs in Terekeka County was obtained. Based on the World Bank preposition that 30 clusters of 15 members were adequate for homogenous clusters, 20 VSLAs were selected randomly for the study.

3.4.2. Sampling Procedure

Sampling technique is the actual procedure that was followed to obtain the individual members of the sample to represent the population. This study employed both probability and non-probability sampling techniques. For quantitative data collection, probability sampling technique of systematic random sampling was used. A randomized list of names of the 1,500 VSLA members of the 60 VSLAs was obtained. The sample frame was obtained from the Stromme Foundation officer in direct contact with the VSLAs (Community Based Facilitators) in Terekeka County who keep the list of all the participating women. A systematic random sampling technique was therefore used picking $n = \frac{N}{1 + N * (e)^2}$ Where n – the sample size

N – The population size

e – The acceptable sample size

* =95% confidence level and $p = 0.5$ assumed.

To obtain the sample size for qualitative data collection, purposive sampling method was used to select VSLA members for the Focus Group Discussion (FGD) 20 VSLAs produced 6-8 members each for focused group discussions. This kind of sample, selections was made based on pre-determined criteria which was the researcher's judgment. Purposive sampling was used because it allows the researcher to see homes of the respondents and this was critical since it enabled the researcher to concentrate on respondents and instances which produced rich and most valuable data and directed focus on extreme cases of improvement or decline in status to illuminate the research questions at hand. Key informant interview was also done including 4 CBFs, VSLA supervisor and manager.

3.5. Methods and Instruments of Data Collection

The study applied three sets of data collection instruments: structured questionnaires for women participating in VSLAs, focus group discussion guide for the VSLA groups and Key informant interview guide for the CBFs, VSLA manager and the supervisor. The questionnaire administration was done by the researcher and four (4) research assistants. The questionnaire comprised

of closed-ended questions and open-ended questions. The questionnaire was divided into sections A, B, C and D. Section A contained information on demographic characteristics; Section B contribution of VSLAs in empowering women in income status; Section C on influence of VSLAs in empowering women towards asset ownership; and Section D focused on influence of VSLAs in empowering women towards decision making in Terekeka County. The Key Informant Interviews (KII) were for the community-based facilitators, VSLA manager and the VSLA supervisor; This was done by the researcher. KII enabled the researcher to get information from individuals who were considered particularly knowledgeable about the topic of the study. It also allowed a face-to-face interaction, which permitted the researcher to seek new insights, ask questions, and assess phenomena under study from different perspectives. The FGD tool provided a method for generating qualitative data to support the capacity development plan and increase the opportunity for the group members to share experiences. The capacity assessment tool (FGD) generated more information on the VSLAs, which informed and helped to connect issues and responses from the individual questionnaire of group members.

3.6. Validity and Reliability

3.6.1. Validity

Dooley (1996) defines validity as the extent to which the study instruments capture what they should measure. Pilot testing was done to ensure the validity of the instruments. This ensured that the instructions were clear both to the enumerators and the respondents and all possible responses to a question were clear. Content validity of a measuring instrument is the extent to which it provides adequate coverage of the investigative questions guiding the study (Mugenda, 2008). In this study, content validity was employed to ensure validity by consulting the judgment of research supervisors within the university. The opinions of the University supervisors were sought for improvements and verify whether the instruments adequately addressed the objectives of the study and answer the research questions. Face validity is the extent to which a measurement method appears “on its face” to measure the construct of interest and this method was used to ensure validity. Content validity is the extent to which a measure “covers” the construct of interest, which was one of the ways to ensure validity. Another method to ensure validity was the criterion validity, which is the extent to which people’s scores on a measure were correlating with other variables (known as criteria).

3.6.2. Reliability

Hungler (2016) refers to reliability as the degree of consistency with which an instrument measures the attribute it is to measure. It therefore means the measure of degree to which research instruments yield consistent results or data after repeated trials. The test-retest method was used to assess the reliability of the instruments, this involved administering the same questionnaire twice to household respondents at some point and correlating their responses independently. A second kind of reliability is internal consistency, which is the consistency of people’s responses across the items on a multiple-item measure, like test-retest reliability, internal consistency which was assessed by collecting and analyzing data. Inter-rater reliability is the extent to which different observers were consistent in their judgments and it was used to ensure reliability of the study.

3.7. Data Analysis Procedures

After completion of the data collection exercise, all the questionnaires were adequately checked for data quality, edited for completeness and consistency, organized and analyzed. For analysis of closed-ended questions, Statistical Package for Social Sciences (SPSS) was used, current versions IBM SPSS statistics 20. Data was analyzed by descriptive statistics. Frequency tables ‘generated; presentation of findings in frequencies. The open-ended questions analysis was through content analysis by the researcher with the aim of quantifying emerging characteristics and concepts. Content and narrative analysis was used to analyze qualitative data by the researcher.

3.8. Ethical Considerations

The researcher did not only demonstrate expertise and diligence, but also honesty and integrity. This was to recognize and protect the rights of the respondents. To render the study ethical, the respondents were given the rights to self-determination, anonymity, confidentiality and informed consent to participate in the research study. The researcher also ensured that all the necessary permits were obtained like the authorization letter from the university with reference number CUEA/ACA/DDS/16/2 and introduction letter from Stromme Foundation in South Sudan, dated 1st Oct 2018.

CHAPTER 4

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS

4.1. Introduction

This chapter presents findings of the study on contribution of Village Savings and Loan Association to women economic empowerment in Terekeka County, Stromme Foundation supported groups. The findings are in accordance with the four objectives of the study.

4.2. Questionnaire response rate

The response rate for the study was 297 (99%) from a sample of 300 respondents. A response rate of 50% is considered adequate for analysis and reporting, 60% is good and that of 90% and above is very good (Mugenda, 2012).

4.3. Demographic characteristics of the respondents

During this survey, the demographic characteristics considered were age, sex, marital status, education and household head status. The few were chosen because they were very important to this study in relation to the context of Terekeka County.

4.4. Age of the respondents

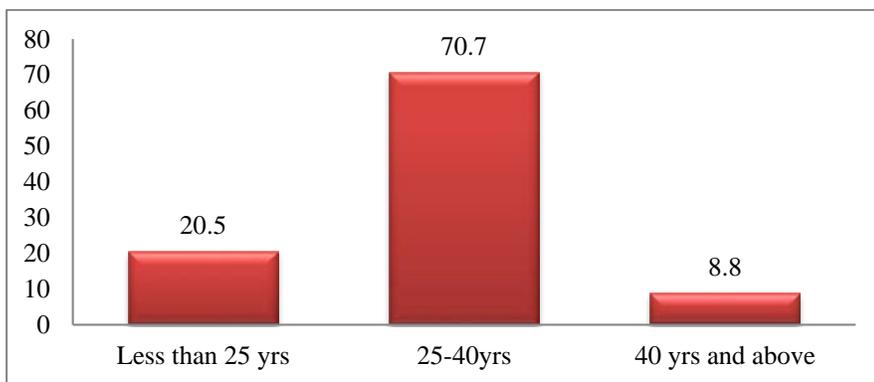


Figure 3: Age of the respondents

Age distribution of respondents is very important in this study, because it has a big impact on respondents' reaction regarding social reality. Besides, difference in age distribution influences respondents' perception and interpretation of social events. The age range of the respondents were less than 25 years, 25-40 years and 40 years and above. Majority (70.7%) of the respondents were women in the 25 - 40 age category as in figure 3 above. These were women who were married or were at some point married and had experience in Savings and Loans Association and ensuring well-being economically for their households for a considerably period. They were well informed, ready and exuded familiarity by giving very useful

information for the study. The respondents who are less than 25 years old were 20.5%, they experience a lot of challenges of meeting the household needs as young parents, and their views enriched the study. Of the respondents, 8.8% were women of over 40 years old. These were women who have been in the role of ensuring household welfare for a considerably period given that they were the oldest age category; they gave rich experience and insight in finding out the contribution of VSLA to economic empowerment of women. This finding complements the VSLA impact evaluation in Terekeka by CARE (2011) that the largest proportion of the respondents were aged 25 to 50 years (70.2%) and that the smallest portion were aged 18 to 20 years at 27.8%. This distribution shows that the project favors women who are adult, this is because they are having many responsibilities, being energetic and having capacity to plan for the funds generated to them and thus able to use the funds profitably.

4.5 Marital status

Table 1: Marital status of the respondents

	Frequency	Percent
Married	297	99%

The respondents were asked to indicate their marital status and the results were show in Table 1 above. Total of 297 respondents interviewed, 99% were married and living with their husbands. This was very important in portraying the role of women in ensuring access to basic needs at households where men are the bread winners. Neither of the respondents was single, widowed nor divorced. This shows that the project favors the marginalized married women as one of the key developments and empowerment approach used by Stromme Foundation in Terekeka County and state with the intention of having them in VSLA groups so that they can be able to support their families.

4.6. Education level of the respondents

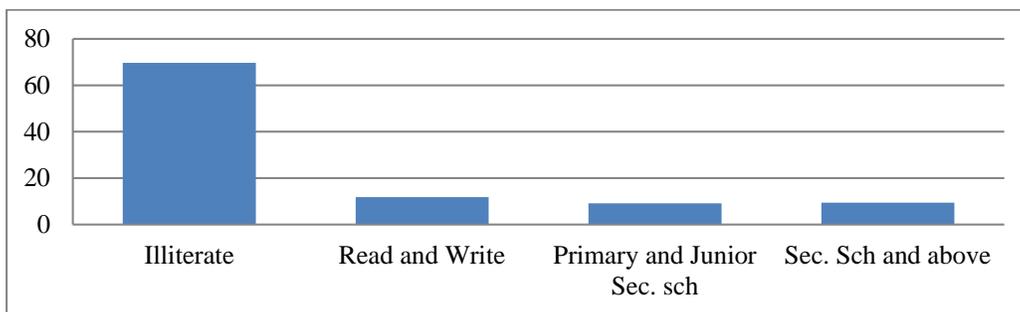


Figure 4: Education level of the respondents

The level of education is one factor which influences respondents' level of thinking and judgment. The respondents were required to give their education attainment and the results were as shown in figure 4 above. Majority of the respondents at 69.7% never attended formal school (illiterate), caution was taken to explain the questions to them without changing their meaning. 11.8% of the members can read and write 9.4% of the respondents had obtained secondary school level of education and above, they had a very good background of financial management and could relate the VSLA intervention with the changes in the status of their household economic level. 9.1% of the respondents had obtained primary school and junior education. They understood the basic accounting of debit and credit and could respond on how VSLAs had impacted on their household economically. This finding clearly indicates that

VSLA is not only for the educated people in towns, but it cuts across especially the rural poor as well. The fact that many were illiterate people, it also tells that this methodology is best for such class of people.

4.7. Empowerment of women by VSLAs in increasing business income.

This section examines how VSLAs contributes to increase in business income and how this empowers women economically. The result of the study presented as below:

4.8. Operating small Income Generating Activities

Table 2: Establishment of small business

	Frequency	Percent
Yes	297	99%

The respondents were asked if they have small business that they operate, the result tabulated as shown in table 2 above. The result indicate that all the respondents have small business which they established as a result of the participation in the VSLA. The respondents got engaged in various kind of small businesses like fish selling, retail goods, vegetable selling, bakery and restaurant operation which are profitable in the area. This is a strong indication that the loan facility available in the VSLAs had empowered women to expand and open small business thus contributing to access to income increase at household to meet their demands.

4.9. Time frame for IGA operation.

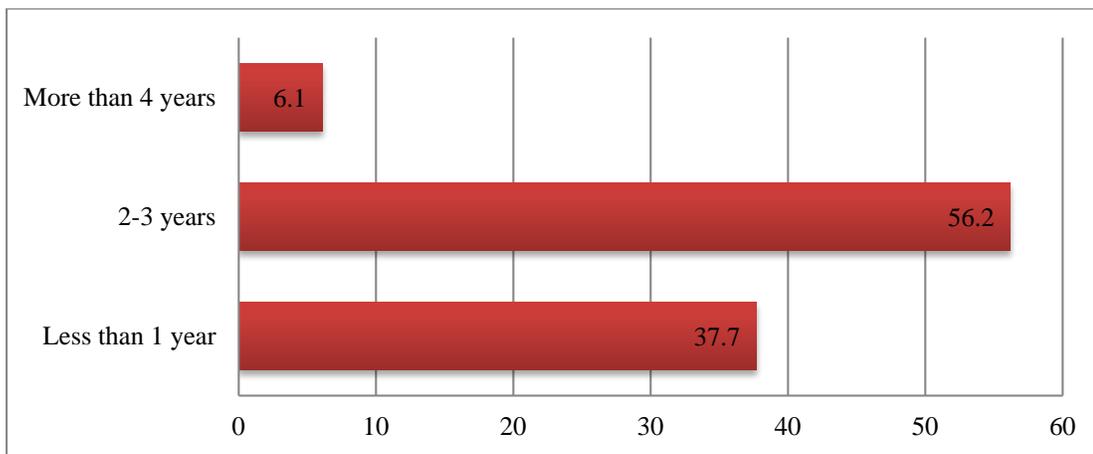


Figure 5: Duration of IGA operation

Majority of the respondents at 56.2% mentioned that they operated their business for 2-3 years since joining the VSLA and this enabled them to gain access to income and support their families in basic needs like food and shelter. On the other hand, 37.7% of the respondents said they have operated their IGA for less than one year. The members who operated their business more than four years were 6.1% meaning that the project helped them in expanding their business as they were already involved in the small business before joining VSLA. It can therefore be deduced from this findings that savings and loans has enabled the participating women in starting and expanding their business, The fact that majority of the respondents were able to operate their business by over four years, it indicated that VSLA contributed directly towards the sustainability of their business as the available loan fund provided access to capital for members to expand their business but also the share out money get re-invested in the business thus expansion and growth

realized, hence increase in income as a result of the VSLA since they were able to access loans and credit from the groups and invest in the business apart from the training attended in business skills.

4.10. Sources of capital for starting IGA

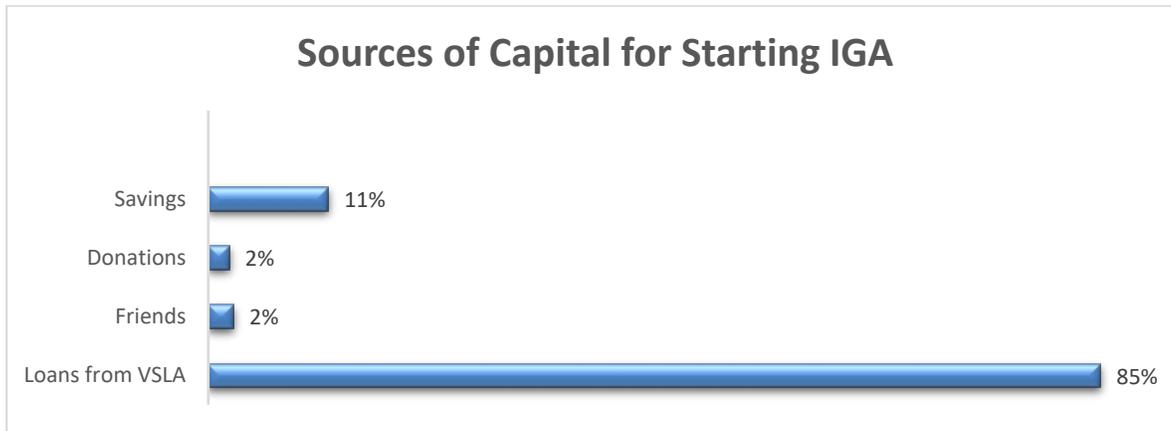


Figure 6: Sources of capital for starting IGA

The finding shows that 85% of the respondents started up their small business using the loans got from the VSLA groups and this helped them to get started with IGA, hence increased income because of the small business. The members who got their capital from savings were 11% and this made it possible to start their own small business. Few respondents (2%) got their capital from friends and 2% got theirs through donations. The fact that the study revealed many businesses were started using loans from the VSLA, members were able to borrow more and more, hence it contributed positively towards increase in business income as it provided capital for many to start and expand their business. Aliza Jane, a member of peace saving group testified that ‘I would have not started my business of tea selling if it were not because of the loan from the saving group’ according to monitoring 2016 report from Stromme Foundation.

4.11. IGA improvement

Table 3: IGA improvement after joining VSLA

	Frequency	Percent
Yes	279	93.9%
No	18	6.1%
Total	297	100.0%

Asked if they have experienced improvements in their small business in terms of size of the stock, income and number of customers, 93.9% of the respondents said yes, their business improved greatly in terms of increase in profits, income and size of the stocks. This has been attributed to the trainings gained, sharing of business ideas with other members of the group and literacy program given to them that enhanced record keeping skills making individuals to be able to know if he/she is making profit or loss but also incidences of loss of cash through credits were minimized leading to increase in income. However, 6.1% of the member said they have not experienced any improvements in their IGA. It can therefore be inferred that VSLA enhanced the ability of member to increase business income at household based on the above.

4.12. Attended business skills training

Table 4: Attended business skills training after joining VSLA

	Frequency	Percent
Yes	287	96.6%
No	10	3.4%
Total	297	100.0%

Out of the respondents interviewed as in table 4 above, 96.6% attended business selection planning and management training and this training built their capacity to adequately select better business, plan well for them and manage them well too resulting to increase in income at household level. Some of the respondents (3.4%) of the respondents did not attend the training as some of them got family issues like sickness and burial and could not attend. This finding signifies that VSLA contributed positively towards increase in business income as business skill training was one of the key components of the intervention to realize more economic independence.

4.13. Training impact on business

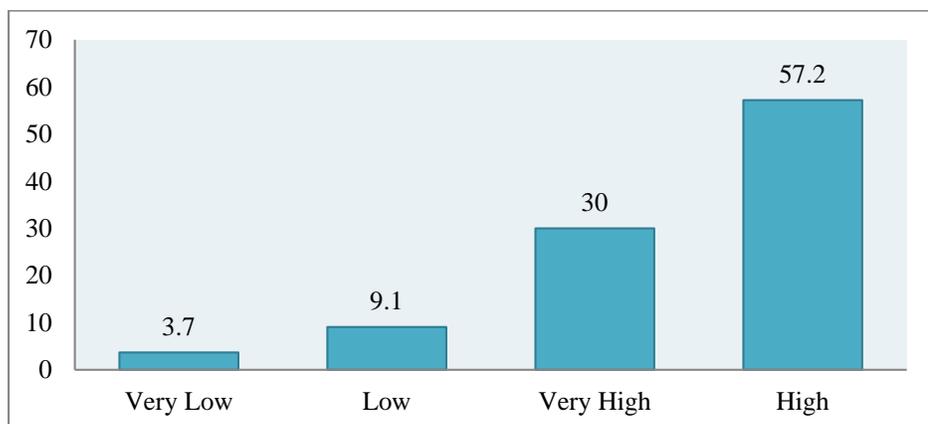


Figure 7: Training impact on business

Figure 7 above shows respondents giving their opinions on whether their participation in the Business Selection Planning and Management training had a positive impact on their business, 57.2% of the members said the training had a very big positive impact as a result they were able to expand their business and increase in come because of high profit realized, 30.0% said the positive impact was very high and this has increased income as a result of the business. Some of the respondents (9.1%) said the training impact was low as they have not realized much of the positive changes after the training and 3.7% said the positive impact was very low and they didn't realize some of the positive benefits. This finding concurs with that of Hugh (2009) that training of women in business skills have positive impact on their business leading to increase in income at household.

4.14. Money borrowed

Table 5: Money borrowed during the past 12 months

	Frequency	Percent
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Yes	288	97.0%
No	9	3.0%
Total	297	100.0%

One of the key purposes of VSLA is to accumulate capital and lend it to the members, as shown in table 5 above, 97.0% of the members said they have borrowed from the savings during the past 12 months and invested it in business which contributed positively to increase in income. 3.0% of the members did not borrow from the savings that they have contributed every week in the group but still use the generated capital to expand on their small business. This is supported by from Uganda which suggest that micro-credit contributes to a women’s increase in business income according to (Wakoko 2004).

4.15. Reasons for not borrowing

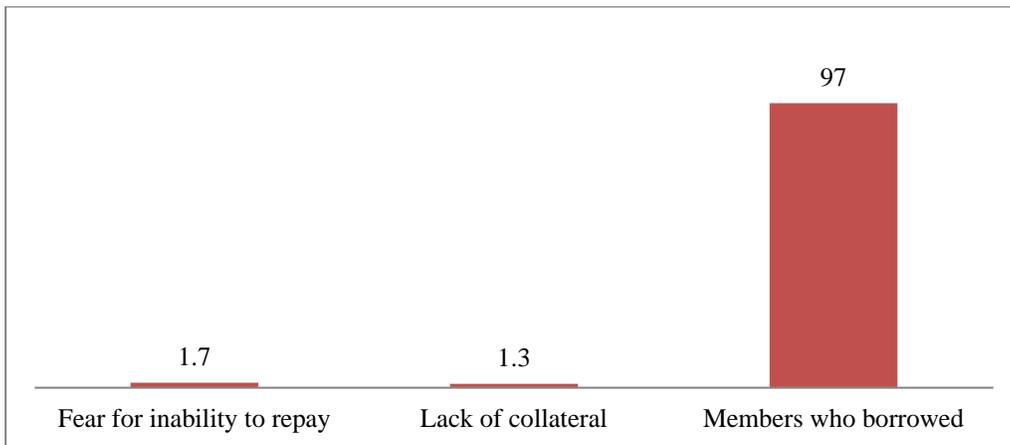


Figure 8: Reasons for not borrowing

Asked why the 3.0% of the members did not borrow from the saving as shown in figure 8 above, 1.7% said they feared that they will not be able to pay back the money as the primary objective to pay back with 10% interest on the amount borrowed within one month as such it discouraged them, however they worked with what they have in their business. 1.3% of the respondents’ said they did not borrow because of lack of collateral or security for which they will offer for the loan. This finding concurs with the views of (Helmore, 2009) that when women borrow, they borrow for a purpose and shall use it for the purpose for which it was borrowed. It can therefore be deduced that VSLAs has empowered women in increasing income at household as few of the members did not borrow for reasons given above, the majority 97% who borrowed confessed to investing the borrowed amount into business as such, their business grew in stock and profit, thus increase in income at household as a result of the business created from the VSLA.

4.16. Sources of borrowing

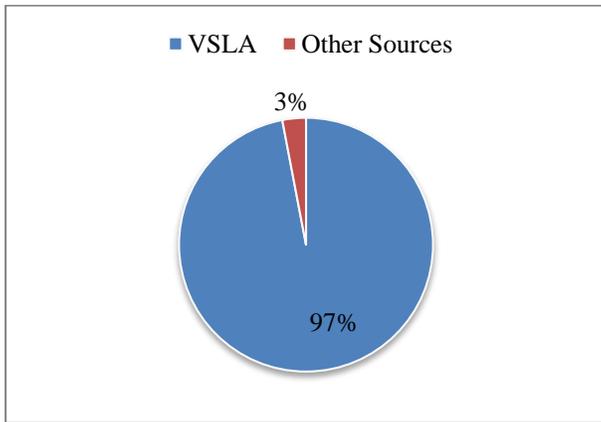


Figure 9: Sources of borrowing

As shown in figure 9 above, 97.0% borrowed from the saving group which they belong to, the borrowed amount invested in the various business. The 3.0% did not borrow due to lack of collateral and fear for inability to pay. Thus, VSLA contributed positively to increase in income at household as the borrowed amount were invested in business and other various activities. The finding supports the views of an evaluation of VSLA project in Bondo District of Kenya by CARE in 2011 that Members, especially women, acknowledged that the project contributed to increase in income because VSLA offered loan services for their business leading to expansion.

4.17. Purposes of Borrowing

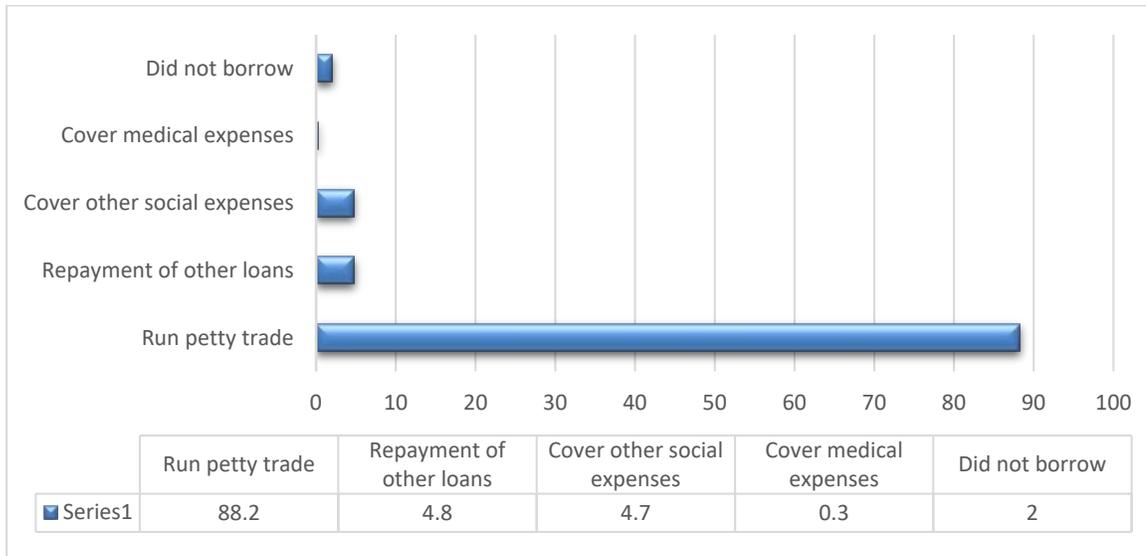


Figure 10: Purposes of Borrowing

As shown above in figure 10, majority of the respondents at 88.2% indicated that they borrowed for running petty trade (business) as that is the primary objective of giving out the loans, the amount borrowed helped in expanding business hence increase in income at household level. Of the interviewed members, 4.8% respondents borrowed for Repayment of other loans and 4.7% to cover social expenses, 0.3% borrowed to cover medical expenses and 2.0% of the respondents did not borrow. It was evidenced that VSLA contributed positively towards the establishment of petty business, hence increase in income at household level among the women participating in savings.

4.18. Empowerment of women by the VSLAs in decision-making process at household and community levels

4.19. Participation in community local activities

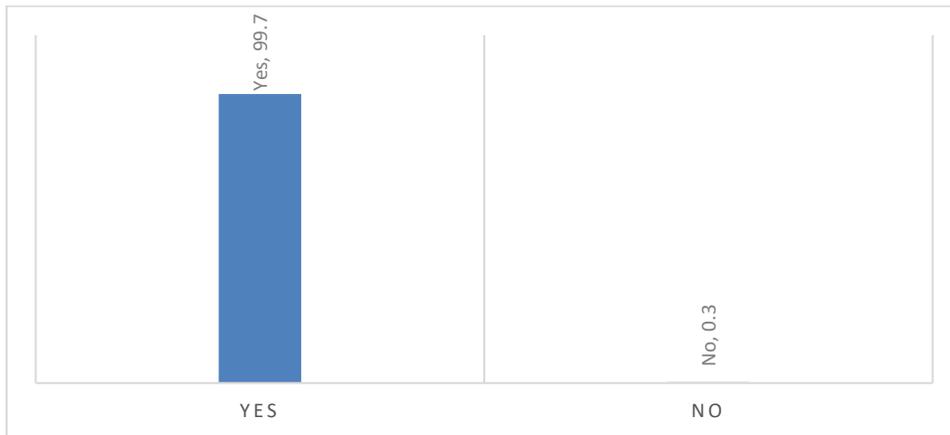


Figure 11: Participation in community local activities

As shown in figure 11 above, 99.7% indicated that they have actively participated in community local activities like meetings, electoral process etc. their participation is an indication that they were involved in decision making process. 0.3% of the respondents have not participated in the community local activities reason being there was no opportunity to get involved apart from only participating in group activities and contributing actively.

4.20. Spouse feelings towards participation in community activity



Figure 12: Spouse feelings toward participation in community activity

The respondents were asked about their spouse (husband) feelings towards their participation in community activity; the results were as shown in figure 12. The finding showed that 48.5% of the respondent said their spouses were highly comfortable about their participation in community activity and this is an indication of empowerment towards decision making for women. 46.1% said their spouse were comfortable about their participation in community activity. 2.4% said their husbands were neutral about their participation in community activity. 1.7% said their husbands were highly uncomfortable about their participation in the community activity and 1.3% of the respondents said their spouse were uncomfortable about their participation in community activity. This agrees with the findings of Dean & Chris (2012) for a study done in Uganda and Malawi, where women expressed increased influence over household and community decisions as well as more frequent engagement with others in their communities. This is an indication that

women were having more voice on household and community concerns because they can learn leadership skills from the VSLAs hence able to influence decision making process as a result of the skills learned.

4.21. Opportunity given to express ideas

The respondents indicated the level of opportunity given to them to express their ideas; the results were as shown in Figure 13.

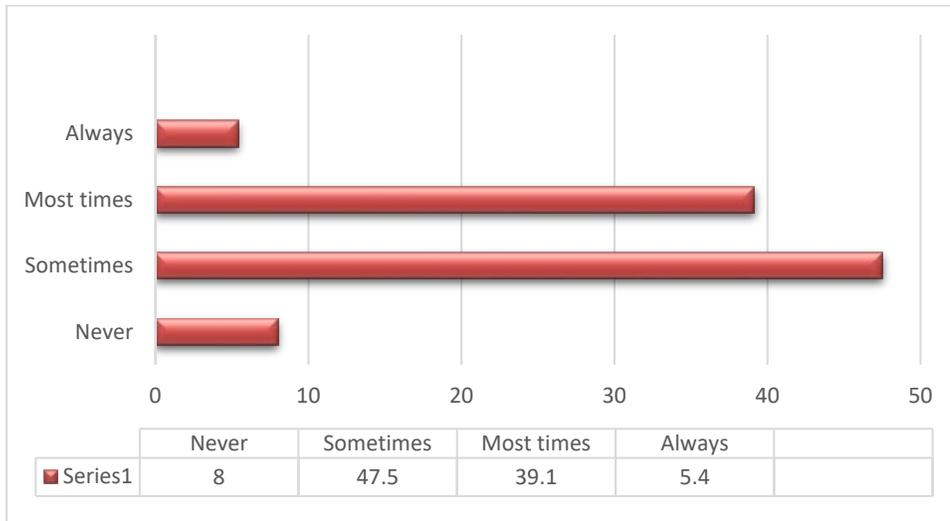


Figure 13: Opportunity given to express ideas

Respondents were asked to indicate the level of opportunity given to express their ideas, 47.5% said they were sometimes given opportunity to express their ideas, 39.1% said they were given most of the times to express their ideas, 8.0% said they were never given opportunity to express their ideas. 5.4% said they were always given the opportunity to express their ideas. This finding conforms to the views of Helmore (2009) who noted that participation of women in microfinance empowers by enhance their decision-making ability. From the findings of this study, VSLA has considerably empowered women to be able to express themselves as such their spouses were able to give them the opportunity to express themselves.

4.22. Consideration of ideas/views by spouse

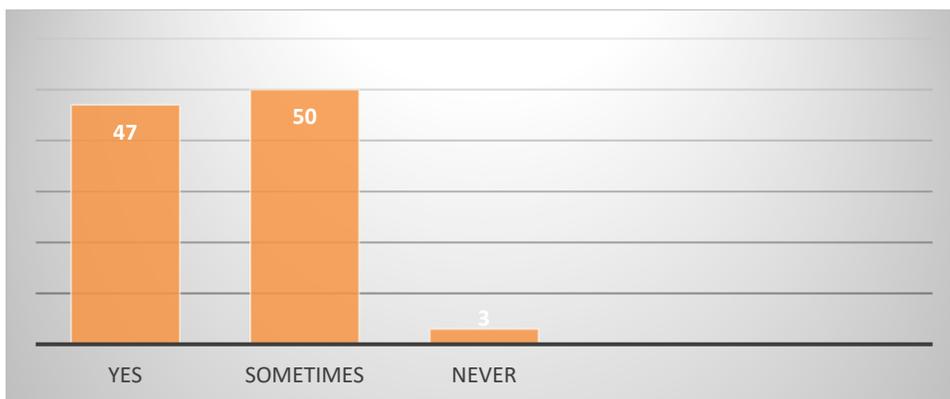


Figure 14: Consideration of ideas/views

The respondents were able to indicate their opinion on whether their ideas/view was taken into consideration; the results were as shown in Fig 14. Asked to give their opinions on whether their views/ideas were given consideration, majority of the respondents at 47% said their ideas were taken into consideration most of the times, 50% of the respondents

said sometimes, and 4.0% said their ideas were always considered and 3.0% said their ideas were never considered. This finding conforms to the views of Helmore (2009) that participation of women in microfinance empowers by enhance their ability to express themselves at household and in public gatherings as such most of their ideas were taken into consideration.

4.23. Decision of membership to join VSLA

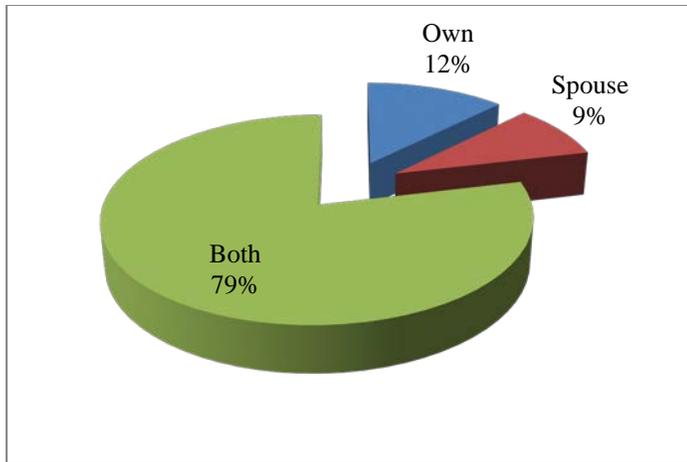


Figure 15: Decision of membership to join VSLA

The respondents were required to indicate their decision of membership to join VSLA; the results are as shown in Fig 15. Asked to give their opinion on the sole decision for them to join VSLA, majority of the respondents at 79% stated that it was both the wife and the husband in deciding the membership to the VSLA, 12% of the decision made by the wife in joining the VSLA and 9% decided by the spouse. This finding closely relates to the result of an evaluation of VSLAs in Bondo by CARE (2011) that 87.9% of the interviewed members reported that they share their ideas together and make collective decision given that the wife also supports the husband in household needs financially, hence ideas of the women also respected by their husbands in decision making process.

4.24. Convincing of spouse in discussion

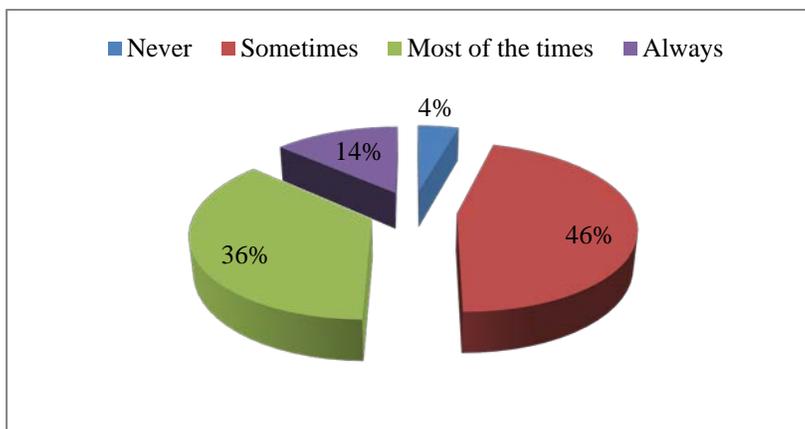


Figure 16: Convincing of spouse in discussion

The respondents were required to indicate their level in convincing their spouse in discussion; the results are as shown in Figure 16. Asked if the respondents were able to convince their spouse in decision making, majority of the respondents at 46% said sometimes they were able to convince their spouse. 36.% said most of the times they were able to convince their spouse in decision making. 14% said always they were able to convince their spouse and 4% said they were never able to convince their husbands in

household related decision-making process. This finding conforms to the result of a study on the Zambuko Trust in Zimbabwe by program (Barnes et al. 2001b) that access to credit had a positive impact on decision making at household level especially when women were able to support their husbands financially.

4.25. Husband agreement to ideas

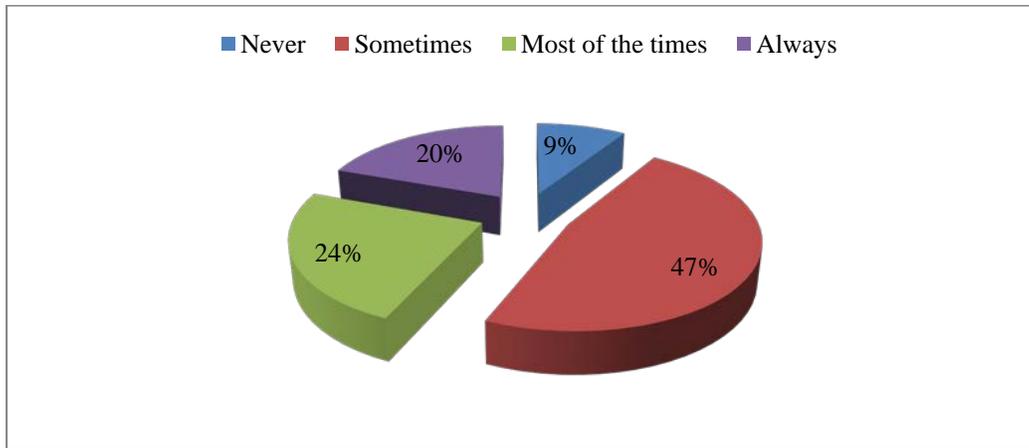


Figure 17: Husband agreement to ideas

The respondents were able to indicate whether their spouse was able to agree to the ideas shared un decision making, the results were as shown in Fig 17 and 47% said sometimes their husbands agreed to their ideas. 24% said their spouse most of the time agreed to their ideas. 20% said always their spouse agreed to their ideas and 9% confessed that their husbands never agreed to their ideas. This finding shows that VSLA contributed positively towards influencing decision at household as they were given skills on effective communication.

4.26. Control of resources at household level

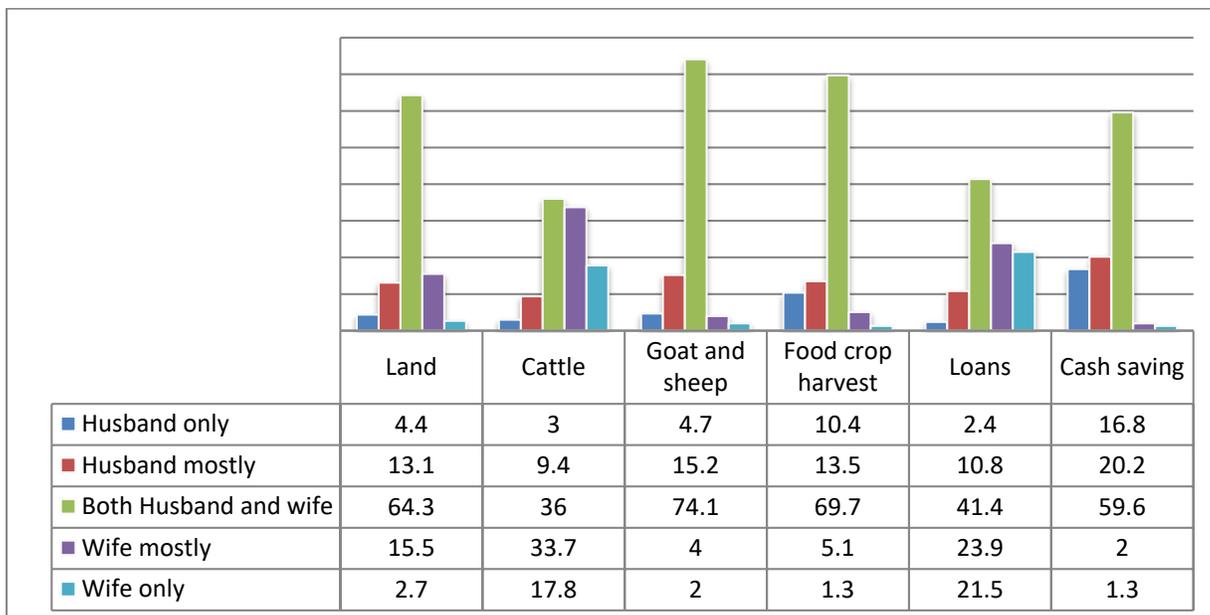


Figure 18: Control of resources at household level

The respondents were able to indicate who has the greater control over land, cattle, goat and sheep, food crop harvest, loans and cash saving, and the results were as shown in Figure 18 above. Control over land at household as one aspect of decision making. Respondents at 64.3% said land is under the control of both husband and wife, 4.4% said land is under the control of husband only, 15.5% said it is under the control of wife mostly, 13.1% by husband mostly and 2.7% by wife only. This significantly showed that through VSLA women had greater influence over their husband in control over resources like land which used not to be the case in Terekeka, thus VSLA is a powerful tool toward economic empowerment. On the control of cattle at their household; the result indicated that 36% of the respondents said both husband and wife, 9.4% said by husband mostly, 3% by husband only, 33.7% by wife mostly and 17.8% by wife only. The fact that majority at 36% of the cattle controlled by both husband and wife, this shows that women through VSLA have control together with their husband in control of resources like cattle at household. Women involvement in decision making process over control of cattle at household emerged as a result of partial contribution towards household resources as they were able to raise fund and support their husbands financially and with ideas thus VSLA played greater part in decision making process of women. The respondents were also able to indicate who takes control in terms of goat and sheep at household level, the result shows that, 74.1% of the respondents said it is controlled by both husband and wife, 15.2% by husband mostly, 4.7% by husband only, 4.0% by wife mostly and 2.0% by wife only, the result show that women through VSLA were able to control sheep and goat together with their husbands as they were able to also invest in the resources which gave them the opportunity and confidence to influence and control resources together with husband thus they played greater role in decision making process towards the development of their families. Further respondents were asked about the control of food crop harvest at household and majority 69.7% said it is controlled by both husband and wife, 13.5% said by husband mostly, 10.4% by husband only, 1.3% by wife only and 5.1% by wife mostly. Significant result indicated that VSLA positively influenced women to control resources like crop harvest collectively with their husbands because of the positive income they were able to get from the business they have and invest in crop production together with their husbands. On the control of loans, 41.4% of the respondents said both husband and wife take charge, 10.4% by husband mostly, 23.9% by wife mostly, 21.5% by wife only and 2.4% by husband only. This is supported in part by data from Malawi on VSLA impact assessment in 2014 which show that control of credit at household by both husband and wife improves relationships and further strengthens common understanding than when it is only controlled by one party only. This is an indication that members of the VSLA have been able to use the credit facility to obtain money for use at household that strengthens family relations between husband and wife thus direct involvement in decision making process. The respondents asked who controls cash savings at household, 59.6% by both husband and wife, 20.2% said by husbands mostly, 2.0% by wife mostly, 16.8% by husband only and 1.3% by wife only. This finding confirms Dean & Chris (2012) who found that in Ghana participation on VSLA had enabled both husband and wife to work collectively in managing available cash at household leading to economic empowerment of women. It can be deduced that VSLAs has empowered women over control of cash at household.

4.27. Decision making level

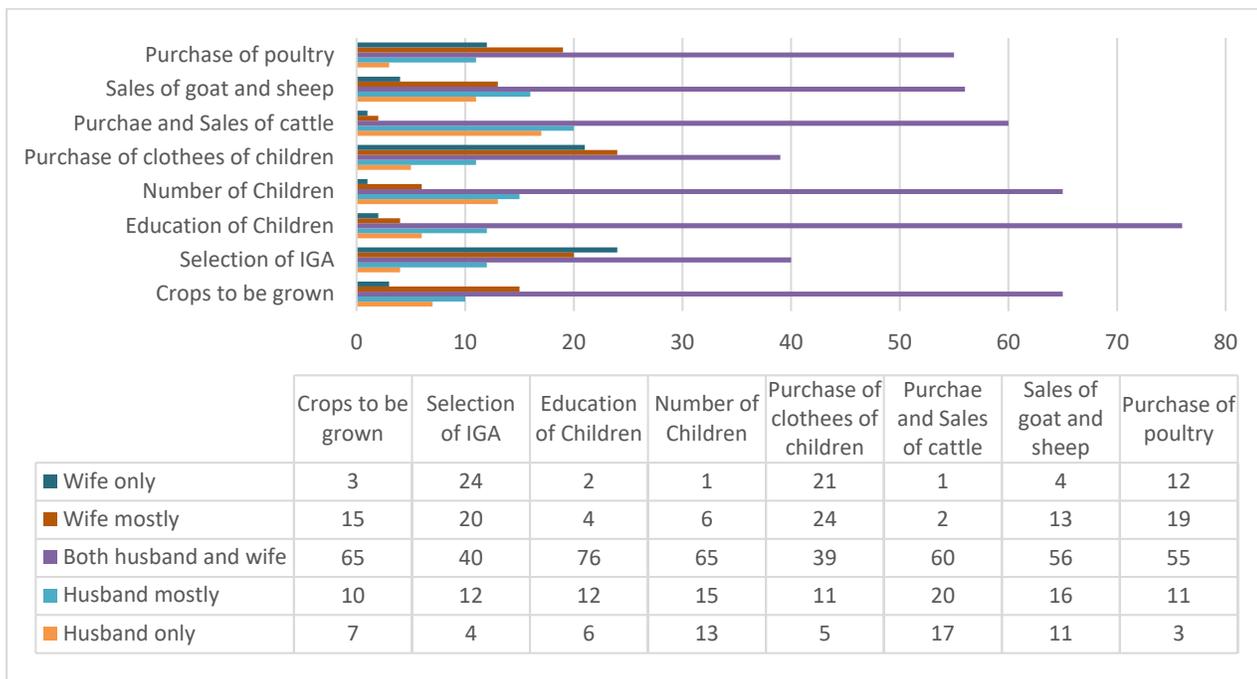


Figure 19: Decision making level

The respondents were able to indicate who decides on the levels of decision making at household regarding the common resources available, the results were as shown in Figure 19 above. From the result, total number of 65% said both husband and wife decide together on the crops to be grown, 15% decision made by wife mostly, 10% by husband mostly, 7% by husband only and 3% by wife only. This agrees with evidence from Tanzania (Brannen 2010) and Rwanda (Lacalle et al. 2008) which suggest that participation in the Village Savings and Credit Association has given power for men to decide collectively with husbands as they contribute financially to the welfare of their families, hence giving them control. The respondents were able to indicate who decides on the selection of IGA at household, 40% said husband and wife, 20% by wife mostly, 24% by wife only, 12% by husband mostly and 4% husband only. This finding supports the view of Holme, (2009) that because of microfinance, the poor can invest in income-generating activities that increase their economic security; It can be deduced that VSLAs have enabled the women members to take active control towards control of small business selection at household. On the decision related to the children education at household, the result show that 77% said both husband and wife involved, 12% by husband mostly, 6% by husband only, 4% by wife mostly and 2% by wife only. This confirms the findings by Corner (2010) that participation in VSLAs had a substantial positive impact on active decision making. It can therefore be deduced that participation in VSLAs has empowered women towards active involvement in decision making process at household like in children education. Further decision level analysis done on the number of children at household, the result indicated that 65% said both husband and wife decided collectively, 15% said mostly husband, 13% said husband only, 6% said wife mostly and 1% said wife only. These findings differed with those of a study by Conner (2010) in Tanzania which revealed that quantitative data suggests that participation in VSLAs have little effect in deciding the number of children by women at household and it confirms otherwise and this is an indication that women have successfully contributed in decision making in regards to the number of children at household. The respondents were able to point out who decides on the clothes for children at household, the outcome indicated that 39% said both husband and wife decided on the purchase of clothes for children at household. 24% said wife mostly decides on that, 21% said wife mostly, 11% said husband mostly and 5% said husband only and it signifies that women were actively involved in the decision making for the clothes of their children at household. On who decides on the purchase and sell of cattle at household, the result as shown above in Figure 19 revealed majority of the respondents at 60% acknowledged that

both husband and wife decided collectively. 20% said it is decided by husband mostly, 17% by husband only, 2% by wife mostly and 1% by wife only. This finding concurs with the view of Hugh (2005), that VSLA provides access to capital for women who allows them to contribute towards purchase of cattle at household which in turn give them control over their sale collectively with their husbands. Asked who decides on the purchase and sale of goat and sheep at household, 56% said both husband and wife decide together, 16% mostly by husband, 13% mostly by wife, 11% by husband only and 4% by wife only. This finding shows that through VSLA women were able to participate in decision making process at household by jointly making decisions on the purchase and sale of goat and sheep at household and lastly the respondents were able to indicate who make decision on the purchase of poultry at household and it clearly indicated that 55% said both husband and wife make the decision jointly, 19% by wife mostly as member of VSLA, 12% by wife only, 11% by husband mostly and 3% by husband only. This greatly confirms Dean and Chris (2012) who find that women members in VSLA have power at household to take part in decision making as the finance they get from their business helps in uplifting their home economically, hence having voice.

4.28. Improvement in household decision making after joining VSLA.

The respondents were able to indicate whether they have experienced improvement in household decision making after joining VSLA, the results were as shown in Fig 20.

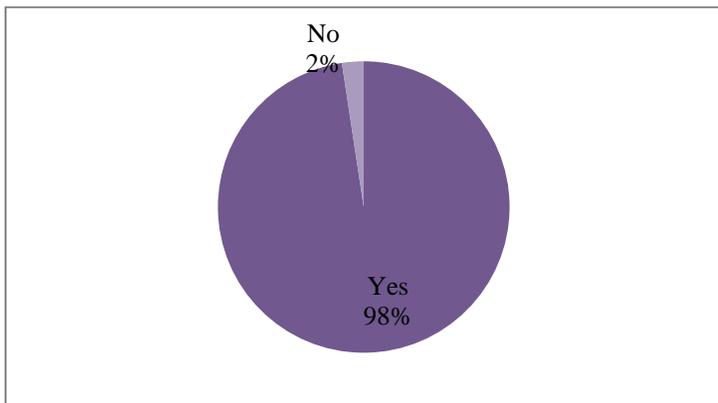


Figure 20: Improvement in household decision making after joining VSLA

Asked if there were improvements in decision making at household after joining VSLA, 97.6% said yes and 2.4% said no. This finding indicates that participation in VSLA has empowered the women to gain bargaining skills, present themselves to their spouses thus improvement in decision making process as they get involved in all the process.

4.29. Relationship with spouse

Table 6: Improvement in relationship with spouse

	Frequency	Percent
Yes	292	98.3%
No	5	1.7%
Total	297	100.0%

The respondents were able to indicate if there was improvement in relationship with spouse; the result was as shown in table 6 below. Asked to express if there were improvement in relationship with spouse, 98.3% said yes and only 1.7% said no. This finding concurs with Dean & Chris (2012) that participating women in Uganda are more likely to get involved in decision making process at household as they have the money that contributes directly towards household welfare which makes, they too have voice. However,

for the study in Uganda the women’s ability to get involved in decision making not only linked to money but other factors like respect to their husbands and cooperative spirit. This is an indication that VSLA had positive impact towards improvement in relation between husband and wife at household.

4.30. Expression in the level of improvement in relation with spouse

The respondents were able to indicate their level of improvement in relations with spouse, the results were as shown in figure 21 below. Asked to rate their expression in the level of improvement in relations with spouse, 60.9% indicated good, 31.0% said significant, 4.0% both said it was fair and slight. This signifies that VSLA partly contributed positively towards improvement in relationships with their spouse since they can support their husbands with family responsibilities financially and other moral duties like good advices.

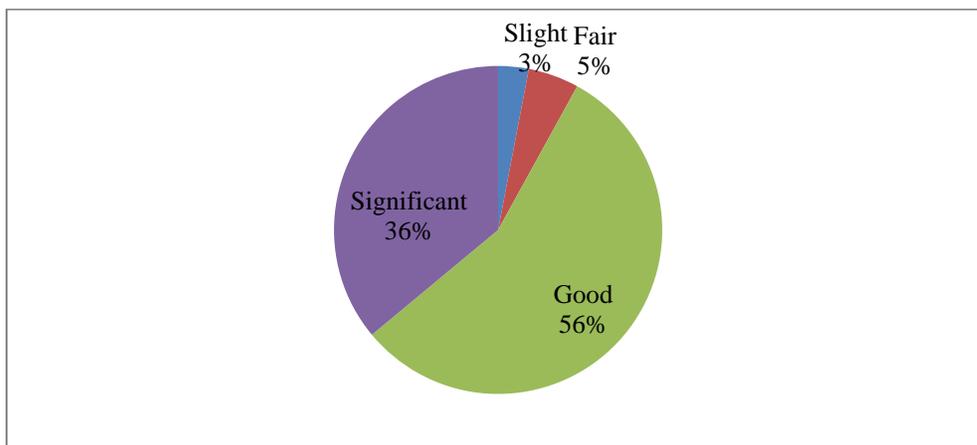


Figure 21: Expression in the level of improvement in relation with spouse

4.31. Empowerment of women by VSLAs in assets ownership.

This section of the study sought to assess the level of ownership of assets by women at household as a way of economic empowerment. Two aspects include material assets and monetary assets assessed. These were: amount of money resources, animal resources and land resources which are common aspects in Terekeka.

4.32. Personal cash saving

The respondents were able to indicate if they have personal cash saving or not, the results were as shown in figure 22. Asked if they have personal cash saving or not, 99.7% said they have cash savings and only 0.3% of the respondents did not have cash savings which is representative of only one person who said her saving was converted to cover for the loan which she took and was unable to repay back, so all the accumulated savings were used to cover up the saving but she was still member of the group.

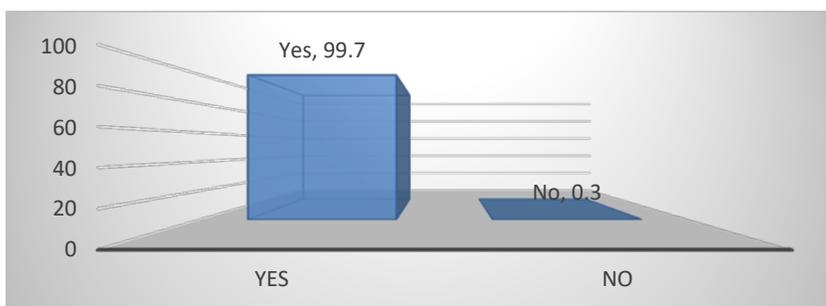


Figure 22: personal cash saving

4.33. Amount of money saved in South Sudanese Pound (SSP)

The respondents were able to indicate the amount of money they have in their saving accounts with the group and members were asked how much they were having in their saving and nearly a half (47.8%) have amounts ranging between 10,000-20,000 SSP. In this study 40.7% of the respondents have between 20,000-50,000 SSP, 7.2% have between 0-10,000 SSP and 4.4% have between 50,000 SSP and above. The amount of money owned by the saving group members were so significant which were in the group saving and has given them the opportunity to borrow to start and expand businesses. Ownership and access to capital has empowered the women economically in relation to asset ownership.

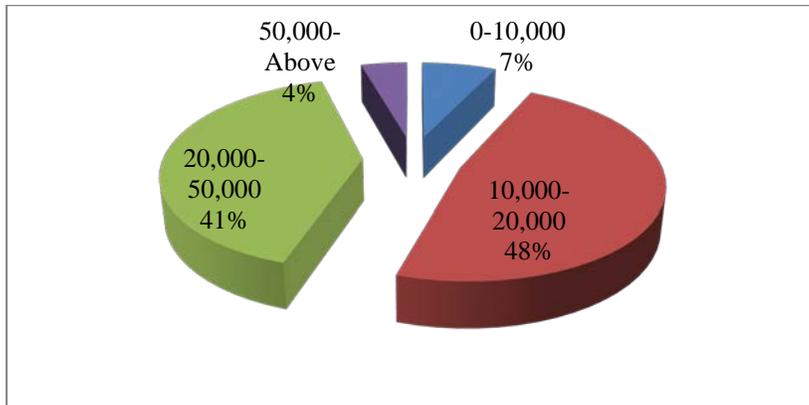


Figure 23: Amount of saving money in SSP

4.34. Where do u keep your personal cash

The respondents were able to indicate where they keep their personal cash saving, the result was as shown in figure 24 below. Members were asked where they keep their money, 88.9% of the members said their savings were kept with the saving groups where they belong. 11.1% said their spouse keep their savings. Through VSLA women were able to keep their money safe which is an asset for themselves and their families, thus women empowerment.

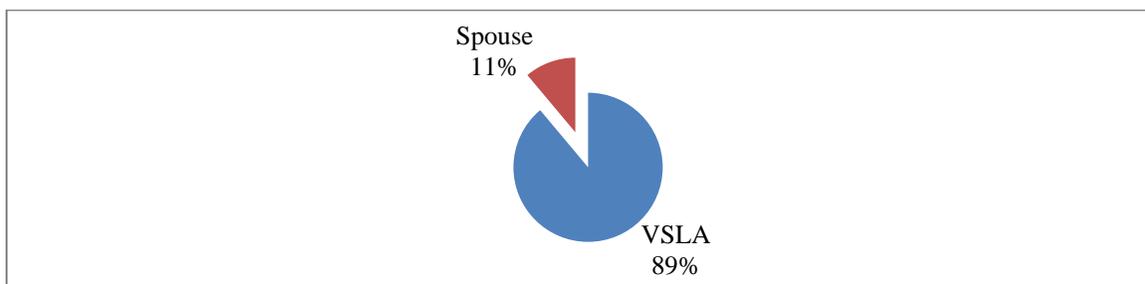


Figure 24: Custody of personal cash

4.35. Personal asset

Table 7: Personal asset other than cash savings

	Frequency	Percent
Yes	295	99.3%
No	2	0.7%

Total	297	100.0%
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Asked if they have other assets apart from cash and 99.3% of the respondents said they have and 0.7% said they don't have which is representative of 0.7%. The most common assets the members mentioned include land, cows, heifers, calves, goat and sheep, grains and chicken as the most common ones in Terekeka context. The access to these assets were associated to participation in the VSLA as 80% confessed to acquired them after joining the group which has given an indication that VSLA had positive impact towards access to other assets as mentioned above.

4.36. Ownership of asset at household level

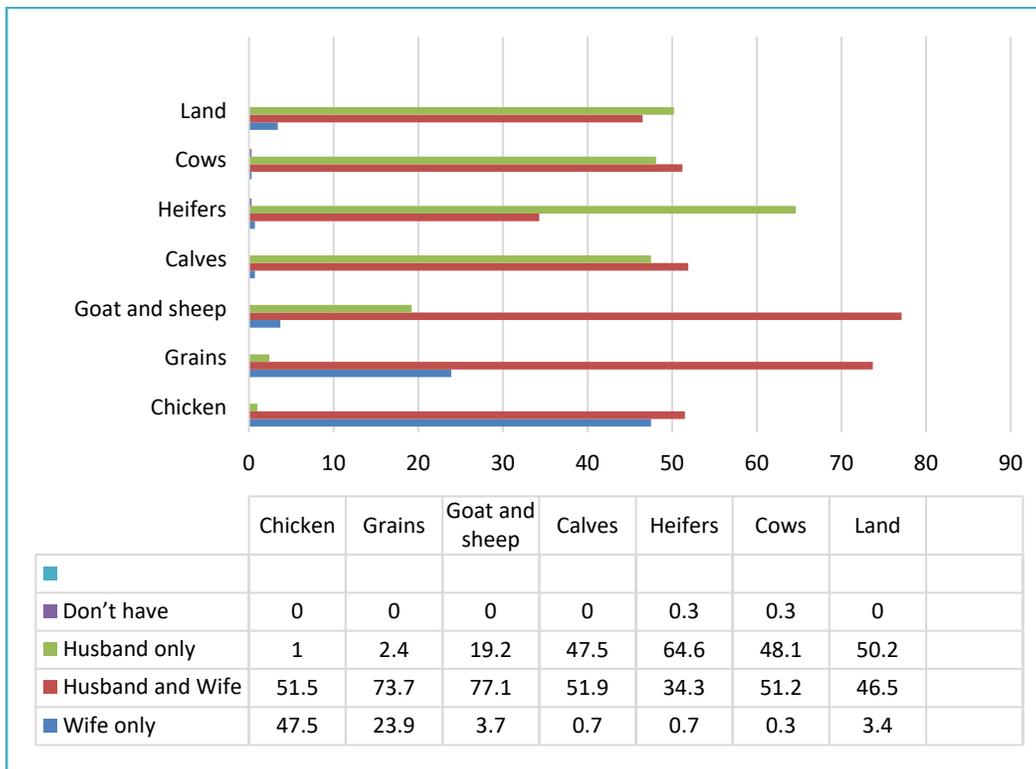


Figure 25: Ownership of asset at household level

The respondents were able to indicate who owns chicken, grains, goat and sheep, calves, heifers, cows and land at household, the results tabulated as shown above in figure 25. Asked about the ownership of chicken and its sale at household, majority at 51.5% said both husband and wife collectively responsible for the ownership and sale of chicken, 47.5% said ownership and sale by wife only and 1.0% by husband only, the fact that both husband and wife have the greatest percentage, it signifies that women were able to contribute positively towards their household welfare and this were able to have the rights to ownership. The respondents were asked on the ownership of farm grains at household level, 73.7% said ownership both by husband and wife, 23.9% said ownership of gains by wife only at household and 2.4% said by husband only and this result confirms the findings of Anyango et al. (2006), who found that VSLA members are more likely to own farm products at household and enjoy better feeding at home. Of the 297 respondents who were asked about the ownership of goats and sheep, 77.1% said ownership by husband and wife, 19.2% by husband only and 3.7% by wife only. This finding show that women have control and say over resources as a result of the VSLA according to CARE assessment report on impact of VSLA in Tanzania in 2014. Majority of the respondents at 51.9% said calves owned by husband and wife, 47.5%

by husbands only and 0.7% by wife only this it indicated that through VSLA activities, women were able to contribute financially in purchase of calves as such they have the share to own because of their contribution. The ownership of heifers at household shows that 64.6% by husband alone, 34.3% ownership by both husband and wife and 0.3% do not have heifers. The finding indicated that heifers were dominantly owned by husbands, this is because most of the heifers were inheritances from the parents to their sons as such women have little ownership over them. The respondents further indicated that majority (51.2%) said ownership of cow collectively by both husband and wife, 48.1% by husband only, 0.3% by wife only and 0.3% not having any cow at home. This finding showed that women played a very big role toward ownership of cows at household, this was because they were able to contribute towards the purchase of the cows at household as a result of participation in VSLA, thus VSLA contributed positively towards ownership of cattle as an asset. Lastly respondents on ownership of land indicated that 50.2% said land at household owned by husband only, 46.5% by both husband and wife and 3.4% only by wife. Land being mostly inheritance from parents, mostly it gave higher chances for the men/husbands to own them, however those which were acquired after marriage, they were owned by both husband and wife which gave women access to own land which is an asset and Khandker (2005), state that Microfinance programs are generally reported to have a positive impact on the level of household asset ownership especially for women.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the main study, conclusions recommendations and contribution to knowledge base. It also gives suggestions for further studies.

5.2 Summary of Findings

The main sample comprised 300 respondents, 297 respondents were reached, and their questionnaires completed for analysis. This gave a response rate of 99%. Among the 12 respondents targeted for the Key Informant Interviews (KIIs), 11 were reached and data sourced from them for analysis. This represented a response rate of 91.67%. Out of the respondents interviewed, 100% were women as per the main goal for this study. 70.7% between 25-40 years, 20.5% between less than 25 years and 8.8% 40 years and above. 100% of the respondent all married. 69.7% never attended school (illiterate), 11.8% can read and write, 9.4% of the respondents had obtained secondary school level of education and above, 9.1% of the respondents had obtained primary school and junior education signifying that VSLA is key towards the illiterate people. 68.4% were not head of the household and 31.6% of the respondents were head of their families. 100% were members of the VSLA.

All the members interviewed have small business which they were operating and 56.2% operated their business for 2-3 years since joining the VSLA, 37.7% of the respondents have operated their IGA for less than one year and 6.1% of the members operated their business more than four years. 85% of the respondents started up their small business using loans from the VSLA, 11% from savings which they were doing, 2% of the respondents got their capital from friends and 2% got theirs through donations. 93.9% of the respondents said yes their business improved greatly in terms of increase in profits, income and size of the stocks, 6.1% of the member said they have not experienced any improvements in their IGA. 96.6% attended business selection planning and management training and 3.4% of the respondents did not attend the training. 57.2% of the members said BSPM training had a very big positive impact on their business, 30.0% said the positive impact was very high, 9.1% said the impact was low and 3.7% said the positive impact was very low. 97.0% of the members said they have borrowed from the savings during the past 12 months, 1.7% said they

feared that they will not be able to pay back the money and 1.3% of the respondents' said they did not borrow because of lack of collateral or security and 3.0% did not borrow due to lack of collateral and fear for inability to pay. 88.2% borrowed for running petty trade (business), 4.8% borrowed for Repayment of other loans, 4.7% to cover social expenses, 0.3% borrowed to cover medical expenses and 2% of the respondents did not borrow, hence the above finding showed that VSLA has contributed positively towards increase in business income of the women as an aspect of the economic empowerment.

Among the members, 99.7% indicated that they have actively participated in community local activities like meetings and electoral process, 0.3% of the respondents have not participated in the community local activities. 48.5% of the respondent said their spouse were highly comfortable about their participation in community activity, 46.5% said their spouse were comfortable, 2.4% said their husbands were neutral, 1.3% said their husbands were uncomfortable and 1.7% of the respondents said their spouse were highly uncomfortable. 39.1% said their ideas were taken into consideration most of the times, 47.5% of the respondents said sometimes, and 5.4% said their ideas were always considered and 8% said their ideas were never considered. 79% stated that it was both the wife and the husband in deciding the membership. 12% of the decision made by the wife in joining the VSLA and 9% decided by the spouse. 46% said sometimes they were able to convince their spouse. 36% said most of the times they were able to convince their spouse in decision making. 14% said always they were able to convince their spouse and 4% said they were never able to convince their husbands in household related decision-making process. 47% said sometimes their husbands agreed to their ideas. 24% said their spouse most of the time agreed to their ideas 20% said always their spouse agreed to their ideas and 9% confessed that their husbands never agreed to their ideas. 64.3% said land is under the control of both husband and wife. 4.4% said land is under the control of husband only, 15.5% said it is under the control of wife mostly. 54.4% by husband only and 2.7% by wife only. 36% of the respondents said both husband and wife, 9.4% said by husband mostly, 3% by husband only and 33.7% by wife mostly. 74.1% of the respondents said it is controlled by husband and wife, 15.2% by husband mostly, 4.7% by husband only and 4% by wife mostly. 69.7% said it is controlled by husband and wife, 13.5% said by husband mostly, 10.4% by husband only, 1.3% by wife only and 5.1% by wife mostly. 41.4% of the respondents said both husband and wife take charge, 10.8% by husband mostly, 23.9% by wife mostly, 21.5% by wife only and 2.4% by husband only. 59.6% by both husband and wife, 20.2% said by husbands mostly, 2% by wife mostly, 16.8% by husband only and 1.3% by wife only. On decision making level at household, decision making on crops to be grown 65% by both husband and wife, 15% by wife mostly, 10% by husband mostly, 7% by husband only and 3% by wife only. On selection of IGA, 40% by both husband and wife, 20% by wife mostly, 24% by wife only, 12% by husband mostly and 4% husband only. On education decision, 76% both husband and wife involved in children education, 12% by husband mostly, 6% by husband only, 4.0% by wife mostly and 2.0% by wife only. 65% said both husband and wife decided collectively on the number of children, 15% said mostly husband, 13% said husband only, 6% said wife mostly and 1% said wife only. 39% said both husband and wife decided on the purchase of clothes for children at household. 11% said wife mostly decides on that, 5% said wife mostly, 24% said husband mostly and 21% said husband only. 60% acknowledged that both husband and wife decided collectively on the purchase of and sales of cattle, 20% said it is decided by husband mostly, 17% by husband only, 2% by wife mostly and 1% by wife only. 56% said both husband and wife decide together on the purchase and sales of goat and sheep, 16% mostly by husband, 11% mostly by wife, 13% by husband only and 4% by wife only. 55% said both husband and wife make the decision jointly on the purchase of poultry, 11% by husband mostly, 3% by husband only, 19% by wife mostly and 12% by wife only. On the expression in the level of involvement in decision making at household 56% said it was good. 36% said it was significant, 3% said it was slight and 5% said it was fair. On the improvement in relationship with spouse, 98.3% said yes and only 1.7% said no. On the expression in the level of improvement in relations with spouse, 60.9% indicated good, 31.0% said significant, 4.0% both said it was fair and slight. Finding showed that VSLA contributed positively towards economic empowerment of women in terms of decision-making process.

In total, 99.7% said they have cash savings and only 0.3% of the respondents did not have cash savings which is representative of only one person. 47.8% have amounts ranging between 10,000-20,000 SSP. 40.7% of the respondent have between 20,000-50,000 SSP, 7.2% have between 0-10,000 SSP and 4.4% have between 50,000 SSP and above., 89% of the members said their savings were kept with the saving groups where they belong. 11% said their spouse keep their savings. On having other assets apart from cash and 99.3% of the respondents said they have and 0.7% said they don't have which is representative of only 2 people. 51.5% said both husband and wife collectively responsible for the ownership and sale of chicken. 47.5% said ownership and sale by wife only and 1, 0% by husband only. 73.7% said ownership both by husband and wife. 23.9% said ownership of gains by wife only at household and 2.4% said by husband only. 77.1% said ownership by husband and wife, 19.2% by husband only and 3.7% by wife only. 51.9% said calves owned by husband and wife, 47.5% by husbands only and 0.7% by wife only. On ownership of heifers, 64.6% said ownership of heifers by husband alone, 34.3% ownership by both husband and wife and one-person representative of 0.3% do not have heifers. 51.2% said ownership of cow collectively by both husband and wife, 48.1% by husband only, 0.3% by wife only and 0.3% not having any cow at home. 50.2% said land at household owned by husband only, 46.5% by both husband and wife and 3.4% only by wife and thus VSLA contributed positively towards assets ownership of women as an aspect of economic empowerment.

5.3 Conclusion

Based on the findings of the study as summarized above, it can be concluded that VSLA methodology is a worthy initiative as it empowers women economically in terms of increase in business income, improved decision-making process at community and household and asset ownership. The study established that more women become empowered economically because of the participation of women from those households in the VSLAs.

The first objective was to examine VSLA empowerment of women towards increase in business income level in Terekeka County. From the findings, it was noted that VSLAs had empowered women towards increase in business income at household through having small business income, operation IGA for over a year which gave them experience to run profitable business, provision of starting capital for small business from VSLA, business skills gaining through training on business selection, planning and management which gave them the opportunity to profitably operate their business.

The second objective was to assess VSLA empowerment of women in Decision-making process at household and community level in Terekeka County, The findings established that VSLAs had empowered women towards increased and better decision making at household and community through participation in community activities like meetings where women got the courage to express their ideas openly, their spouse feelings were comfortable towards their participation, spouse were able to allow their wives to participate in VSLA after seeing the impact with their successful groups, majority were able to convince their spouse in decision making at household, spouse and other family members able to buy the ideas of the women. Further finding showed that women participating in the VSLA had strong influence and control over resources in terms of decision making at household on control of cattle, poultry, goat and sheep, purchase and sale of crop harvest, crops to be grown, loan utilization, savings utilization, children education and purchase of clothes for children.

The third objective was to find out VSLA empowerment of women towards assets ownership at household in Terekeka County. The ownership of asset by women at household can be attributed to the participation of the women in VSLAs, this was seen through women having access to capital through saving accumulations, ownership of other assets other than cash savings include cattle, chicken, crop grains, goat and sheep, calves, heifers and land.

The fourth objective was to identify gaps in relations to the VSLA program in the supported groups, some of the key gaps identified include limited support in terms of training opportunities to the members, poor formal financial services like Banks that can offer other service products like insurances, fluctuation of commodity process affecting business, high inflation in the country

especially Terekeka, insecurity along the road making transportation a challenge and bad road during rainy season thus delivering products becomes difficult to lend money from their VSLAs to buy adequate food for the household members. Moreover, participation in VSLAs enabled the women to address unexpected circumstances that compromise their household food security by among other things building their capacity to manage entrepreneurial risk for IGAs. As a result, nutritional stability and security at the household has been enhanced.

5.4 Recommendations

From the finding of the study, the researcher wishes to make the following recommendations;

- There is need for Stromme Foundation to recognize that poor people need a range of financial services not just savings and credit, given that their incomes are ‘low, unpredictable and irregular’. They need to enhance linkages of the established VSLAs to financial and agricultural institutions.
- The government should invest in time-saving infrastructure, such as basic energy and water infrastructure or the organized provision of childcare services, to reduce the time and effort women dedicate to providing household services so women can have more productive hours.
- The government should enhance women’s ability to access better markets. This can be accomplished by investing in infrastructure and transportation services that enable women to travel safely, in a reasonably priced and culturally appropriate way; sharpening their negotiating skills; and by facilitating women’s participation in associations or cooperatives.
- To maximize the positive effect that VSLAs is having in empowering women economically, Stromme Foundation should make efforts to increase women’s ability to generate and control income by involving their husbands on round table discussion about the roles of women at home.
- The government should enhance women’s ability to fulfill their roles as bread winners and businesswomen by improving women’s access to resources, technology and information. More efforts should be put to safeguard women’s right to land ownership.
- Better taxation policy for the rural women doing small business in the market through reduction on service tax by government, this will motivate women in joining business industry.
- Stromme Foundation must advocate for better security through the government to encourage safer movement of people, goods and services along Terekeka-Juba road.

5.5 Contribution to Knowledge base

Objective of the study

To examine VSLA empowerment of women towards increase in business income level in Terekeka County

To assess VSLA empowerment of women in Decision-making process at household and community level

Contribution to the body of knowledge

It was found out that through loan facility, VSLAs have enabled members economically to increase their business income. It was Established that increase in business income was linked to the ability of members to borrow and invest into the business by buying more stock. Women’s participation in business skills training was also found to enhance increase in business income.

It was established that VSLAs enhanced the ability of women to participate in decision making process at community and household by improving the confidence and leadership level of the members. They made women to take part

in Terekeka County. easily in meetings and other community events more easily without fears and intimidation from their male counterparts. It was also found out that the ability to make decisions relating to household related matters was boosted hence empowerment.

To find out VSLA empowerment of women towards assets ownership at household in Terekeka County Participation in VSLAs enhanced women ability to own variety of assets. This was through: strengthening the financial ability, imparting knowledge on business to access finances and enabling the women to engage more in decision making relating to purchase and ownership of assets.

To identify gaps in relations to the VSLA program in the supported groups The study conducted helped in identifying` some of the gaps that affect the women in the process of running their daily business of IGA, saving and other community development activities in Terekeka County like limited training and lack of formal banks.

5.6 Suggestions for further research

The researcher suggests that;

- A study should be conducted on the influence of VSLA in empowering men towards household economic and social stability in Terekeka County.
- A study should be conducted on the effect of VSLA on the retention and transition of secondary school girls in Terekeka County.

ACKNOWLEDGEMENTS

My greatest thanks and heartfelt appreciation go to my University supervisors, Dr. Lydia Mwaura and Rev. Martin Otiende for their guidance, valuable comments and encouragement during this study. I also extend my thanks to my external examiners Mr. Lawrence Ofunja and Mr. Lawrence Wakanyua for their valuable comments and guidance in compiling this research thesis. Special thanks to Mr. Okuku Michael, as acting head of Department, for the allocation of the two supervisors, Dr. Mavole for coordinating the whole research process of the Faculty, and not forgetting all the CUEA staff for their contributions during presentations.

I would also like to express my sincere appreciation and thanks to Stromme Foundation former Regional director Mrs. Priscilla Mirembe Serruka for giving me the opportunity to continue with my studies while working and financial support of 50% of the cost of my tuition. Special thanks to Stromme Foundation South Sudan Country team leader Mr. Otik Robert Monoji for authorizing and granting me permission to conduct the study under the SF VSLA supported project in Terekeka County. I would like to appreciate the field office leadership team members and all beloved SF partner Support for Peace and Education Development Program (SPEDP) staff members for their sincere support and encouragement in the entire research process. Unreserved appreciation goes to the field work enumerators who carefully and patiently collected data for this study. Many thanks and appreciation also go to the study respondents for their valuable information and time for interview and group discussions, without whose cooperation the study would not have been possible.

Finally, I would like to express my deepest thanks to my wife Juwa Stella Elias and my children, Lovi Fintan Joseph, Fuli Zion Joseph and Yangi Noelle Joseph for their all-round support and patience showed during the study process. I am indebted to my mother Lindrio Agnès and brothers Andrugua Linous and Koji Justin for their encouragement, valuable comments, and advice

throughout the course of my study. Above all I would like to praise the almighty God for giving me the courage and endurance to finalize this thesis.

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An Overview of Metalliferous Ore Minerals Resources in Myanmar

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DOI: 10.29322/IJSRP.9.08.2019.p92141

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92142>

Abstract- Myanmar has extensive mineral resources and a well-established centuries old mining industry. The main resources are iron, copper, gold, silver, lead, tin, tungsten, nickel, antimony, petroleum, gas, coal, jade and gemstone. In Myanmar, the mineral sector ranks third after agriculture and forestry products and is regarded as having excellent potential in the development programmes of the country. The aim of this paper is to introduce the explored and unexplored metalliferous ore minerals resources in Myanmar. It is also described the current status of mining and mineral processing industries.

Keywords- mineral, resources, mining, deposits, metalliferous

I. INTRODUCTION

Myanmar, formerly known as Burma, is situated in South East Asia. It is located between 09 degree 32 minutes North and 28 degree 31 Minutes North and longitudes 92 degree 10 minutes East and 101 degree 11 minutes East. It is bounded on the north by Tibet Autonomous Region of China, on the east by Yunnan Province of China, Laos and Thailand, on the south by the Andaman Sea and the Bay of Bengal, Bangladesh and India. Myanmar has an extensive mineral resources and a long history in mining industry. The main richness of the mineral resources in Myanmar are Jade, Ruby, Sapphire and Limestone. The secondly rich resources are Copper, Lead, Zinc, Tin, Tungsten, Gold, Coal and Barite. The fairly rich resources are Antimony, Silver, Nickel, Gypsum, Iron and Manganese. The other resources are Chromite, PGM Minerals, Radioactive Minerals, Diamond, Fertilizer Minerals, Fluorite, Bauxite, Mercury, kaolin, Feldspar, Quartz, Bentonite and Mica. [5]

In the mineral sector, mineral deposits have been worked with the government sector and private sector. The government had partially privatized several state owned productive metallic mines and formed several new joint-venture companies or cooperatives with local and foreign companies for mining and mineral processing.

II. METALLIFEROUS MINERALS DEPOSITS

Among those, significant resources and mines of metalliferous ore minerals will be mentioned in this paper.

A. Iron ore deposits and mining operations

Iron ore deposits are has been found in the following regions.

- 1) Kahaing Taung Deposit: It is situated near Phakhant in Kachin State and is a Lateritic residual type of deposit. In ore reserves given as P-2 rank are 223 million metric tons with average grade of 50.56 % Fe (Iron). However, only 15% is Hematite, 2 % Magnetite and 75% is given as Goethite and Limonite. Mining is not yet started. Some form of beneficiation and pelletization will be required before this material can be used.
- 2) La Maung Deposit: It is near Phakhant also. Total reserves given are P-2 rank 8.9 million metric tons with a grade of 51.54 % Fe. Mining is not yet started.
- 3) Peng Pet Deposit: It is situated near Taunggyi in Southern Shan State. Reserves given as P-2 rank are 10.7 million metric tons of Hematite with 56.4% Fe and 0.019% As (Arsenic). Other 60 million metric tons were shown as Limonite with 42.6% Fe, 0.11% As and 10 million metric tons of Limonite at 43.2% Fe and 0.19% As. Total reserves are 80 million metric tons. A 200,000 tpy capacity ROMELT plant was built near this iron ore deposit. It is in the last phases of construction but presently the project is temporarily stopped and it is under care and maintenance.

- 4) Kya-Twin-Ye Deposit: Another iron ore deposit is Kya-Twin-Ye, which is situated near Pyin-Oo-Lwin. The reserves ad P-2 was given as 8 million metric tons. Fe content 54% and over 60% is Hematite and the rest is Limonite. In this mine, mineral processing method employed ore crushing, screening and washing the ore to get +7mm and -30mm size. A 40,000 tpy Direct Reduction Plant has been operating since 1985, using the iron ore supplied by this mine.
- 5) Kho-Kyun Deposit: It is situated near Bokpyin in Taninthayi Division. Reserves recorded were 7.6 million metric tons as P-2 rank and iron content is 46.05 %.
- 6) Maputae Deposit: It is situated in Taninthayi Division near Kaw Thauung. The reserves recorded was 1 million metric tons, P-2 rank with Fe 42%.
- 7) Taung Nyo Taung Deposit: It is situated near Shwe Gu in Kachin State. The reserves recorded were 18.9 million metric tons. Fe content is 40.67% and said to contain Hematite, Limonite and Magnetite.

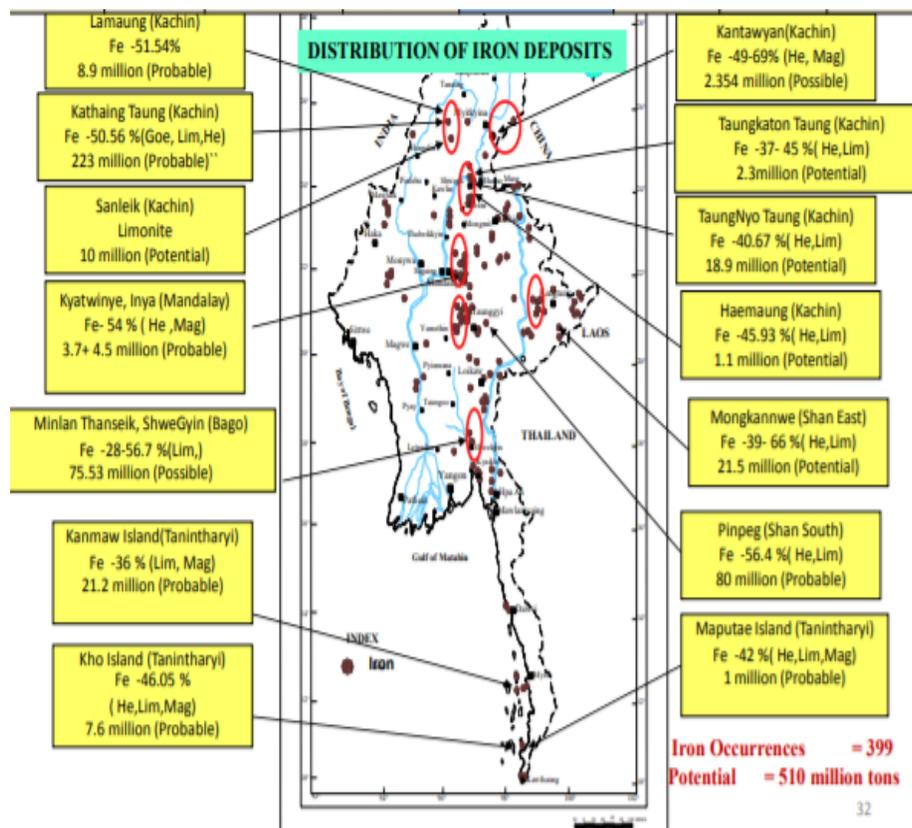


Figure 1. Distribution of Iron Ore Deposits [2]

B. Coal Deposits

After iron deposits, it is worthwhile to describe about the coal deposits as iron ore needs coal to go into iron and steel business. Myanmar does have over 490 occurrences of coal with a potential of 490 million tons. However most of the coal resources are of low grades, low tonnage and are located in remote areas far away from the iron ore resources. Properties and resource sizes of some coal deposits are presented in Table 1.

Table 1. Chemical Analysis of Coal [9]

No	Location			Chemical Analysis					
	Region	Township	State Division	Fried Carbon %	Volatile %	Moisture %	Ash %	Calorific Values Btu lb	Sulfur %
1	Kalewa	Sagaing	Sagaing	52.51	38.62	9.7	8.87	11720	
2	Darthwekyauk	Tamu	Sagaing	50.00			1.00	12000	Less than 1
3	Palizawe	Mawlike	Sagaing	41.47	45.32				

4	Mawlike	Mawlike	Sagaing	49.70	43.85	8.6	6.40	11800	1.12
5	Kyopyin	Kawlin	Sagaing	31.00	34.40	8.3	34.40	9174	1.48
6	Lweji	Bamoh	Kachin	17.59	38.90	14.36	43.49	6396	0.69
7	Kawrapyin	Tanintharyi	Tanintharyi	36.66	34.82	5.51	21.25	9977	2.00
8	Mewtaung	Tanintharyi	Tanintharyi	43.59				9754	2.24
9	Karathiri	Bokpyin	Tanintharyi	37.60				9810	0.32
10	Wungychaung	Stikphyu	Magwe	31.71	41.80		26.40	8365	3.60
11	Tasuletperhla	Peuk	Magwe	34.60	48.40		16.90	8349	2.50
12	Kyesi-Marsan	Kyesi	Shan(South)	35.60	48.98	13.29	15.36	10153	2.56
13	Kholan	Naman	Shan(South)	14.77	56.26	21.32	28.80	7355	
14	Tigyit	Punlaung	Shan(South)	33.81	34.40	18.51	13.27	9169	
15	Makyaning	Tayang	Shan(North)	26.86	50.86	12.65	22.27	9187	1.08
16	Marpan	Tayang	Shan(North)	35.58	55.00	19.45	9.33	9889	0.80
17	Harpu	Tayang	Shan(North)	27.57	56.26	28.40	13.16	8244	0.99
18	Sale	Lasio	Shan(North)	33.00	54.02	15.98	12.98	9881	1.40
19	Sanya	Lasio	Shan(North)	35.47	58.32	17.77	6.21	10420	0.64
20	Sataung	Lasio	Shan(North)	33.67	96.99	28.28	9.21	8770	2.56
21	Namma	Lasio	Shan(North)	34.54	44.31	8.64	20.69	10083	1.44
22	Narkee	Lasio	Shan(North)	38.01	59.49	15.98	2.52	11080	0.64
23	Narlan	Lasio	Shan(North)	33.42	41.83	16.57	17.14	9370	6.97
24	Namlinhkam	Lasio	Shan(North)	35.71	52.97	13.25	11.32	10440	4.69
25	Sarlaung	Thipaw	Shan(North)	30.52	51.36	12.16	18.06	9772	5.82
26	Mahlaw	Thipaw	Shan(North)	35.26	61.30	19.88	6.43	10430	0.64
27	Wankyan	Kyzington	Shan(North)	23.00	23.00	40.00	8.50	5890	0.40
28	Hoko	Kyzington	Shan(North)	44.45	56.50		15.41	11233	1.17
29	Mainghkok	Maington	Shan(North)	45.00			1.86	10185	
30	Narpariaw	Maington	Shan(North)	25.93-28.07	26.31-31.89		14.83-15.39	7720-8370	0.96
31	Kywein	Ingapu	Ayeyawadi	41.10	18.24	1.16	40.70	8163	0.93
32	Kari	Dawai	Tanintharyi	42.30	48.80		9.51	8885	0.74
33	Banchaung	Dawai	Tanintharyi	40.87	38.95	7.49	20.05	11345	1.47
34	Thepyuchammt	Kyainnykgyi	Kawlin	39.90	33.56	8.2	19.77	10390	1.35

The highest grade is sub-bituminous and all of them are non-coking grades. The one, Namma Coal is used for a direction reduction plant (40,000 tpy) which is 230 km far away from Namma. Also, coal at Kyesi Mansan is allocated for Peng Pat iron smelter (ROMELT Process, 200,000 tpy) and these two facilities are 250 km apart.

C. Copper Ore Deposits

The Monywa copper district is 115 km west northwest of Mandalay in an elevated flood plain west of the Chindwin River in western Myanmar. The district is on the northern margin of Myanmar's dry zone; annual rainfall is about 800 mm confined to the May–October period. Maximum daily temperatures from March to June can exceed 45°C. Four major high sulfidation deposits of Miocene age define the district: the almost contiguous Sabetaung, Sabetaung South and Kyisintaung deposits and the much larger Letpadaung 7 km to the southeast, combined resources totaling 2 billion tonnes ore with over 7 million tonnes contained copper. Initially flotation was used to concentrate the ore containing 0.7-1.0% copper, the recovery was about 70-75%, when the new technique solvent extraction-electrowinning (SX-EW) method was employed cut-off grade of ore that could be treated was 0.08% copper, with increased recovery of 80% and producing 99.99% purity copper metal. [1]

D. Gold Ore Deposits

In Myanmar, total gold reserves of the country have not been fully estimated. The ore reserves of the evaluated prospects are estimated at 5.6 million tones and possible gold reserves associated with these are calculated at 18.2 metric tons. Gold reserves has been found in Khan Tee in Chin State, Myitgyinar, Shwe Gu Nanmar, Intawgyi in Kchin State, Kaw Lin, Shwe Bo, Kyaukpahto in Sagaing Division, Phayaung Taung in Mandalay Division, Myese Taung near Latpatan, Shwe Kyin, Madauk in Pago Division, Maeyonegyi, Maeyonekalay near Thantone in Mon State. Among those, the Kyaukpato gold project is located 40 km east of the Kawlin township in the Sagaing State. A potential economic area of 470m by 70m has been identified with ore reserves (1.0 g/ton

cutoff grade) of 3.46 million tones averaging 4.02 g/ton of gold. A 40 ton/day pilot plant was in operation producing 1800 troy oz (87kg) of gold per year. Mineral processing of gold ore employed are gravity concentration method by using sluice or spiral concentrator. And then, cyanidation process is carried out to recover the gold metal. [8]

E. Lead, Zinc and Silver Deposits

The mineral deposit of lead, zinc and silver has been found in Bawdwin Mine and Yandanatheingi Mine in Shan State, Bawsaing mine in Kayah State. For example, ore reserves of Bawdwin Mine are 5 million tones with average grade of Ag 4.58 oz per ton, Pb 7.46 %, Zn 3.17% and Cu 0.14% in underground Mine and open pit Mine ore reserve is 9 million tones with average grade of Pb 5.17% and Zn 4%. Mineral dressings of lead, zinc and silver ores have been carried out by crushing, grinding, sizing and conventional flotation method.

F. Tin and Tungsten Deposits

The mineral deposits of tin and tungsten can be found in Mawchi Mine in Phasaung Township, Hermyingyi Mine which is located about 40 km north-east of Tawel, Kanbouk which is located 90 km north of Tawel. In Mawchi Mine, the reserve 712540 ton of ore of 3.02 % (Sn+W). Annual production of tin is about 50 tons and tungsten is 100 tones. All tin and tungsten mines have been privatized and at present there is no state operated tin tungsten mine apart from one tin smelter in Thanlyin. Gravity concentration method has been used in mineral dressing.

G. Nickel and Chromium Deposits

The mineral deposits of nickel are found in Tagaung Taung in Kyauksel township, Thabeikkyin Township and Mwe Taung in Chin State. Potential ore reserves of the Tagaung Taung area was 1.1 to 1.3 million tons with nickel content above 1.5 percent, but more recent estimates have far exceeded these reserves. Gravity concentration method has been used in mineral dressing. And then, pyro metallurgical processes are used to produce ferronickel. Mwe Taung deposit is a nickel laterite ore deposit. Probably reserves in Mwe Taung have 10 million tons with 1.19 above percent nickel. The chromium deposits are Mwe Taung, Webula Taung, Hakhalay, Nat Hill, Bopibun, Muwelut, Maungtaw-Hnamataw and Falam.

III. CONCLUSION

The Union of Myanmar has a promising potential of mineral resources. But, comparison with other mines in the world most Myanmar Mines can be classified as small- scale mines. Most of the mineral processing methods are gravity concentration and flotation. Some private mines have been used artisanal methods. The mineral exploration, mining and metallurgical sectors play a dominant role in the economic development of the country. As the government is at the present allowing more foreign investors to invest in the mineral industry, it is certain that this industry will fast grow with momentum and be very promising in the near future in Myanmar.

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Modelling of Reference Evapotranspiration Using Penman's Monteith (FAO-56) For Bauchi Metropolis

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DOI: 10.29322/IJSRP.9.08.2019.p92143

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92143>

Abstract- Limited information exists on reliable estimates of evapotranspiration (ET) for successful design of Irrigation planning , management practices , water resource and the effective uses of the water resources .The evaporating power of the atmosphere is expressed by the references crop evapotranspiration (ET_0) which represents the evapotranspiration from a standardized vegetated surface. It is a climatic parameter which can be computed from weather data. The data was collected from the Agro-weather station of Abubakar Tafawa Balewa University, Bauchi (2013-2016) and was estimated using penman's monteith (FAO-56). The result obtained shows that in the months of April, May and June expresses the optimal evaporative demand of the atmosphere with a value of (13.008, 11.0487 and 12.1778) mmday⁻¹ therefore much water is needed for crops growth and development. Whereas Mean temperature, solar radiation and wind speed are positively correlated with the estimated ET_0 with a range of correlation coefficient of (+0.504 - +0.866) which implies that the soil surface is cover by grass and crops, transpiration takes place while relative humidity and atmospheric pressure are weakly correlated with (ET_0) with a range of correlation coefficient (+0.380 - +0.063) were recorded. These weak correlation described the semi-arid region of Bauchi Metropolis.

Index Terms- Climatic parameter, correlation coefficient, evapotranspiration, penman's monteith.

I. INTRODUCTION

Evapotranspiration greatly affects crops during planting and harvest for the past decade, large volume of water was lost from the soil by evaporation and from the crops by transpiration, it reduces water content around the crops root zone leading to low yield of crops production as well as water scarcity [14].

According to [2] defined water scarcity as the point at which the aggregate impact of all users impinges on the supply or quality of water under prevailing institutional arrangements to the extent that the demand by all sectors, including the environment, cannot be satisfied fully. Water scarcity affects all social and economic sectors and threatens the sustainability of the natural resources base. The need of addressing water scarcity on crops requires an urgent need to develop a standard, precise and globally acceptable method of estimating reference evapotranspiration for accurate computation of crop water requirements has been stressed by many authours [8, 9, 4, 3, 18, 7]. Several models had been proposed by many authours and these include FAO-Penman, Penman, 1982-KinberlyPenman, FAO-Corrected-Penman, Penman-Monteith, Blanney-Criddle, Priestley-Taylor, FAO-Radiation, Hargreaves, and FAO-Blanney Criddle [3, 6, 17, 5, 7]. Many of these models are subject to local calibration thereby making them to have limited global acceptance. Due to the higher performance of FAO-56 Penman-Monteith (FAO-56 PM) model in different parts of the world when compared with other models, it has been accepted as the sole method of computing reference evapotranspiration from meteorological data [13, 3, 12, 16, 19, 10, 11].

In order to use FAO-56 PM model in computing daily evapotranspiration, specific meteorological data are required such as daily maximum and minimum air temperature, solar radiation, wind speed, and relative humidity. These data can be obtained directly from automatic weather stations. These automatic weather stations are unavailable in most developing countries due to their high cost acquisition and maintenances. Similarly analogue instrument are used in some meteorological stations in Nigeria leading to limited data due to their archaic equipment and lack of suitable facilities. These make it difficult for estimation reference evapotranspiration.

In this study, Penman's monteith (FAO-56) model was developed for the estimation of evaporation and transpiration using climatic parameter such as maximum and minimum temperature, relative humidity, sunshine hour and wind speed available at the Agro-weather station (ATBU) for predicting which climatic condition the estimation of references evapotranspiration could be accurate or inaccurate for optimal use of water resources and the effective application of water resource for Bauchi metropolis.

II. MATERIALS AND METHOD

3.1 Data collection

Maximum and minimum temperature, relative humidity, sunshine hour, solar radiation and wind speed for a period of four (4) years (2013 - 2016) for Bauchi latitudes 9° 3' and 12° 3' north and longitudes 8° 50' and 11° east. Table 1-6 was obtained from Agro-weather station, Abubakar Tafawa Balewa University, Bauchi.

3.2 Estimation of reference evapotranspiration

The study was developed to estimate the reference evapotranspiration based on Penman-monteith method (FAO-56) by using of metrological data (2013-2016).

$$ET_o = \frac{0.408\Delta(R_n - G) + \gamma \frac{900}{T_a + 273} U_2 (e_s - e_a)}{\Delta + \gamma(1 + 0.34U_2)} \dots(1)$$

Whereby ET_o is the reference evapotranspiration mmday^{-1}

From equation (1) we obtained the solution of Δ , R_n , G , T_a , U_2 , e_s , e_a and γ respectively from empirical relation.

Table 1: Monthly Mean Daily Maximum Temperature (T_{max}^o)

Month	2013	2014	2015	2016
January	26.45	26.55	25.17	17.43
February	28.68	28.71	30.59	25.35
March	31.34	32.34	32.54	31.19
April	29.15	34.28	32.59	33.00
May	29.44	30.92	31.12	31.81
June	27.39	29.55	30.45	28.87
July	25.83	27.19	27.19	25.81
August	27.91	26.17	25.87	24.97
September	27.72	26.89	25.38	25.38
October	27.93	29.17	24.34	27.61
November	27.24	28.67	25.30	27.46
December	26.89	26.92	22.09	25.78

Table 2: Monthly Mean Minimum Temperature (T_{min}^o)

Month	2013	2014	2015	2016
January	23.87	23.95	21.68	16.72
February	25.78	25.88	28.62	25.53
March	28.98	29.86	29.58	31.18
April	29.00	30.61	30.44	32.99
May	29.44	28.62	31.09	31.80
June	25.08	29.49	29.56	28.85
July	23.57	25.23	25.23	25.80
August	25.39	24.37	23.56	24.96
September	25.86	24.47	25.35	25.35
October	26.29	24.77	24.11	27.59
November	24.35	26.36	25.29	27.44
December	23.55	26.84	22.08	25.76

Table 3: Monthly Mean Relative Humidity (Rh %)

Month	2013	2014	2015	2016
January	17.20	17.65	17.36	27.23
February	14.29	28.71	12.71	17.75
March	20.91	32.34	17.55	26.89
April	38.85	38.92	14.06	34.71
May	52.11	54.76	40.02	54.69
June	61.87	61.09	66.45	68.98
July	71.26	70.91	70.91	82.73
August	78.83	75.03	78.83	86.66
September	71.85	72.31	83.94	83.94
October	56.41	57.00	73.41	65.76
November	26.53	29.34	42.58	39.75
December	23.46	21.34	34.97	28.42

Table 4: Monthly Mean Solar Radiation(MJm⁻²day⁻¹).

Month	2013	2014	2015	2016	
January	17.76	15.46	16.44	10.48	
February	16.17	16.25	17.20	10.98	
March	19.32	19.51	19.55	19.51	
April	20.91	19.75	22.04	19.75	
May	19.05	18.82	20.22	18.82	
June	17.76	19.97	19.06	19.97	
July	14.16	16.87	16.87	16.87	
August	13.34	14.83	14.16	16.49	
September	12.56	17.78	12.94	12.94	
October	11.16	15.59	15.62	12.07	
November	10.93	14.35	12.63	10.91	
December	14.33	12.35	10.54	10.51	

Table 5: Monthly Mean Wind Speed (m/s)

Month	2013	2014	2015	2016	
January	0.790	0.538	0.790	1.118	
February	0.714	0.731	0.714	1.018	
March	0.784	0.687	0.784	1.235	
April	0.814	0.929	0.814	1.563	
May	0.962	0.789	0.924	1.760	
June	0.804	0.861	0.870	1.619	
July	0.680	0.675	0.675	1.242	
August	0.550	0.641	0.550	1.159	
September	0.593	0.637	1.063	1.663	
October	0.519	0.547	0.899	0.845	
November	0.529	0.539	0.961	0.901	
December	0.578	0.568	1.096	0.983	

Table 6: Saturated Pressure (P_{ka})

Month	2013	2014	2015	2016	
January	942.55	942.62	945.39	945.93	
February	941.49	941.59	941	943.94	
March	939.78	939.91	940.27	941.58	
April	941.19	939.64	941.03	940.45	
May	942.18	940.80	940.2	718.19	
June	943.39	942.14	941.95	944.03	
July	942.86	944.06	944.06	943.73	
August	943.24	943.41	942.86	943.58	
September	942.78	943.18	943.33	943.33	
October	941.39	942.61	942.93	941.89	
November	943	942.40	943.72	942.29	
December	943.48	943.68	942.16	943.2	

III. RESULT AND DISCUSSION

Figure (1-3) shows the statistical Analysis in testing the penman’s model with climatic parameters. (wind speed, sunshine hour, air temperature, solar radiation, relative humidity)for Bauchi metropolis. According to [1], correlation coefficient, r and coefficient of determination, R² are related by $r = \sqrt{R^2}$ and a correlation greater than 0.8 is generally described as strong. In this case plant loss their water inform of transpiration whereas a correlation less than 0.5 are generally described as weak, soil loss its water in form of evaporation.

Table 7 shows the estimated ET₀ based on Penman’s Monteith (FAO-56) Method in other to determine how much water is needed for healthy growth of plant.

The analysis evaluation was conducted for monthly observed base line (January – December) and the correlation coefficient in finding their degree of linear relationship between climatic parameters and estimated ET₀ was also observed. In figure (1-3) presents the correlation of monthly mean wind speed, relative humidity and solar radiation plotted with estimated ET₀. It could be observed that

ET_O has a strong correlation coefficient with the climatic parameters respectively, which indicates that much water is needed for crops production while weak correlation coefficient of relative humidity and atmosphere pressure shows it semi-arid region.

Table 7 shows that in the months of April, May and June for optimum irrigation planning, management practices and for effective use of water resources, application of water on crops is highly advised due to the high rate of evapotranspiration as (13.008, 12.1163 and 10.2327) mmday⁻¹ for 2013, (10.5799, 9.8797 and 11.0487) mmday⁻¹ for 2014, (10.5799, 9.5797 and 11.0487) mmday⁻¹ for 2015 and (9.0024, 12.1778 and 9.5543) mmday⁻¹ for 2016. The estimated ET_O has a range value (9.0024 – 13.008) for Bauchi metropolis.

Table 7: Estimated Reference Evapotranspiration Rate (ET_O mm day⁻¹)

Month	2013	2014	2015	2016
January	3.8647	2.1452	2.1452	0.3687
February	3.5566	3.9524	3.9524	0.9734
March	8.5134	8.6166	8.6166	6.7066
April	13.008	10.5799	10.5799	9.0024
May	12.1163	9.8797	9.8797	12.1778
June	10.2327	11.0487	11.0487	9.5543
July	6.3219	7.7665	7.7665	6.3918
August	7.2503	5.1264	5.1264	5.8757
September	5.9744	6.5942	6.5942	3.2290
October	3.8537	7.4206	7.4206	3.4764
November	1.9722	3.9672	3.9672	1.8029
December	3.4059	2.4746	2.4746	1.0542

Table 8: correlation coefficient for (2013-2016)

Year	T _{av} (°C)	Ws (m/s)	(SR Mjm ⁻² day ⁻¹)	Rh(^o /o)	P (Kpa)
2013	0.521	0.526	0.594	0.246	0.063
2014	0.504	0.614	0.857	0.245	0.280
2015	0.526	0.566	0.866	0.115	0.349
2016	0.531	0.566	0.866	0115	0.349

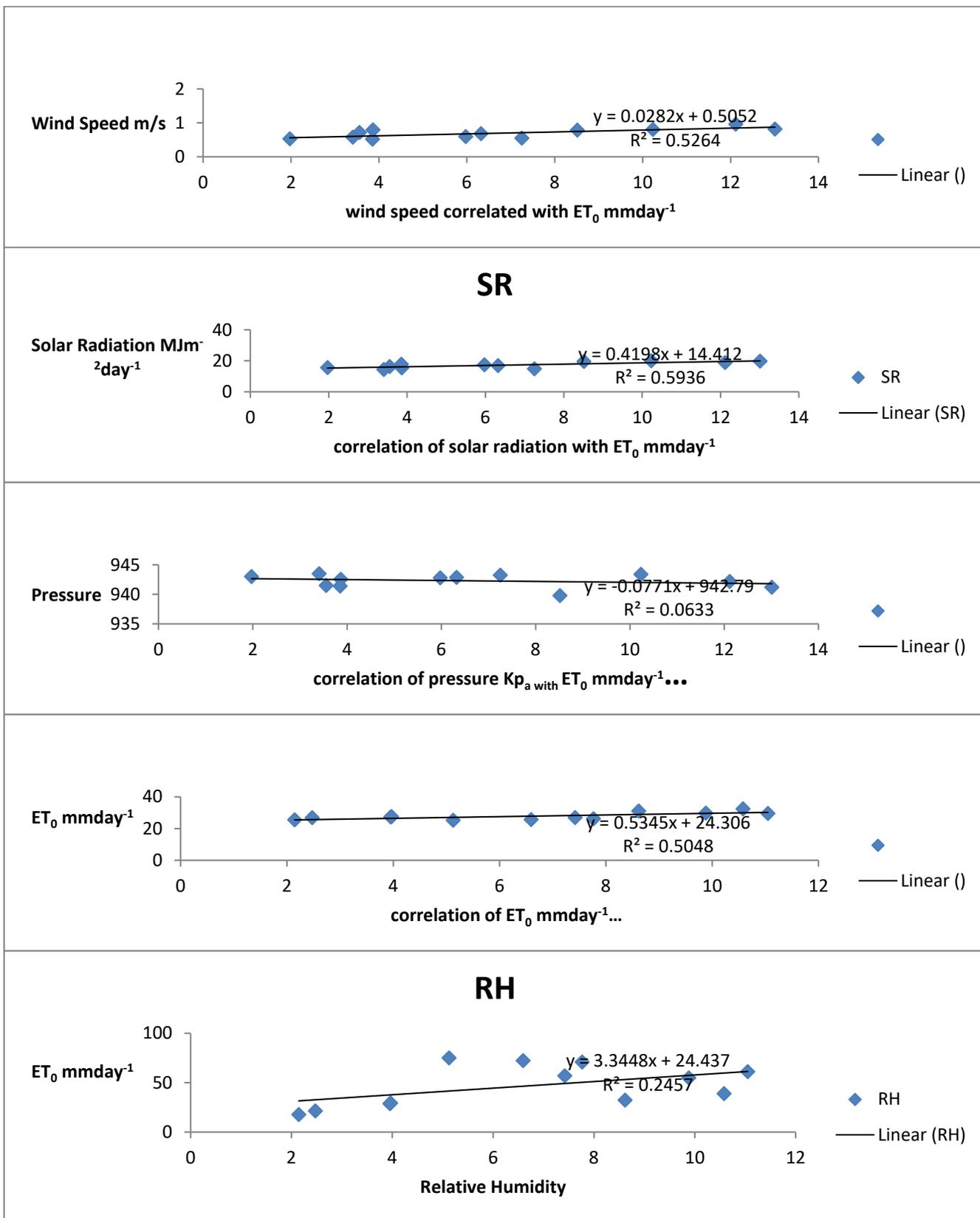


Figure 1: Plot of estimated ET₀ with Climatic parameter for 2013

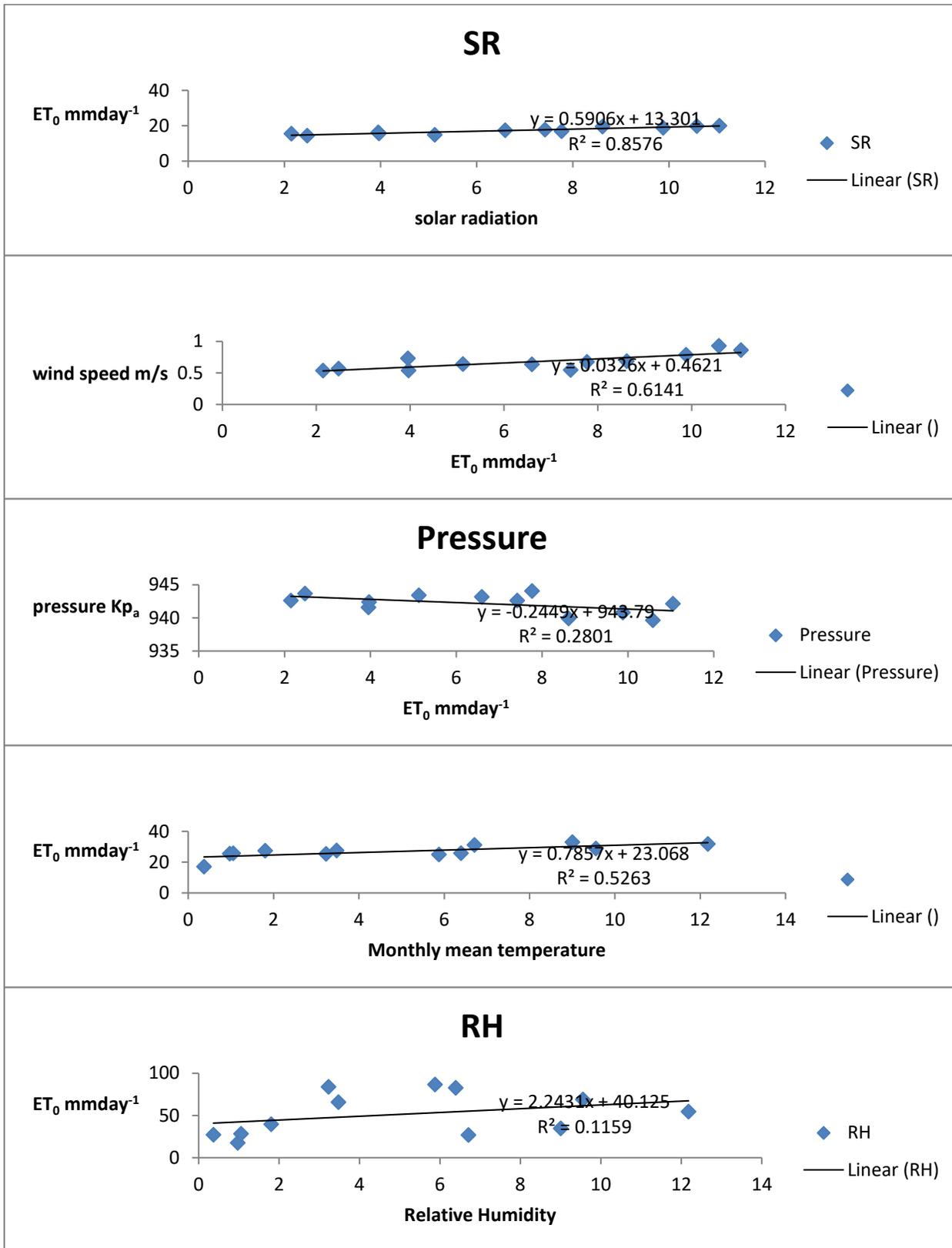


Figure 2: Plot of estimated ET_0 with climatic parameter for 2014

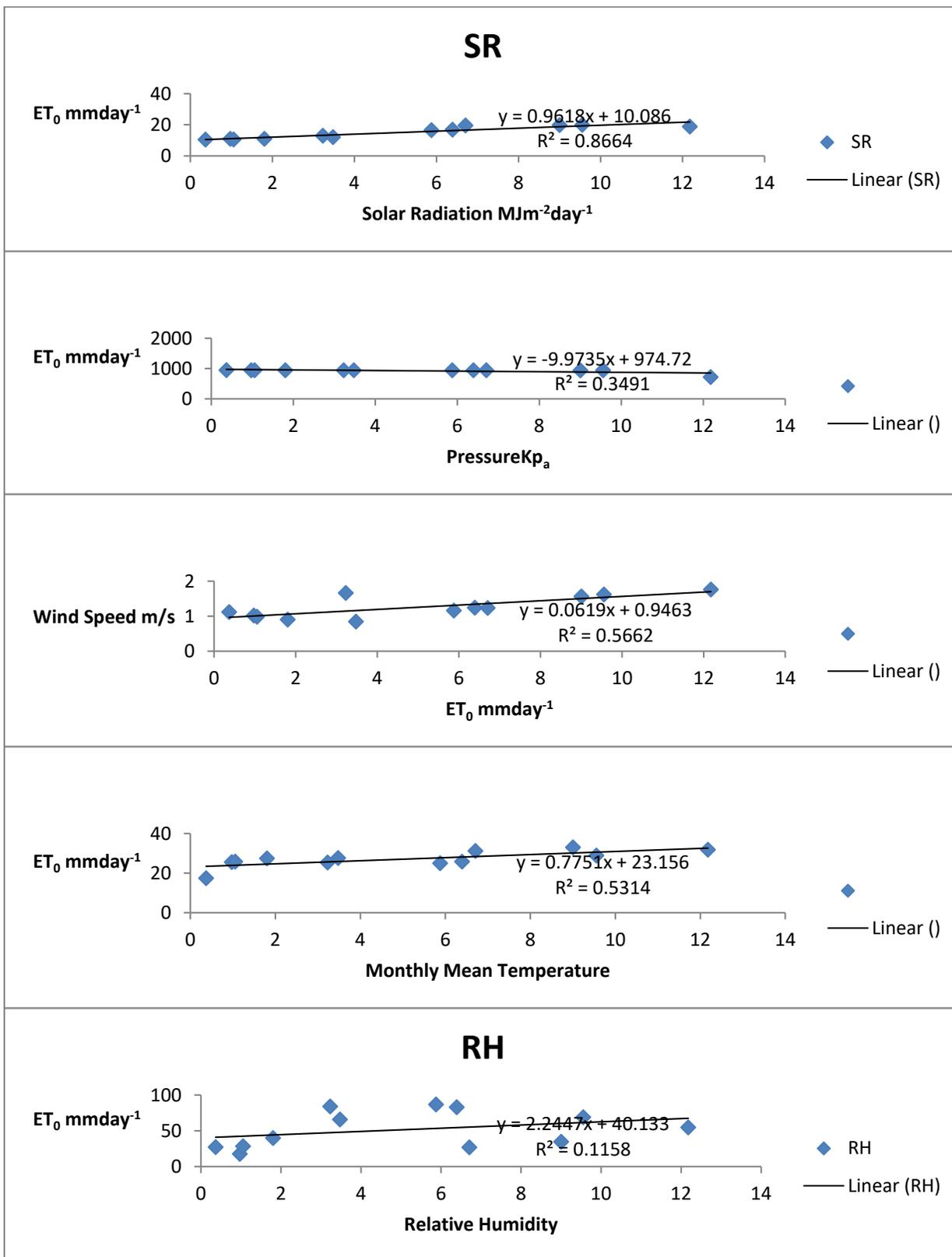


Figure 3: Plot of estimated ET_0 with climatic parameter for 2015

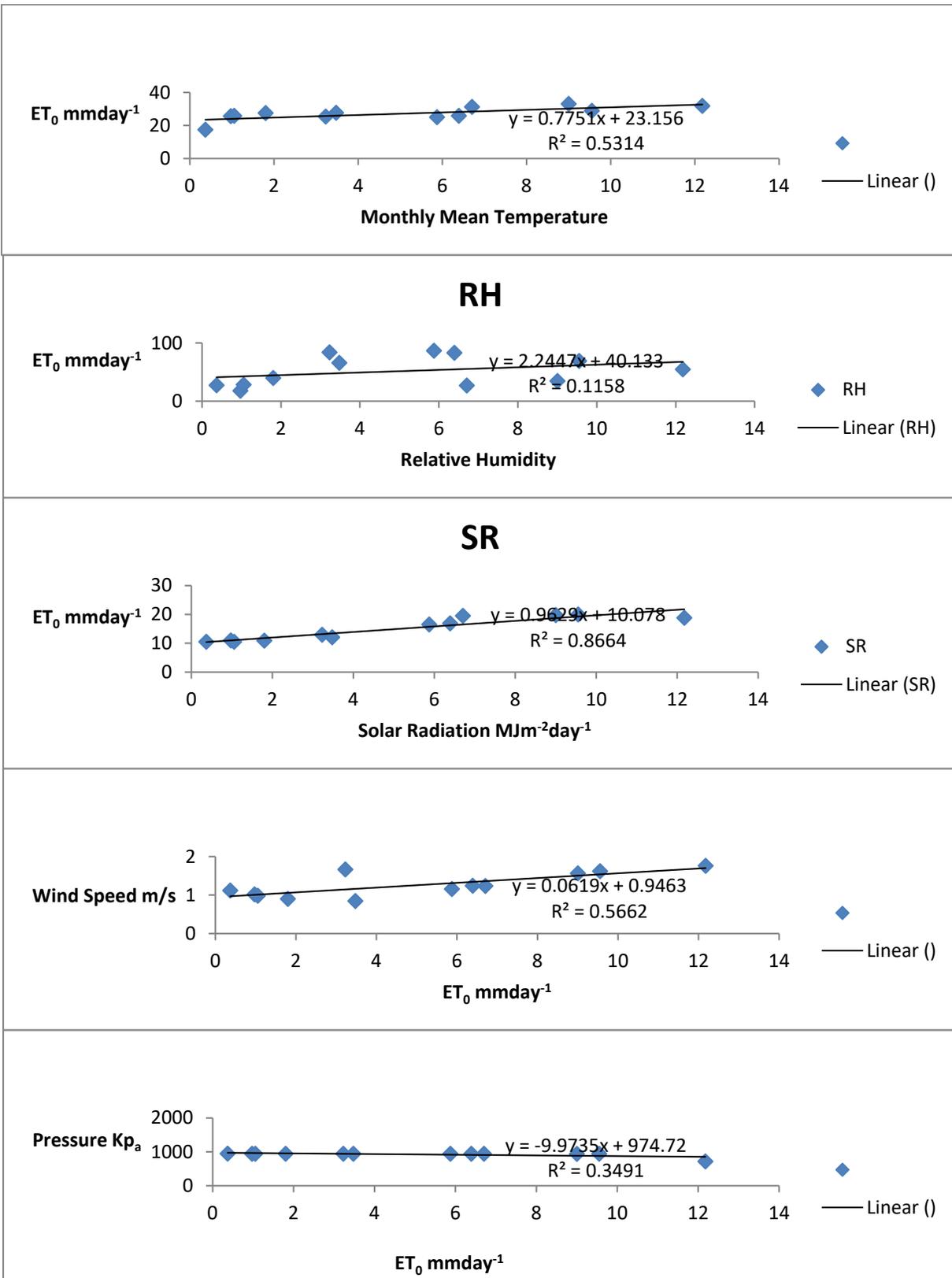


Figure 4: plot of estimated ET₀ and climatic parameter for 2016

IV. CONCLUSION

The model was developed for the estimation of reference crops evapotranspiration ET_0 base on penman's monteith FAO-56 and from the result obtained we can conclude that in Bauchi from (2013-2016) in the months of April, May and June crops lost water and it nutrient by transpiration with high range value from (13.008 – 9.0024) mmday^{-1} . Therefore irrigation activities is highly advised. Climatic parameters were correlated to test whether there is agreement between estimated ET_0 . It has shown that air temperature, solar radiation and wind speed are strongly positively correlated with ET_0 , that is increase in atmospheric temperature, solar radiation and wind speed will increase the rate of transpiration and evaporation processes which expresses the evaporative power of the atmosphere.

ACKNOWLEDGMENT

I acknowledge God almighty for making this work a successful one.

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Evaluation of the Chromite Refractory Lining Condition used in Induction Furnace

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DOI: 10.29322/IJSRP.9.08.2019.p92144

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92144>

Abstract- Refractories refer to the heat resistant material and are widely used as the internal linings of furnaces, kilns, reactors and other vessels in the metallurgy industry. According to the chemical compositions, chromite is one of the neutral refractory. In this work, the chromite ore from Mwetaung area was used as raw material. Firstly, the chemical compositions and refractoriness were measured. The experimental works for chromite refractory materials for use in lining of induction furnace was carried out. To study the use of chromite raw material as induction furnace lining, five different sizes of chromite were mixed. Boric acid was used as binder. Cast iron and aluminium alloys were used as materials for melting. The lining was tested for a total of only (14) hours and (4) heat. After each test, the condition of the lining was studied and it was observed that no severe damage or erosion of the lining took place.

Keywords – chromite ore, chromite refractory lining, induction furnace, chemical compositions, refractoriness.

I. INTRODUCTION

Nowadays, induction furnaces are widely used in metallurgical industries because they can be used in a variety of ways. Induction furnace capacities range from less than one kilogram to one hundred tonnes. They can be used to melt cast iron, mild steel and various alloy steels. Two types of induction furnace are core type induction furnace and coreless type induction furnace. From this, the coreless type induction furnace is mostly used because they can be started on cold metal, they can be used for a bath-type operation and they provide uniform temperature control with localized overheating. The induction furnace body consists of four main parts such as furnace casing, induction coil, refractory lining and gear housing.[4]

Refractory lining is the protective layer inside the furnace or kiln that withstand high temperature applications as a form of insulation. The most important refractory properties are chemical analysis, structure and phase constitution, fusion and softening temperatures and thermal conductivity. The selection of refractory lining materials is closely related to the different types of slags such as basicity and acidity_ namely acid, basic and neutral. The main raw materials used as high silica, quartz

and fireclay are acid refractories. They can used where slag and atmosphere are acidic condition. Magnesite and dolomite, chrome- magnesite and magnesite- chrome are basic refractories and they can be used in basic condition of slag atmosphere. Chrome and high alumina are neutral lrefractories and chemically stable to both acids and basic slags condition.[1]

In this work, the raw materials was obtained from Mwetaung area, Chin State. First of all, the chemical compositions are measured to know the content of chromium oxide. The typical content of Cr_2O_3 should be contained minimum amount of 30% for refractory purposes.

Secondly, the fusion and softening temperatures were measured because the refractory material that withstand the high temperature at which it is to be used. After that, the chromite refractory was used as in an induction furnace and condition of the lining was investigated.

The major goals of this study is to evaluate the characteristics and properties of Mwetaung chromite ore whether it can be used as refractory material or not. So, it will be tested as refractory lining and analyzed it behavior.

II. EXPERIMENTAL PROCEDURE

A. Chemical Analysis

The chemical composition of Mwetaung area was determined by wet analysis method.

B. Fusion and Softening Temperatures

By using the Pyrometric Cone Equivalent (PCE) method, the fusion and softening temperatures of chromite ore were examined.

In this testing, the standard Seger cones were manufactured by the Japan Seger Cone Association. The prepared chromite cones mixed with different binders such as boric acid, sodium silicate and magnesium chloride were tested with three standard Segre cone (#35, #36, #37) for three times.

C. Using Lining Materials in an Induction Furnace

The raw chromite from Mwetaung area,Chin State was used for testing as lining in induction furnace.

D. Preparation of Chromite

This step included cleaning,drying, washing, grinding and sieving.

1). Cleaning

The raw ore chromite contained various impurities such as dust, insects and soil particles. So, the material was cleaned by washing with water at least two times and then dried naturally.

2). Crushing and grinding

The process of crushing and grinding can differ according to the different sources. The general size of the raw material was in the range between 20 mesh sizes to 1 inch cube. Five different sizes of materials are required for this experiment and so the different milling machines as shown in Figure 1 are used. The gyratory crusher was used to crush 3/2" size to under 1/2" size. To obtain under 5 mesh size, jaw crusher was used. By using pulverizer, powder particles were obtained. Ball mill was used to grind 5 mesh size to different under sizes to powder.



(a) Gyratory Crusher



(b) Jaw Crusher



(c) Ball Mill



(d) Pulverizer

Figure.1. Different Types of Milling Machines

3).Screening

The required sizes of material are

- a) + 8 mesh size
- b) -8 to +28 mesh size
- c) -28 to +65 mesh size
- d) -65 to +150 mesh size
- e) -150 mesh size.

To obtain the above sizes, the crushed and ground particles were screened by using different types of sieve number. The sieve shaker which contains different types of sieves was shown in Figure 2.



Figure 2. Sieve Shaker

D. Induction Furnace Lining

As shown in Figure 3, test lining of local chromite refractory material in 0.15ton induction furnace was carried out. The former shown in Figure 4 which was needed for lining preparation was made of mild steel sheet and it was 2mm thickness. The dimension of the former is shown in Figure 5. Vent holes which had about 3mm diameters were made around the former sidewall for the escape of moisture.

The weight (kg) and ratio used for lining preparation is shown as Table 1. Boric acid was used as binder. The total weight of 150kg was required for lining preparation.



Figure 3. 0.15 ton Induction Furnace

The various ratios of raw material and boric acid were thoroughly mixed in concrete mixer as shown in Figure 6. for about 1 hour. Firstly, the cooling coil was inspected to check if water leakage took place or not.

The sealing of inductor was also checked and the diameter of coil was leveled out with a coil grout. After that the coil was set up into the furnace as shown in Figure 7. Before ramming, the asbestos cloth was covered as an insulating layer around the surface of the coil as shown in Figure 8. And then, the asbestos sheet was also covered on that layer in order to protect the coil as shown in Figure 9. After that, the inner height of the furnace was measured.



Figure 4. The Former

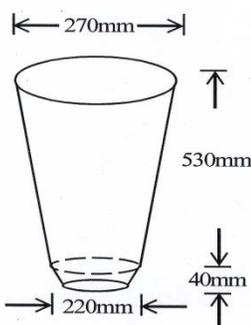


Figure 5. Dimension of the Former.

Table 1. Mesh (size) Number, Percentage and Weight of Refractory Material and Boric acid Used for 0.05 Ton Induction Furnace Lining

No	Material	Size	Percentage	Weight (kg)
1.	Chromite	+ 8 mesh	11.08	16.62
		-8 to +28 mesh	35.48	53.22
		-28 to +65 mesh	18.73	28
		-65 to +150 mesh	13.06	20
2.	Boric acid	- 150 mesh	21.65	33
			1.5	2.2
	Total			153.04



Figure 6. The Concrete Mixer



Figure 7. Setting up the Coil



Figure 8. Covering by Asbestos Cloth



Figure 9. Covered with Asbestos Sheet

Firstly, the bottom of the furnace was rammed. The mixture was poured into the bottom about 240 mm thick and rammed with appropriate rammers and vibrator to get the thickness of 120 mm. And then, the mixture was again filled about 240 mm thick and rammed to get the total thickness of 240 mm.

The former was firmly seated on the bottom surface in the furnace as shown in Figure 10. Any voids between the former and its base can cause cracks from insufficient support. And so, a substantial weight of scrap was placed into the former to prevent shifting during ramming.

The prepared mixture was rammed layer by layer using the same tools for the sidewall. To avoid lamination, the side by side layer was loosened slightly. The workers changed their

positions alternatively around the former while they were ramming.

The lining was rammed to the level of the topmost turn of the inductor. The capping material (refractory clay, chromite and silicate) was not excessively wet to avoid excessive shrinkage during curing. After that the lining was dried. When the lining was ready for use, some iron blocks were appeared in the iron blocks and the heat developed was transferred to the adjacent layer of the lining as shown in Figure 11.



Figure 10. Settlement of the Former

The power should be applied slowly to gently warm up the chamber to avoid cracking of the lining. The preheating temperature cycle was holding at 200°C for 2hr, keeping between 200°C to 600°C for 3 hr, 600°C to 900°C for 2hr, 900°C to 1100°C for 2hr 1100°C to 1350°C for 1hr and temperature 1350°C for keeping time.

This process lasted for about 10hrs. If the power was applied too rapidly, uneven heating of the former could result in potentially catastrophic failures such as thermal shock and hazardous steam explosions. After preheating, the furnace was charged with some blocks of cast iron and melting operation was started.



Figure 11. Preheating the Furnace



Figure 12. Pouring into the Ladle

After getting that temperature, all the blocks were melted down. Then the molten cast iron was poured into the ladle as shown in Figure 12. From this, the molten cast iron was poured into the mold. After that, the lining was cleaned of remaining metal and slag and the condition of the lining was inspected visually.

III. RESULTS AND DISCUSSIONS

A. Chemical Compositions

For the use of refractory purposes such as furnace lining, the chromite ore obtained from Mwetaung area was firstly determined the chemical compositions. The following table 2 was shown the test results and discussed compared with the typical compositions.

Table.2 Comparison between typical and Mwetaung chromite ore compositions

No.		Typical Compositons	Mwetaung Chromite Ore Compositions
1	Chromic Oxide	30 to 50 %	49.98%
2	Iron Oxide	12 to 16%	15.7%
3	Silica	3 to 6 %	4.68%
4	Alumina	13 to 30%	12.14%
5	Magnesia	14 to 20%	15.26%
6	Lime	Up to 1%	ND

By comparing these two results, it can be seen that the Mwetaung chromite ore is within the range the of typical compositions. For this reason, it can be used as the refractory material.

B. Fusion and Softening Temperatures

Following the Pyrometric Cone Equivalent (PCE) test results, the prepared chromite cones did not soften or fusion up to 1820°C. It can also be seen that the different binders could not affected in refractoriness. For this, the Mwetaung chromite ore has a fusion point of over 1825°C and the three different binders can be used.

C. Refractory Lining Condition

The chromite ore was tested as refractory lining in 0.15ton induction furnace. The lining condition after melting is discussed below.

Before the operation started, the lining thickness of side wall and bottom were measured. The lining thickness of sidewall was 130mm and the bottom was 240 mm, respectively.

For the first heat, cast iron was melted. The temperature recorded was 1350°C. The melting time was taken about 4hrs. After melting, the lining was cleaned of remaining metal and slag and inspected visually. After melting condition, the lining thickness of side wall and bottom were measured again and compared to the original dimensions. By comparing these two datas, it was observed that there was no difference in the lining thickness.

For the second and third heats, aluminum alloys were melted. The temperature recorded was 700°C. The melting time was 30 minutes for each melting. After melting, the lining was cleaned and inspected visually. The lining condition after third time heating is shown in Figure 13.

Although the lining had been used for three melts, no change in the lining thickness was observed. It can be noted that the erosion of the lining had not occurred. But small cracks which were formed at the upper region of the side wall were detected. This was occurred because the molten cast iron was not reached and good sintering condition was not obtained. performance of chromite ore is mentioned in Table 3.



Figure 13. Lining Condition after Third Time Melting

Table 3. Performance of Chromite Ore

No.	Melted metal	Time (hr)	Condition of Lining	Remark
1.	Cast Iron	10	–	Preheating time
2.	Cast Iron	4	No Change in lining thickness during short time melting No damage	Melting
3.	Aluminum alloy	0.5		
4.	Aluminum alloy	0.5		
	Total	15		

It can be seen from the above table that the use of Mwetaung chromite ore as a refractory lining had tested for total of only (14) hours and (4) heats_ two for cast iron and two for aluminum alloy. After each test, the condition of the lining was studied and it was observed that no damage or erosion of the lining took place.

The number of tests that could be made depended on the restrictions and limitations of the factory such as furnace condition, necessary equipments, cost, time, labors and power supply. Therefore, the obtained results were discussed on the basis of melting on 14 hours of total melting time.

IV. CONCLUSION

In this study, the raw materials Mwetaung chromite ore can be used as the refractory material according to the test results. The chemical composition of Mwetaung chromite was within the range of standard compositions. According to the PCE test results, it does not soften or fused up to 1820°C. Because of limited testing facilities, some experiments could not be carried out. For testing the lining, fixed size distribution ratio and one type of binder, sodium silicate was used. In this study, locally available metal scraps were charged during melting. If possible, the known chemical analysis of metal should be charged. According to the type of slag produced, the acid or basic melting practice can be chosen. In this tests, chromite refractory lining was tested for a total of only (14) hours and (4) heats. The number of tests that could be made depended on the restrictions and limitations of the factory. If possible, many tests should be carried out. However, various possible attempts were made to test the feasibility of chromite refractory lining.

According to the results obtained from both determination of properties and test works, Mwetaung chromite ore can be used as refractory lining material for induction furnace.

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Valuing Recreational Benefits of a Marine Protected Area: A Case of Pigeon Island National Park in Sri Lanka

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Abstract

Pigeon Island is one of the marine national parks in Sri Lanka. Rock pigeon, coral reefs, fishes, golden sand, sun and snorkeling sites enhances the attraction of many local and foreign tourists. These recreational activities have created so many negative impacts on the ecosystem itself and the protection of this natural recreational site is a timely necessity. Hence, this study attempted to estimate the recreational value of Pigeon Island National Park (PINP). Data were collected from 119 respondents using systematic random sampling method. 56.3% respondents are belong to 26 – 31 age category and single. Main occupation is recorded as self-employment and income varies from Rs.25000 to 35000 per month. Data from 117 respondents were used for calculating the Zonal Travel Cost and 76 sampling units used for the Individual Travel Cost method. Result of the zonal method shows that the total recreational value of Pigeon Island is 594.8 million Rupees per year (P value is less than 0 and R-squared is 57%) while Individual travel cost method estimates it as 524.9 million Rupees per year (P value less than 0 and R-squared is 67.5%).

Key words

Pigeon Island National Park, Travel cost method, Recreational value, negative impacts

1. Introduction

People depend on the natural environment for a variety of benefits to their wellbeing. Valuing nature and its program of research provides a venue in which researchers, policymakers, and practitioners can explore how better to take account of these benefits within decision making (Lipton *et al.*, 1995). There is growing concern about environmental issues and an increasing demand for recreational activities and resources.

Environmental conservation is important to enable nature to get on with the job of keeping us and the planet healthy so that people and nature can thrive (Japan International Cooperation Agency, 2016). Marine and coastal ecosystems produce various services, including Provisioning services, Supporting services, Regulating services, Cultural services (Forest trends and Katoomba group, 2010).

Coastal areas are those which are most visited by tourists and in many coastal areas tourism presents the most important economic activity but negative impact also there such as Massive influxes of tourists, often to a relatively small area, have a huge impact. They add to the pollution, waste, and water needs of the local population, putting local infrastructure and habitats under enormous pressure (Zahedi, 2008).

Tourism plays a leading role in Sri Lankan economy. It serves a lot of foreign exchange to the country. So, Sri Lankan government pays attention to develop tourism. The tourism industry in the Eastern and Northern provinces of the country continued to grow with local and foreign investors, focusing their attention on harnessing the high potential for tourism in these provinces.

Sri Lanka as an island consist of a number of attractive and nature-based tourist destinations. Pigeon Island Marine National Park (PIMNP) is one of the best places to visit in the Eastern province. It is one of the two marine national parks in Sri Lanka. It is the only national park in the country to harbor a colony of the beautiful blue rock pigeons and contains some of the best remaining coral reefs in the country (Jayaweera, 2013).

The island is situated within the dry zone of Sri Lanka consists of two parts (islands); triangle shaped Island and Elongated shape Island. Small Island is Pigeon Island. The national park is rich in biodiversity. There are around 100 types of coral reefs and 178 species of fish on this island.

Travel cost method (TCM) is the technique used to estimate the recreational value on non-market resources or public goods using consumption behavior in related markets. The main aim of this method to determine the peoples' willingness to pay to the visit. There are two approaches including individual and zonal. Zonal method is inexpensive and easiest method to estimate the recreational value. Individual method is same as zonal approach. But it uses individual survey data for the statistical analysis. This present study estimate the value of pigeon national park by using these two approaches.

2. Methodology

2.1 Study Area

Pigeon Island National Park (PINP) is located 1 km off shore of the Nilaveli beach, in the Trincomalee District, Sri Lanka (8045'0" N and 810 9'0" E to 80 36'0" N and 810 14'0" E).

2.2 Survey design and Data collection, Questionnaire survey and data analysis

The visitors to the park were first divided into two categories i.e. local and overseas visitors. The overseas visitors have been omitted from the study to avoid the extremes that would come up due to their high purchasing power and other fees charged (i.e. transportation, lodging, entrance etc.) Data for the study were collected from both primary and secondary sources. Secondary data were collected (number of visitors to the PIMNP) from the visitor statistics maintained by the park wardens.

Primary data were collected from a field questionnaire survey. The questionnaire consisted of 2 sections. Section 1 related to visitor's socio economic characteristics and section 2 related to recreational travel characteristics. Information on area of residence, socio economic features, their visitation rates to PINMP, information on round trip mileage, travel costs, opportunity cost of travel time, length of the trip, time spent at the site and other locations visited during the same trip were obtained from the questionnaire. The questionnaire survey was administered for the randomly selected visitors from 09.00hrs to 17.00hrs during October 2017 to November 2017. The survey was conducted both in weekdays and weekends. Minitab 18 was used to analyze the data.

2.3 Method

The TCM evaluates the recreational use value for a specific recreation site by relating demand for that site (measured as site visits) to its price (measured as the costs of a visit). A simple TCM model can be defined by a 'trip-generation function' (*tgf*) such as;

$$V = f(C, X)$$

Where,

V = visits to a site

C = visit costs

X = other socioeconomic variables which significantly explain V .

TCM can be divided into two basic variants of this model according to the particular definition of the dependent variable V . The 'Individual Travel Cost Method' (ITCM) simply defines the dependent variable as the number of site visits made by each visitor over a specific period, say one year. The 'Zonal Travel Cost Method' (ZTCM) on the other hand, partitions the entire area from which visitors originate into a set of visitor zones.

The ZTCM approach redefines the trip generating function (*TGF*) as;

$$V_{hj}/N_h = f(C_h, X_h)$$

Where,

V_{hj} = Visits from zone h to site j

N_h = Population of zone h

C_h = Visit costs from zone h to site j

X_h = Socioeconomic explanatory variables in zone h

The visitor rate, V_{hj}/N_h , is often calculated as visits per 1,000 population in zone h .

We can specify the individual travel cost model as:

$$V_{ij} = f(C_{ij}, A_i, Y_i, H_i, N_i, M_i, J_i, E_i)$$

Where,

V_{ij} = number of visits made per year by individual i to site j

C_{ij} = individual's total visit cost of visiting site j

A_i = age of individual i
 Y_i = average income of individual i 's household
 H_i = size of individual i 's household
 N_i = size of individual i 's party
 M_i = marital status
 J_i = job of individual
 E_i = educational level of individual

Recreational value was calculated using Zonal travel Cost Method and individual travel method.

2.3.1 Zonal travel cost method

Total travel cost include round trip cost (only for travel) and opportunity cost of time for round trip. Round trip travel distance and time are calculated by using the Google map.

Total travel cost = travel cost for round trip + opportunity cost of time for round trip

Opportunity cost of time is calculated for round trip travel.

*Wage rate = average monthly income / (25*8)*

Here,

25 is average working days in one month

8 is average working hours in a day

So

Opportunity cost of time is 33% of wage rate (Amoako-Tuffour and Martinez-Espineira, 2008)

*Opportunity cost for time = (monthly income / 25*8) * (33/100)*

According to survey 15 administrative district were selected as zones (Ampara, Anuradapura, Badulla, Batticaloa, Colombo, Jaffna, Kegalla, Kilinochi, Kurunagal, Mannar, Matale, Mullaitivu, Polonnaruwa, Trincomalee, Vavuniya) and removed three zones such as Puttalam, Moneragala and Ratnapura because of the less two visits in survey. Out of the data of 116 visitors removed 3 zones and only 113 samples were considered for zonal travel cost method.

After the zone divided visitation rate (visits/1000) was calculated for each zone 29

Visits for zone = (No of responders/total sample size) × Total visitors per year

(Visits/1000) = (visits for zone × 1000)/zonal population

Simple linear regression analysis was carried out using Minitab 18. Then added hypothetical entry fee with total travel cost and calculate the amount of visitors for each zone. Demand curve for zonal travel cost method was constructed. Area under the demand curve is consumer surplus (recreational value)

2.3.2 Individual travel cost method

Total cost for Pigeon Island, It includes travel cost for individual (round trip travel cost, round trip opportunity cost of time) + individual entry fee + individual food expenditure + boat cost for individual + equipment cost for individual

Total travel cost = travel cost for round trip + opportunity cost of time for round trip

Entry fee = ticket fee for person + (boats man ticket fee/no of trip members in the boat) + service charge + boat park fees + 15% Vat

Ticket for person = Rs.40 (Rs.20 for children)

Service charge = Rs.300

Boat park fees = Rs.125

Though there were 116 samples for the individual travel cost method 69 samples were considered and removed other samples because that samples were extreme cases. Regression analysis was done for total cost for Pigeon Island and other variables. According to suitable regression equation estimate visitation rate for total cost (cost for Pigeon Island). Demand equation and demand curve for individual travel cost method were estimated and consumer surplus was calculated (Recreational value)

3. Results and discussions

3.1 Age distribution of tourists to pigeon island national park

Figure 1 shows the age level distribution of the respondents. Out of that 56.3% of the respondents belong to 26-31 years old category. It is clear from the figure that more than 75% of the tourist who are visiting the PIMNP are belonging to 20-31 years old category. less than 20 years old category were omitted in this study because they don't have enough income for calculate travel cost for PINMP

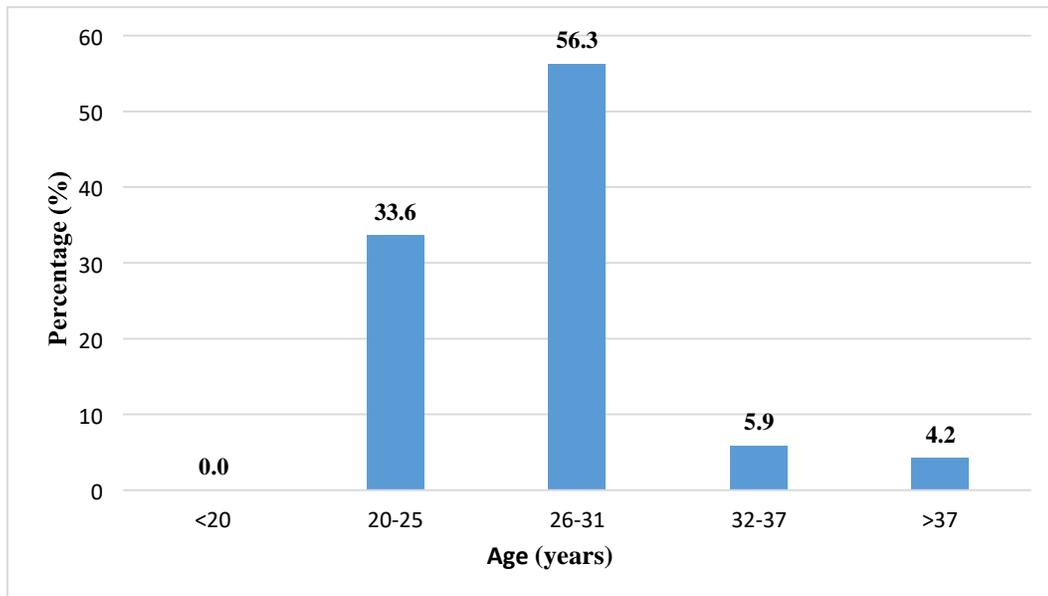


Figure 1-Age distribution of tourist

3.2 Marital status of tourists

Most of the tourist are unmarried who have 60.5% in the survey and 39.5% tourist are married.

3.3 Ethnic group percentage in my survey

High percentage of tourist ethnic group is Tamils (42%), 41.2% belongs to Sinhalese and 16.8% belongs to Muslims.

3.4 Education level of tourists

The majority of the respondents are having a degree and 34.5% of respondents are having a primary education. Out of the respondents, 29.4% have secondary education.

3.5 Type of occupation of tourist

Majority of the respondents are self-employment. It is about 34.5%. 27.7% of the respondents are working in government sector, 30.3% respondents are working in private sector and others (labors) have 7.6% in survey.

3.6 Results for zonal travel cost method

Based on linear regression analysis, R-squared is 57%. so visitation rate had strong negative relationship with total travel cost. And p value is less than 0.05 so this regression analysis is significance.

Maintaining cost and entry fees were comparatively minimum amount than consumer surplus so paper eliminate that amounts. According to zonal travel cost method, consumer surplus or recreational value of Pigeon Island is (area under the demand curve) is 594.8 million Sri Lankan rupees.

3.7 Results for individual travel cost method

Recreation value or consumer surplus according to individual travel cost method.

Area under demand curve give the recreational value of Pigeon Island is 7117 rupees for individual

So total consumer surplus = 7117×76288

= 524.9 million rupees

4. Conclusion

Pigeon Island have more recreational value according to the assumption of 40 rupees per kilometer. If we use per kilometer travel cost is low amount than 40 rupees recreational value became too low amount and if we use higher amount for per kilometer recreational value became very high. According to the estimation, recreational value of Pigeon Island for the zonal travel cost method is 594.8 million Rupees and Individual travel cost method is 524.9 million rupees.

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Prediction of Centrifugal Pump Performance on Theoretical and Experimental Observation at Constant Speed of Impeller

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DOI: 10.29322/IJSRP.9.08.2019.p92146

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92146>

Abstract- This paper presents the design of impeller and its performance describes under the prediction of theoretical and experimental observations of single-suction centrifugal pump. The designed pump is single stage centrifugal pump with closed type and it is capability deliver 0.015 m³/s of water at a head of 20 m. The designed parameters of impeller are 99 mm of inlet diameter and 250 mm of outlet diameter, by mean of vane angles at 20° inlet and 23° outlet. The number of vanes is 6 and input shaft power is 6 hp. The inlet width and outlet width are 20 mm and 12 mm respectively. The discharge diameter is 80 mm to operate the designed head and capacity. The performance analysis of the pump is also presented on design speed. According to theoretical observation, the predicted maximum efficiency is nearly 65% and the expressed actual efficiency of designed pump is 61%. Also experimental results are 66.67% of maximum efficiency without consideration overall losses and actual capacity of designed pump is 0.0215 m³/s at the same condition. Therefore, the designed efficiency has a satisfactory value. The designed single-suction centrifugal pump can fulfill the requirements of water pumping system for irrigation, and agricultural application.

Index Terms- head, flow rate, speed, efficiency

I. INTRODUCTION

A pump is a device which lifts water from a lower level to a higher level at the expense of mechanical energy. It consists an impeller rotating within a volute casing. Radial flow pumps are centrifugal pumps in which the fluid is pumped perpendicularly to the pump shaft. The flow mechanism in a centrifugal pump can generally be described as follows: Through a suction flange the liquid flows through the suction hub into the rotating impeller due to an energy fall. The pump unit absorbs mechanical energy from a drive motor through a shaft. The blades of the impeller which is permanently fixed on the shaft exert a force on the fluid and increase its angular moment. Pressure and absolute speed increase as a result. Consequently energy is being transferred to the fluid. The energy which is present in kinetic form as an increased absolute speed is usually converted into additional static pressure energy by a diffuser device. Pumps are widely used for irrigation and are most

common where pumping from surface water supplies such as river, lakes and streams and rising water to a higher level.

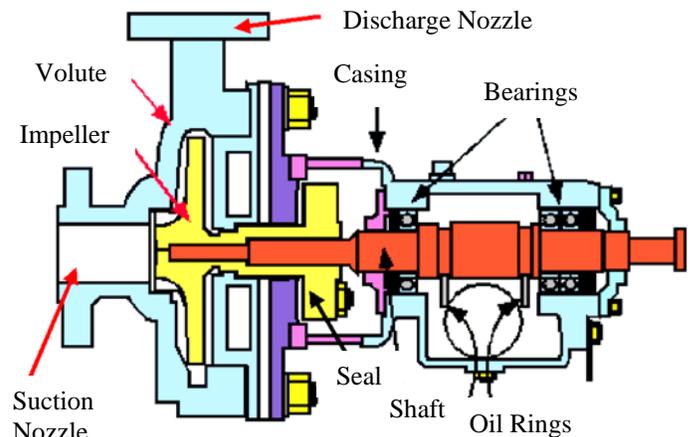


Fig.1 Single Suction Centrifugal Pump

II. DESIGN OF CENTRIFUGAL PUMP

The two main components of centrifugal pump are impeller and casing. The impeller is enclosed in a water tight casing that the kinetic energy of water is converted into pressure energy before the water leaves the casing. The other components are suction pipe, discharge pipe, shaft, bearing, wear rings, stuffing box, mechanical seal and various types of valves and gauges.

When the overall design of pump is considered, the shape of an impeller is the most important for optimum efficiency. Impeller design should be in such a way that, losses must be as low as possible. The design of a pump's impeller can be divided into two parts. The first is the selection of proper velocities and vane angles needed to obtain the desired performance with the best possible efficiency. The second is the layout of the impeller for the selected angles and areas.

The specifications of pump that will be designed are:

Pump head,	H	= 20 m
Discharge,	Q	= 0.9 m ³ /min
	Q_s	= (Q/60) m ³ /s

$$\begin{aligned} &= 0.015\text{m}^3/\text{s} \\ \text{Rotational Speed, } n &= 1800 \text{ rpm} \\ \text{Density of water, } \rho &= 1000 \text{ kg/m}^3 \end{aligned}$$

A. Design of impeller

Specific speed is an essential criterion to determine the impeller shapes. It is mathematically expressed as

$$n_s = \frac{n \times \sqrt{Q}}{H^{3/4}} \quad (1)$$

In this design, calculated value of specific speed based on required head and capacity is 180 rpm and it is within the range of low specific speed pump that is greater than 80 and less than 600. So, end-suction type single stage centrifugal pump with closed impeller is chosen.

Pump efficiency, η is assumed by using Fig. A1. and also the diameter of suction pipe D_s can be estimated from this chart. The discharge pipe diameter D_d is usually selected equal to or one size smaller than that of the suction pipe. Thus, velocities in these pipes are given by

$$V_s = \frac{Q_s}{\pi \frac{D_s^2}{4}}, V_d = \frac{Q_s}{\pi \frac{D_d^2}{4}} \quad (2)$$

Input power of centrifugal pump can be determined by following equation.

$$L = \frac{\rho Q_s g H}{\eta} \quad (3)$$

For charge condition of the pump work, maximum shaft power or rated output of an electric motor L_r (kW) is decided by using Equation (4).

$$L_r = \frac{(1 + F_a) \times L}{\eta_{tr} \times 1000} \quad (4)$$

Where, F_a is the allowance factor, and 0.1~ 0.4 for an electric motor and larger than 0.2 for engines And then, η_{tr} is the transmission efficiency, and 1.0 for direct coupling and 0.9 ~ 0.95 for belt drive.

The shaft diameter at hub section of impeller is

$$d_s = \sqrt[3]{\frac{16 T}{\pi \tau}} \quad (5)$$

Where, T is the torsional moment and it can be estimated by

$$T = \frac{60 L_r}{2 \pi n} \quad (6)$$

Allowable shear stress of material of shaft, τ is 24.5 MPa because the main shaft is made of S30C. The estimated shaft diameter will be increased because it is difficult to predict the bending moment at this time.

The hub diameter, D_h is usually taken from 1.5 to 2.0 times of the shaft diameter and the hub length, L_h is from 1.0 times to 2.0 times of the shaft diameter.

The diameter of impeller eye, D_o is calculated by

$$D_o = \sqrt{\frac{4Q'_s}{\pi V_{m0}} + D_h^2} \quad (7)$$

Where, the flow rate through the impeller, Q'_s is Q/η_v and volumetric efficiency η_v is estimated by

$$\eta_v = \frac{1}{1 + \frac{1.124}{n_s^{2/3}}} \quad (8)$$

For Equation (7), the velocity at the eye section is given by

$$V_{m0} = K_{m0} \sqrt{2gH} = (1.5 \sim 3.0) \leq V_{m1} \quad (9)$$

$$K_{m0} = (0.07 \sim 0.11) + 0.00023 n_s \quad (10)$$

For a fluid flowing through the rotating impeller, u is the tangential velocity, V is the absolute velocity and v is the relative velocity of a fluid particle to impeller rotation. The angle between V and u is α and the angle between v and u is β and it is the angle made by tangent to the impeller vane and a line in the direction of motion of the vane. The tangential component and radial component of absolute velocity V are V_u and V_r respectively. The outlet velocities triangle with solid lines represents the actual diagram.

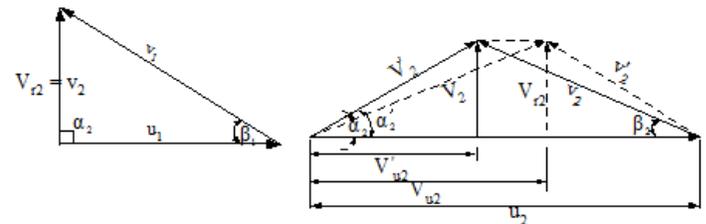


Fig. 2 Impeller Inlet and Outlet Velocity Diagrams

The parameters K_u (speed constant), K_{m1} , K_{m2} , and D_1/D_2 are obtained on the value of specific speed in Fig A2.

The outlet diameter D_2 ,

$$D_2 = \frac{u_2 \times 60}{\pi \times n} \quad (11)$$

Where, the peripheral velocity at impeller outlet is

$$u_2 = K_u \sqrt{2gH} \quad (12)$$

The peripheral velocity at the inlet is also expressed by

$$u_1 = \frac{\pi D_1 n}{60} \quad (13)$$

And then, flow velocities at the inlet and outlet are

$$V_{r1} = K_{m1} \sqrt{2gH} \quad \text{and} \quad V_{r2} = K_{m2} \sqrt{2gH} \quad (14)$$

If the incoming flow has no pre-rotation, the blade angle β_1 (deg) is given by

$$\beta_1 = \tan^{-1} \left[\frac{K_{b1} V_{r1}}{u_1} \right] \approx \tan^{-1} \left[\frac{V_{r1}}{u_1} \right] + (0 \sim 6) \quad (15)$$

Where, $K_{b1} = 1.1 \sim 1.25$

The amount of outlet angle β_2 usually has between 15° and 35° . So, the vane outlet angle is assumed that $\beta_2 = 23^\circ$ in this design. From the velocity triangles, inlet and outlet relative velocities are

$$v_1 = \frac{u_1}{\cos \beta_1} \quad \text{and} \quad v_2 = \frac{V_{r2}}{\sin \beta_2} \quad (16)$$

The virtual tangential component V_{u2} of V_2 is

$$V_{u2} = u_2 - \frac{V_{r2}}{\tan \beta_2} \quad (17)$$

For radial-type impellers, the slip factor, η_∞ varies between 0.65 and 0.75 and it is assumed that $\eta_\infty = 0.7$ average. Thus, the actual tangential component V'_{u2} of V_2 is

$$V'_{u2} = V_{u2} \eta_\infty \quad (18)$$

Thus, the actual outlet is found by

$$\tan \alpha'_2 = \frac{V_{r2}}{V'_{u2}} \quad (19)$$

The absolute outlet velocity from outlet velocity diagram is

$$V'_2 = \sqrt{V_{r2}^2 + V'_{u2}^2} \quad (20)$$

The number of blades, Z is decided by using the Plfeiderer formula.

$$Z \approx 6.5 \frac{D_2 + D_1}{D_2 - D_1} \sin \left[\frac{\beta_1 + \beta_2}{2} \right] \quad (21)$$

In this design, blade thickness and shroud thickness are taken as 2.5 mm and 3.0 mm respectively for D_2 is greater than 200 mm.

The inlet passage width b_1 and outlet passage width b_2 are calculated by

$$b_1 = \left[\frac{Q'_s}{\pi D_1 V_{r1}} \right] \left[\frac{\pi D_1}{\pi D_1 - S_1 Z} \right] \quad \text{and} \quad b_2 = \left[\frac{Q'_s}{\pi D_2 V_{r2}} \right] \left[\frac{\pi D_2}{\pi D_2 - S_2 Z} \right] \quad (22)$$

Where, S_1 is $(\delta_1 / \sin \beta_1)$, S_2 is $(\delta_2 / \sin \beta_2)$, and δ_1 and δ_2 are blade thicknesses near the leading edge and trailing edge respectively. Moreover, S_2 can also be determined by the following relationship equation.

$$\frac{\pi D_1}{(\pi D_1 - S_1 Z)} = \frac{\pi D_2}{(\pi D_2 - S_2 Z)} \quad (23)$$

The impeller blade is drawn by three circular arcs method with solid work software.

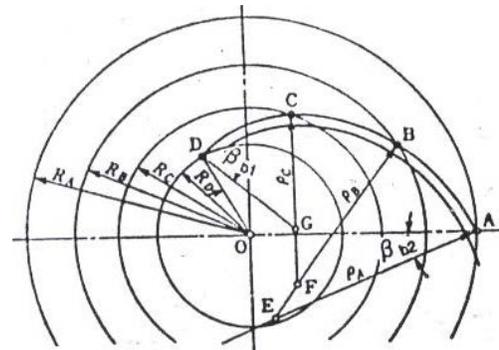


Fig. 3 Curvature of Impeller Blade

$$\rho_A = \frac{(R_A^2 - R_B^2)}{2(R_A \cos \beta_2 - R_B \cos \beta_B)},$$

$$\rho_B = \frac{(R_B^2 - R_C^2)}{2(R_B \cos \beta_B - R_C \cos \beta_C)} \quad \text{and}$$

$$\rho_C = \frac{(R_C^2 - R_D^2)}{2(R_C \cos \beta_C - R_D \cos \beta_1)} \quad (24)$$

Where, R_A, R_B, R_C and R_D are base circle radii, $R_A = D_2/2$ and $R_D = D_{1h}/2$.

$$R_B = R_A - \frac{R_A - R_D}{3} \quad \text{and} \quad R_C = R_B - \frac{R_A - R_D}{3} \quad (25)$$

The angles between β_1 and β_2 are divided into three angles.

B. Design of volute casing

Design of volute casing is calculated depending on the D_2 and the basis of constant average flow velocity in volute casing. The volute casing increases proportionally in size from cut water to the discharge nozzle. In rear velocities distribution, across volute section is not uniform. Volute angle is read from volute constant chart shown in Fig. A3 and in this design, the volute angle, α_v is 8° based on n_s value.

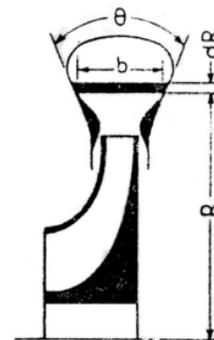


Fig. 4 Section through Volute Casing [4]

The width of the volute at any point may be calculated from

$$b = b_3 + 2x \times \tan(\theta/2) \quad (26)$$

Where, x is the distance between any radius R and impeller outside radius R_2 . The volute is designed by determining the angle Φ° measured from and assumed radial line by tabular

integration of Equation (27).

$$\phi^o = \frac{360 R_2 V'_{u2}}{Q} \int_{R_2}^{R_\phi} \frac{bdR}{R} = \frac{360 R_2 V'_{u2}}{Q} \sum_{R_2}^{R_\phi} b \frac{\Delta R}{R} \quad (27)$$

The tongue angle of volute casing is determined by

$$\phi'_t = \frac{132 \log_{10} R_t / R_2}{\tan \alpha'_2} \quad (28)$$

Volute wall thickness is chosen according to suction pipe diameter and it is taken as 6 mm since the suction pipe diameter is within 100 and 150 mm in this design.

No	Descriptions	Symbols	Results
1	Input Power	L	6 hp
2	Shaft diameter	d_s	34 mm
3	Hub diameter	D_h	51 mm
4	Hub length	L_h	68 mm
5	Impeller eye diameter	D_o	97 mm
6	Impeller inlet diameter	D_1	99 mm
7	Impeller outlet diameter	D_2	250 mm
8	Inlet angle of impeller blade	β_1	20°
9	Outlet angle of impeller blade	β_2	23°
10	Impeller passage width at inlet	b_1	20 mm
11	Impeller passage width at outlet	b_2	12 mm
12	Number of impeller blades	Z	6 blades
13	Base width of volute casing at D_2	b_3	24 mm
14	Volute tongue angle	Φ'_t	15.51°
15	Discharge nozzle diameter	D_d	264 mm

A. Modelling of Centrifugal Pump

The three dimensional centrifugal pump is created by using Solidworks Software.

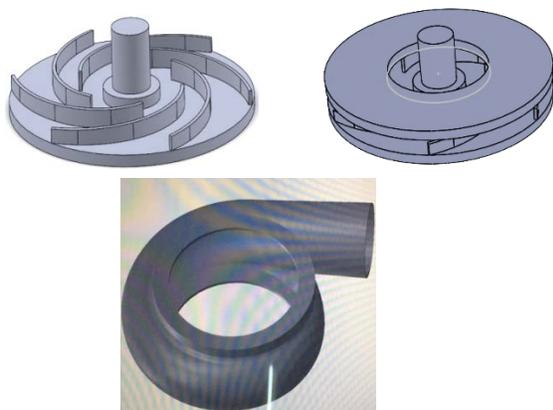


Fig.5 Three Dimensional View of Impeller and Casing

IV. IMPELLER PATTERN MAKING PROCESSES

The design of wood pattern of impeller for 6 hp output makes by using OPTIMUM F105(CNC MILLING MACHINE). After that it uses in the sand moulding to do the foundry process. Finally, the impeller casting produce from foundry was machining with Lathe machine.



III. DESIGNED RESULTS OF CENTRIFUGAL PUMP

A. Calculated Results

The calculated results for both impeller and casing design of centrifugal pump are clearly expressed in Table I.

Table I

CALCULATED RESULTS OF SINGLE-SUCTION CENTRIFUGAL PUMP DESIGN



Fig.6 (a) 3 Axis CNC Milling Machine, (b) Impeller Core, (c) Final Product of Impeller

V. DESCRIPTION EXPERIMENTAL SET UP

(a) (b)

(c)

Fig. 6 (a) 3-axis CNC Milling Machine, (b) Impeller Core, (c) Final Product of Impeller

VI. DESCRIPTION OF EXPERIMENTAL SET UP

The description of experimental set up is single suction centrifugal pump with coupling a 18 hp diesel engine. It consists of main components such as impeller, volute casing, gate valve, discharge pressure gauge, suction pressure gauge, suction pipe, 200 gallons fiber tank and supply lake. A speed measurement device (Tachometer) use to measure in pump designed speed operation. Also stop watch is as a timer to take time in filling water tank with discharge water.





Fig.7 Description of Experimental Observation

VII. PERFORMANCE ANALYSIS AT CONSTANT SPEED OF IMPELLER

Performance Characteristic curves of actual head and efficiency on capacity are presented at the design speed of impeller in Fig 8. The actual head is achieved by subtracting of shock losses, diffusion losses, friction losses, circulatory flow effect, leakage losses and mechanical losses from the theoretical head.

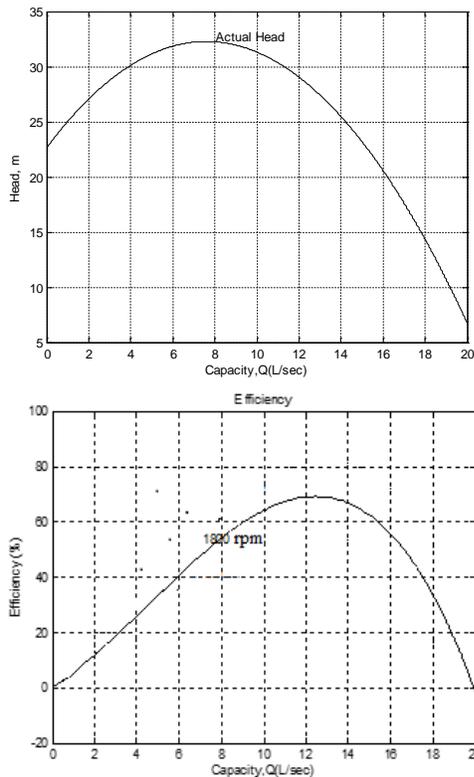


Fig. 8 Performance Characteristic Curves of Actual Head and Efficiency on Capacity in designed Speed

VIII. PERFORMANCE RESULTS AT CONSTANT SPEED OF IMPELLER

Table. II

EXPERIMENTAL RESULTS IN EIGHT POINTS GATE OPENING

Sr. No	Gate Opening	Discharge Pressure MN/m ²	Head (m)	Time (Sec)	Q (Lit/ sec)	Efficiency (%)
1	Fully Opened	0.010	1.019	32	28.317	6.323
2	6/7	0.035	3.5680	33	27.459	21.47

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3	5/7	0.050	5.0970	34	26.651	29.77
4	4/7	0.080	8.1550	36	25.171	44.98
5	3/7	0.100	10.194	37	24.490	54.71
6	2/7	0.150	15.291	42	21.575	66.67
7	1/7	0.170	17.329	60	15.102	57.35
8	Fully Closed	0.190	19.368	0	0	0

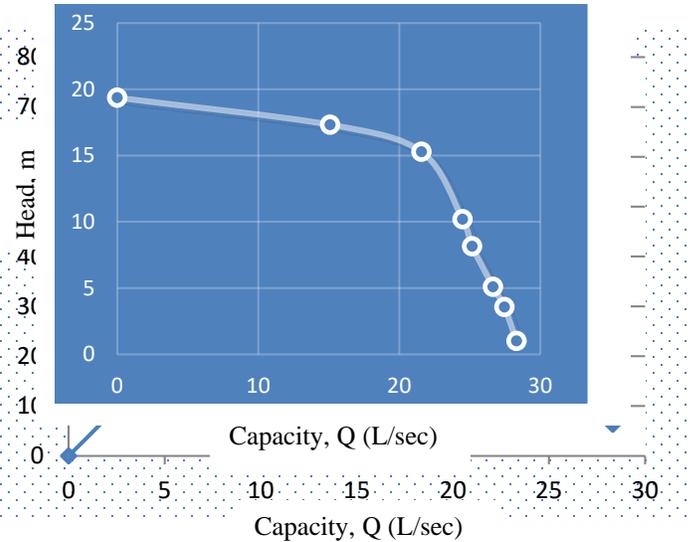


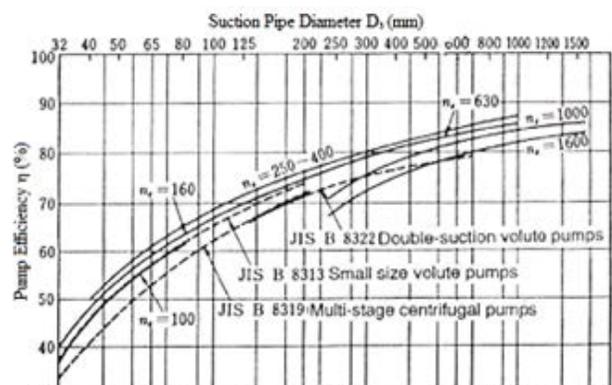
Fig. 9 Performance Characteristic Curves of Head and Efficiency on Capacity in designed Speed

IX. CONCLUSION

The designed pump is intended to use in agricultural application especially for river pumping project. The clearance between impeller and tongue of volute is 3 mm. The diameter of discharge flange is 80 mm. The thickness of volute casing to withstand the discharge pressure, 6 mm is selected depending upon the suction pipe diameter. If the performance is predicted, the maximum efficiency has nearly 65%. From Fig 8, the designed centrifugal pump satisfies for head of 20 m and capacities of 15 L/sec at speed of 1800 rpm. This pump is observed at design speed 1800 rpm by setting up the throttling valve in discharge nozzle with 8 points opening. In each point, impeller operates at constant speed. Under the test run the pump head is reached to 19 m of head at fully closed position. Before the maximum shut of head at 1/7 gate opening, the capacity of water is being in design flow rate. According to the experimental observation, the maximum pump efficiency is 66.67% at 15.29 m of head and 21.575 L/sec of capacity. Therefore this paper recommends the designed pump is capable to do nearly in designed head and flow rate.

APPENDIX

A.FIGURE



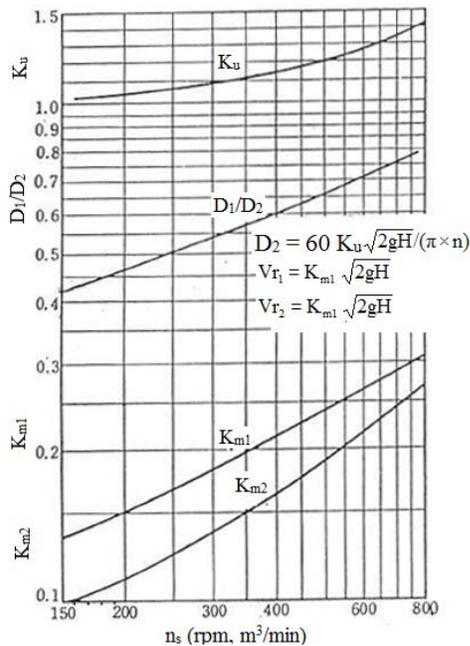


Fig. A2 Stepanoff Chart

[7] Christian Brix Jacobsen, “Centrifugal Pump”, Department Head, Structural and Fluid Mechanics, R&T,

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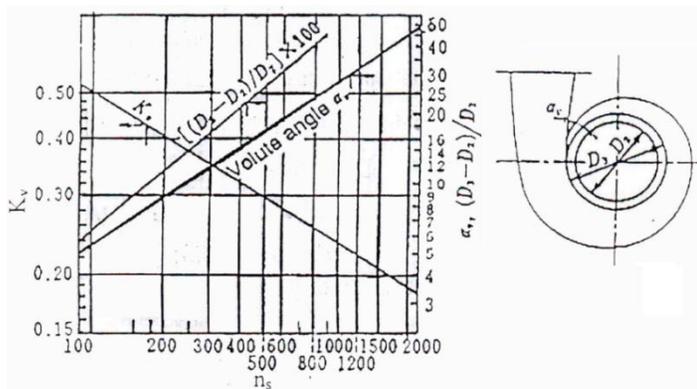


Fig. A3 Design Parameters for Volute Casing [3]

ACKNOWLEDGMENT

The author would like to express his special thanks to Nay Win Sein, Associate Professor, Department of Mechanical Engineering, Technological University (Mandalay) for his valuable experience in production area, Cho Cho Khaing, Associate Professor, Department of Mechanical Engineering, Technological University (Mandalay) for her advice and some under graduate students for collaboration in observation test.

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Contemporary Challenges on Definition of Civilian in Hostilities in the face of New Technologies

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DOI: 10.29322/IJSRP.9.08.2019.p92147

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92147>

Abstract- The current war fronts are something different from the earlier battle field. Modernization of the world differentiates the strategies of wars, methods of wars and planning of achieving the military benefits. Therefore the earlier laws do not fit with the current war front. Therefore, the objectives of this research are analyzing the contemporary developments in the battle field, how do they all affect the definition of civilian and whether the earlier laws are sufficient for protecting and safeguarding the civilians during hostilities. Traditional method of war based on the progressive disappearance of the battlefield helped to define the direct participation based on the physical appearance in battle front. However, the modern war front is mostly technologically improved and computerized. Therefore the physical appearance is not an effective element under the modern battle field. Therefore defining civilians based on the direct participation and active participation is essential due to the changes in nature of the battle fronts. This paper has focused on the area where the contemporary challenges in defining the civilians and whether laws are sufficient to the developments on this area or not.

Throughout the research, the author finds that the combination of increased civilians in action and high tech methods of warfare has some challenges for the laws of armed conflicts and determination of category of combatant and civilian and these actions are beyond the level of direct participation in hostilities, amounting to the active participation. At the same time there are no adequate laws to protect the civilians, distinguish the combatants, civilians and military objectives in the modern battle space and balance the humanity and the military advancement. Finally, the author of the research suggests the suitable definition for civilian based on the term of active participation in hostilities and the law reforms in this area to meet the contemporary development in battle space.

Index Terms- Civilian, Direct-participation, active-participation, Hostilities, Geneva Convention

I. INTRODUCTION

According to law, the actions which gain the military purposes and advantages such as attacking or trying to capture members of the enemy's armed forces or their weapons, equipment or positions or laying mines or sabotaging lines of military communication are deemed to be the notion of 'direct participation'¹. On the flip side, activities which connect with civilians working in depots and canteens providing foods and clothing for the armed forces or in factories producing weapons cannot be considered as direct participation. These are the examples set aside by experts in international humanitarian law for defining direct participation. Nevertheless, the current war fronts are something different than the earlier battle field. Because of globalization and modernization of the world, strategies of wars, methods of wars and planning of achieving the military benefits can be different from earlier. Therefore it cannot be relied only the laws and examples which are suitable for earlier situations of war. Therefore analyzing the contemporary developments in the battle field and those how do they all affect the definition of civilian whether the earlier laws are sufficient for protecting and safeguarding the civilians from direct attack during hostilities.

The beginning of the twenty-first century has seen huge changes in the war fighting capacities of the modern military.² Traditional method of war based on the progressive disappearance of the battlefield helped to design the definition of direct participation. Alternatively, the modern war front is mostly based on the technologically improved and computerized, therefore physical appearance is not one effective element under the modern battle field. Therefore, defining civilians according to the direct participations and active participation is essential according to the contemporary necessities. This chapter has focused on the areas where the contemporary challenges in defining the civilians and whether laws are sufficient to the developments on this area or not.

II. THE NATURE OF MODERN COMBAT AND QUESTIONS ON NOTIONS OF DIRECT AND ACTIVE PARTICIPATION.

¹ www.casebook.icrc.org, ICRC Interpretive Guidance on the Notion of Direct Participation in Hostilities.

² Heather Harrison Dinniss, 'Cyber warfare and the laws of war' p.139

Modern battle field is different from the classical battle field. This battle field is transformed as battle spaces and two or even three dimensional warfare has been supplanted by virtual and four-dimensional armed conflict.³ Therefore the impact of the mode proximity is questionable element to decide directly participation in hostilities. In a forward edge of the battle area, when troops are engaging each other which makes great proximity and closer can be identified as direct participation. At the same time even an individual who does not engage in a combat in the immediate field but participates in the fray. In a battle spaces, the new technological advances that causes transparency, force mobility, command and control accuracy and range weaponry, therefore here proximity cannot be the *de jure* standard, useful, reliable and often dispositive evidence for direct participation. When in Iraqi front line when the US and British forces attacking on Iraq, in operation desert storm Allied forces and freedom strikes removed from the forward edge of the battle area (FEBA) had greater operational and strategic impact than military in immediate vicinity. Therefore here proximity is no longer helpful to decide whether such activities come under the direct participation or not. Therefore in modern conflicts, the proximity diminishes the scope of deciding the meaning of direct participation.

The technologically advanced militaries of the world can conduct offensive operations far awash from battle field and in a very secure areas hundreds even thousands of miles away. Thereby, it creates complicating view of opponent on deciding the fact of direct participation. In a case of air craft are maintained, loaded, launched and recovered in dangerous combat conditions. If a civilian engaged in that long and complicated process, then he is considered as active participation unambiguously. Because in strike air craft process, other than the air crews flying the missions have major role on that attack in hostilities. Therefore those civilians are no way a lesser part in hostilities. Thus proximity fails to assist to decide the definition of direct participation as modern technologies and strategies.

Contracts for the sale of arms before, during and after the armed conflict, a civilian is working as a seller. The question is arising on the status of the employees involved in that agreement. There are new developments on civilian employees of armed forces in positions vital to the success of combat operations. Earlier wars considered like civilian truck drivers, now modern war front expands the consideration on participation of civilian computer expert sitting in a place using remote and participating in a military operation. A functional approach to decide civilian category depends on types of activity undertaken by him.⁴ Even some criticized that it is difficult to distinguish an employee working under the weapon system and a cook providing food to the armed forces when all are wearing uniform.⁵

In the modern context, it is spread that the notion of computer network attack (CNA) which does not use the kinetic force. CNA is a part of the cyber warfare and cause injury, damage or destruction which is in sufficient intensity to construct a severe attack. The most computer operations are made by civilians. Therefore here the crucial question is that status of the civilian who operates the CNA Attacks. CNA participants must be considered as the direct participation.⁶ This is deeply discussed in following sub heading. These are the areas are developed in the battlefield from the traditional field. When the developments are occurred, the questions in laws and definition of Notion of direct and active participation also questionable. Categorizing civilians and combatants is difficult without any structural definition for these notions. Thus no constant practice for categorizing these two category of people in modern warfront.

III. CIVILIANIZATION OF THE MILITARY

Both 1907 Hague Regulation and the 1948 third Geneva Convention address civilians accompanying the armed forces⁷. After that civilians mingle with armed forces to get involve the hostilities.

3.1. Reasons for civilization.

There are three factors deciding the reasons for increasing civilianization of military. First is that civilians are cheap, because the armed forces invest far less time and money in the training and educational of civilians and the civilian work force. Additionally, the civilian workforce operates without supporting structure such as medical facilities to dining halls and barracks.⁸

Secondly the demand for Dow seizing military. This is motivated to save money. However the highly trained forces are better to the current threat environment. Militaries of Eastern Europe and the former Soviet Union are flared because of ineffective combat. Even the populations of these countries correctly contest the usefulness of the cold war legacy forces, and particularly given the vicious budgetary competition for government resources.⁹

Third is technology of warfare is out spacing the ability of most militaries to train and field operators and maintenance personnel. This technology intended command, control, communications, computers, intelligence, surveillance and reconnaissance. This a symmetrical advancements search superiority of intellectuals among civilians.

³ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.510

⁴ ICRC, Direct Participation in Hostilities under International Humanitarian Law, Report prepared by the International Committee of the Red Cross Geneva, September 2003, p.5

⁵ Ibid, p.6

⁶ Ibid.

⁷ Regulations Respecting the Laws and Customs of War on Land, annex to Convention (No IV). Respecting the Laws and Customs of War on land, Oct.18,1907,art 13,36 Stat.2277,1 Bevans 631; Geneva Convention III art 4A(4).

⁸ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.512

⁹ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.513

However, there are other reasons for using civilians in armed conflicts in western¹⁰ and southern Asian countries¹¹. Such are armed groups want to protect themselves from the enemy attack, trying to create an image of civilians are attacked by opposite military to international arena and trying to push opposite side into the violations of laws of armed conflicts, civilians have no combatant responsibility which should be followed in armed conflict and laws give more protection to civilian and nothing to combatant in battle field. These grounds increase the reliance on civilian and cause civilianization on military.

3.2 Practical issues in Civilianization

Narrow interpretations of the term direct participation legitimize the use of civilians in all but does not legalize direct application of force during hostilities. The civilians are employed by the military are hardly all desk works sitting in various ministries of defense. During operation Joint Endeavor Bosnia and Herzegovina, here, one on ten deployed personnel were civilian whereas during counter drug operations in Columbia, the ratio raised to one into five.¹² Civilianization can occur in one of two ways, through direct hiring and by contract.¹³ In United States follows these two methods to include civilians in military.¹⁴ Hiring the civilians is called as mercenaries which is prohibited under IHL.¹⁵

Many time contractors directly participate in combat operations. For example Halliburton as a huge defense contracting company, publicly advertises the services of facilities operations and maintenance, ownership and operation of defense facilities, construction of major military infrastructure, contingency worldwide deployment and support submarine and surface ship maintenance and support, aircraft and vehicle maintenance and support and logistics support at remote locations.¹⁶ Contractors have also been used to provide direct systems support to numerous other systems during hostilities including B-2, F-117, F-22, Global Hawk unmanned aerial vehicle and TOW anti-tank system.¹⁷

3.3.3. Civilianization Vs. laws under armed conflict.

Article 4 of Geneva Convention III defines prisoners of war, under that it is providing that who can be the legal combatant in hostilities. Such are members of armed forces, members of militias, civilian members in armed forces of military air craft crews, war correspondents, supply contractors, members of labour units or services... On the other hand Article 43 of Additional

Protocol I indicates members of armed forces or organized groups who shall be subject to an internal disciplinary system and shall comply with rules in IHL have the right to participate directly in hostilities.¹⁸ These hiring civilians and contractors to combat directly break the requirements of being members of armed group or force. Thus, they don't have right to combat. Therefore these civilians are considered as illegal combatants.¹⁹

Finally, hiring or contracting civilians to direct part in hostilities is called mercenaries is prohibited. Therefore they cannot be considered as lawful combatants. Because of non satisfaction of requirements as combatant, they can be considered as unlawful combatants. Due to the participation of these combatant original purpose of the war cannot be attained thus that activities are prohibited under IHL. Even such prohibition is there also, practically hiring civilians are happened in battle Field.

3.4 Armed Civilians and Human Shields

3.4.1 Involuntary Human Shields.

According to article 51(8) of Additional Protocol I of Geneva Convention law provides combatants shall not release the parties to the conflict from their legal obligation with respect to the civilian population and civilian. This denotes that involuntary human shields cannot be attacked directly and if attacked that would be considered under the proportionality principle and military necessity. Generally, involuntary human shields are used by States to protect the valid military objective. However, This does not render the individuals as direct participants in hostilities.²⁰

The approach in the United States Joint publication 3-60²¹ specifically provides that

Civilians may not be used as human shields in an attempt to protect, conceal or render military objects immune from military operations. It is apparent that they are not direct participants in hostilities. Therefore, involuntary human shields cannot be attacked directly like civilians.

3.4.2 Voluntary Human Shields.

Human Rights Watch has suggested that voluntary shields are similarly not directly participating in hostilities because "their actions do not pose a direct risk to opposing forces" and they are

¹⁰ <http://www.aljazeera.com>, news/war and conflict, "Syria's civil war explained from the beginning" on 14, April, 2018.

¹¹ <http://www.humanrightwatch.org>, "War on the Displaced Sri Lankan Army and LTTE Abuses against civilians in the Vanni."

¹² Lis L. Turner & Lynn G. Norton, "Civilians at the Tip of the Spear", 51 Air Force Law Review 1, 4 (2001)

¹³ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.514

¹⁴ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.51

¹⁵ Article 47 of Additional Protocol I of Geneva Convention of 1949.

¹⁶ See generally, Halliburton website at <http://www.halliburton.com/> cited by Michael N. Schmitt,

"Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.516.

¹⁷ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.516

¹⁸ Article 43(2) of Additional Protocol I of Geneva Convention of 1949.

¹⁹ Shoo you Zachary, "Between the Geneva Conventions: Where Does the Unlawful Combatant Belong?" <http://doi.org/10.1017/s002122370002772>

²⁰ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.521

²¹ Joint publication 3-60, Joint Targeting, 31 Jan 2013. <http://justsecurity.org>.

not 'directly engaged in hostilities'.²² Any how this interpretation of direct participation is narrow²³. Most importantly, the standard is participation in hostilities not engagement. Here the human shields are attempting to preserve a valid military objective from enemy combatants. In essence they are not different from point air defenses which are employed more to protect the target than the destroy attacking aircraft.²⁴

The participation of voluntary human shield is affecting on the achievement of military necessity which is one of the underlying purpose of the IHL. In the circumstances of participation of voluntary human shield would affect the balance of military necessity and protection of civilians. Therefore, they can be considered as directly participants in hostilities. Thus voluntary human shield would loose their protection under the definition of civilian. Then their death and injury need not to be considered with the proportionality calculation for voluntary participants.

3.4.3 Exceptional Considerations

Children who act as voluntary shields would be an exception to the above mentioned rule, because they have lack of mental capacity to form the intent to voluntarily shield military objectives.²⁵ At the same time, in the voluntary human shield and involuntary human shield can be categorized based on the intention to shield the military objects. Here the question is arising how to identify the intention and differentiated. Any how the intention is material therefore it should be identified then only it can be decided as, voluntary human shield are deemed as direct participants and other category is not considered as direct participants in hostilities.

3.5 Computer Network Attack (CNA)

3.5.1 What is CNA?

Department of Defense Dictionary of Military and Associated Terms defines computer network attack as, "operations to disrupt, deny, degrade, or destroy information resident in computers and computer networks, or the computers and networks or the computers and networks themselves".²⁶ Information operation is called as computer network attack. Information operations are "actions taken to affect adversary information and

information systems while defending one's own information and information systems."²⁷

3.5.2 CNA attackers and the direct participation.

CNA may involve new ways of fighting for example hacker activities, viruses, Trojan horses and worms. Attacks could be conducted from a distance through radio waves or international communications networks without physical intrusion beyond beyond enemy borders and without immediate physical damage.²⁸ CNA raises several questions on direct participation. CNA does not involve with launching of kinetic force because this attack will be occurred outside the context of traditional hostilities. However this non-kinetic attacks cause severe results than using traditional weaponry. Since computer network attack can cause actual injury, death, damage or destruction to enemy forces, those who conducting operations are unquestionably considered as direct participants.²⁹ Direct participation reasonably encompasses with CNA directed against the enemy's immediate war fighting capabilities. For instance, involvement in a computer network attack directed against enemy command and control facilities, surface to air missile systems and combat communications nets would constitute direct participation in hostilities.³⁰ Because of diminishing the military capabilities of opposition individuals who are conducting CNA have to be considered as direct participants. Therefore civilians and contractors to conduct CNA who involves many information in warfare activities are likely to engage in during armed conflict will amount to direct participation.

3.6 National references for civilian

3.6.1 United States

According to the US Department of Defense dictionary of military terms³¹, CNA is included under weapons system.³² Therefore in the modern era, technology decides everything about the powerful military.³³ Therefore those attacks and their operators are considered as direct participants in hostilities because of its causing severe harm.

when considering contractors in hostilities, Some limited service Guidance directs that permits contractors to wear military uniforms and equipment for safety or security in cold Weather

²² Human Rights Watch, International Humanitarian Law Issues in a Potential War with Iraq (20 feb 2003), available at <http://www.hrw.org/background/arms/iraq02020003.htm>.

²³ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.521-522.

²⁴ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.521

²⁵ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.522.

²⁶ Chairman, Joint Chiefs of Staff 1994,98

²⁷ Joint Chiefs to staff, Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms(12 April 2001) at 203. Operations that might constitute information operations include operations security, psychological operations, military deception, electronic warfare, physical attack, and computer network attack. See Joint Chiefs of Staff, Joint

Publication 3-13, Joint Docyrine for Information Operations.(9 oct 1998)at1-9.

²⁸ Knut Dormann, Computer network attack and international humanitarian law. Paragraph2

²⁹ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st Centaurus Armed Conflict. P.526.

³⁰ Ibid, P.527

³¹ US Department of Defense, Dictionary of Military and Associated Terms(as Amended through 20 march 2006)(Washington DC,2001)

³² For a contradicting view see Gregory F Introccia and Joe Wesley Moore'communications Technology, Warfare and the Law:Is the Network a Weapons system?(2006)479.

³³ Singer, 'Outsourcing War', P.W.Singer, CorporateWarriors: The Rise of the Privtized Military Industry (Cornell University Press, Ithaca, 2003).

Operations.³⁴ The United States took a remedial step in 2000 when congress passed the Military Extraterritorial Jurisdiction Act.³⁵ The acts subjects those persons employed by the US armed forces abroad including contractors to federal criminal prosecution. However the act did not cover fully. Therefore, they cannot be governed under the military jurisdiction and the commander may not enforce his orders on them". Therefore it is questionable that whether they are considered as direct participants or not. Even those should be considered as direct participants and illegal combatants according to IHL.

A US Army Judge Advocate General School guide states that "the contract technical adviser that spends each day working with members of an armed force to make a weapon system more effective is integrated with force and taking active role in hostilities and therefore may be targeted"³⁶. However there is no uniform guidance exists regarding the services of civilians who involved in hostilities in gathering and transmitting military intelligence, serving as a member of a weapon system crew or on a military air craft and conducting search and rescue. As Mr. Jays Parks noted that "the work of some civilians has become so critical to military success that those individuals are civilians in name and garb only".³⁷

Military manuals characterize civilians who engage in traditional intelligence gathering as direct participants. These modern civilian intelligence officers are more essential to the application of force than their more traditional counter parts. Nevertheless, there is no state practice even weight of scholarly opinion, that would treat them as direct participants, and there is no any serious suggestions for characterizing them in USA.

According this analysis, in USA, both active participants and the direct participants can be targetable. Their military manuals and national acts do not indicate that active participants are civilians and can be protected.

3.7 Does the law correspond to reality?

3.7.1 Issue 01

The existence of revolution in military affairs has been happened through the technological developments. Under that Information operations and computer network attacks have raised many challenges on laws of armed conflict.

One of the most pressing problem on the laws of armed conflict can be the status of personnel armed with CPUs and keyboards sitting at a desk a continent away,³⁸ The law of armed

conflict establishes a fundamental distinction between combatants and civilians.³⁹ All military objects are required to mark distinctive signs of the belligerent part.⁴⁰ There is a impossibility to distinguish a particular computer from which the attack is launched. One method of achieving such markings is that any computer network emanates from a designated military IP address.⁴¹ A form of electronic marking is already used for medical transports on radar or IFF technology intending to protect the object.⁴² In the age of computer net work attack range and visibility are no longer requirements for targeting and only the requirement is that computer to be marked as a military computer. When the internet is being searched by millions of software bots then it can be found easily whether that is connected with military network or not with IP address.⁴³

In 1992, US Department of Defenses and military computers came under attack from intruders an estimated 53 times.⁴⁴ By 1997 the annual number of attacks had risen to 780, that number had risen to alimony 40,000 times in 2002 through the computer network attack.⁴⁵ Therefore this is the example how does the computer networks attacks helps to attain the military advantages and targets. Therefore these must be legalized, at the same time the adequate laws must be there for regulating such attacks and distinguishing the civilians and combatants too. On the other hand, the high tech battle space there is no practical need for distinguishes.⁴⁶

3.7.2 Issue 02

During a computer network attack against military assists, the originator is either a lawful combatant or a civilian directly participating in hostilities, and he may be legitimately targeted.⁴⁷ Where a combatant engaged in a computer network attack where there is no physical proximity to opposing forces, thus the chance for mistakenly affect the civilians, therefore the requirement to wear a uniform and other distinctive marks should be there. If no chance for the misunderstanding, then no need to wear a distinguishing emblem is irrelevant.⁴⁸

3.7.3 Issue 03

The Sabotage by computer network attack utilized on a daily basis by civilian virus writers around the world. An attacker sends an email to the recipient which incorporates a virus or other malicious code, the code activities upon opening the email and damages information resident on the recipient's computer

³⁴ Department of Army, Regulation 715-9(29 oct 1999), at par 3-3e.

³⁵ Military Extraterritorial Jurisdiction Act, 10 U.S.C.3261(22nov 2000).

³⁶ Protecting Human Rights During Military Operations, 48TH Graduate Course Deskbook(International & Operational Law Department, The Judge Advocate General's School, United States Army, 2000) at 15-3, cited in Turner and Norton (cut. footnote 18) at 31.

³⁷ Parks (op.cot. footnote 7) at 132.

³⁸ Kenneth Watkins, *combatants, unprivileged Belligerents and conflicts in the 21st Centaurus.* (HPCR, Campridge, MA, 2003)

³⁹ See Nuclear Weapon case, p.257.

⁴⁰ Diendtein, Conduct of Hostilities(2nd edn) 45

⁴¹ Heather Harrison Dinniss, 'Cyber warfare and the laws of war' p.146

⁴² Additional Protocoll, Annex 1, art 8.

⁴³ Boys are used legitimately to create search engines, mailing lists, indexes etc.

⁴⁴ Schmitt, 'Normative Franework', 885 fn.25.

⁴⁵ James F Dunnigan, *The Next War Zone: Confronting the Global Threat of Cyber Terrorism*, 85.

⁴⁶ Heather Harrison Dinniss, 'Cyber warfare and the laws of war' p.147

⁴⁷ Heather Harrison Dinniss, 'Cyber warfare and the laws of war', p.148

⁴⁸ Mark R. Shulman, 'Discrimination in the Laws of Information Earfare'(1999) 37 ?

networks.⁴⁹ This would amount to a lawful rule of war and helping attain the military advancement. Here the computer system is used as a delivery device and cause directly damage which is caused by a civilian. However whether the individual considered as combatant or civilian is question under the IHL. Because there is a question on deciding whether the actor being physically present in the territory is a fundamental element of sabotage or not.

Tiramus Dinstein argued that the combatant must be physically located in an area controlled by the enemy.⁵⁰ Even there are more recent domestic cases indicates the computer intrusions are sufficient to prosecute on a civilian as a combatant.⁵¹ At the same time Baxter points out the purpose of destruction establishes the combatant status.⁵² Therefore in that civilian is considered as direct participation. And deemed as combatant no longer being civilian. Therefore, there are so many contradiction between experts in IHL because of inadequacy of law. Mere direct participation is given in treaty without any definition for such norm. Therefore no constant practice is there in its application.

3.7.4 Issue 04

The damages are caused by the reason of computer manipulation rather conventional arms. The ICRC Interpretive Guidance emphasizes 'electronic interference with military computer networks....whether through computer network attacks(CNA) or computer network exploitation (CNE)' as an example for direct participation and noted that during the expert meetings computer network attacks causing military harm to the adversary is regarded as part of hostilities'.⁵³ Thus the establishment and exercise of control by electronic means over military personnel and objects or over computer networks used by a majority of experts involves in the process.⁵⁴ Likewise the assistance of civilian contractors in the design and execution of computer network attacks, whether as coders or systems specialists would also constitute as direct participation or not is a question under IHL.⁵⁵

Knut Ipsen has argued on direct participation which includes use of weapons system in an indispensable function 'although he gives no guidance as to which functions should be considered indispensable.⁵⁶ Under that two questions are arising 1st is whether a system used for launching computer network attack is a weapons

system and 2nd is whether maintenance and support of that network constitute an indispensable function which amount to direct participation.⁵⁷ Under Ipsen's analysis, maintenance of a weapons system would be seemed as an act which has direct causal relationship with the harm done to the enemy and armed forces.⁵⁸ Schmitt argues that immediate maintenance and support nature and not to a routine may be seemed as direct participation.

3.7.5 Issue 05

The use of civilians is participation in hostilities by government intelligence agencies, such as CIA, DIA, NSA and National Reconnaissance Office. Some intelligence operatives are clearly participating directly in hostilities. The great example on using of Predator unmanned aerial vehicles armed with Hellfire missiles. In December 2001, The predator tracked fleeing Taliban vehicles and destroyed them with its own Hellfire missiles, before the victims realized that they were being followed.⁵⁹ In another attack in February 2002, a Predator with Hellfire was used to target Osama bin Laden at an area suspected of being an Al-Qaeda tunnel complex.⁶⁰ Therefore in these examples participation is there, but they are beyond the direct participation attacks were proceeded. According these circumstances there is no adequacy in laws like these advanced situations in modern battle field.

3.8 Conclusion

The combination of increased civilian inaction and high tech methods of warfare has some challenges for the laws of armed conflicts and determination of combatant and civilian. The chapter has been analyzed with some major areas which connect with civilians participations. The nature of modern battle space consists the technologically advanced military and computerized attacks. Thus the proximity cannot be the de jure factor to decide the direct participation in hostilities. Computer Network Attacks which connect with computer operations and are mostly made by civilians are sufficient to construct severe attacks. Therefore those cannot be considered as civilians and they have to be considered as direct participants in hostilities. Even there is no clear identification on every act which is performing by information technology support staff will amount to direct participation in hostilities and most would not meet the test of direct causation in the ICRC Interpretive Guidance, those activities cause severe

⁴⁹ Heather Harrison Dinniss, 'Cyber warfare and the laws of war', p.153.

⁵⁰ See section 2.2 below, Dinstein, *Conduct of Hostilities*(1st edn)209.

⁵¹ See generally Antonio Cassese, *International Criminal Law*(Oxford university press, 2003)277 citing *Rivard v. United States*(1967) 375 F 2d 882.

⁵² Baxter, 'unprivileged Belligerency', 336, citing *United States v. List et al*(1046) *Trials of War Criminals*, XI(1950),1245, *War Crimes Reports*, VIII(1949)56.

⁵³ ICRC, *Interpretive Guidance*, 48.

⁵⁴ ICRC, *Third Expert Meeting in the Notion of Direct Participation in Hostilities summary report*(ICRC, Geneva, 2005),13.

⁵⁵ Heather Harrison Dinniss, 'Cyber warfare and the laws of war' p.168.

⁵⁶ Ipsen, 'Combatants and Non-combatants' 67.

⁵⁷ Heather Harrison Dinniss, 'Cyber warfare and the laws of war' p.168.

⁵⁸ Note that is not a universal view. Although disagreeing with the merits of it Parks does not consider that the maintenance of the Swiss Air Force by civilian engineers would constitute direct participation under the terms of Additional Protocol I: Parks, 'air war and the law of war' fn.397, but Schmitt, 'Direct Participation', 508.

⁵⁹ Joseph Fitchett, "high tech weapons change the Dynamics and the Scope of Battle; war in the Computer Age," *International Herald Tribune*, 28 Dec.2001, at 1.

⁶⁰ Michael N. Schmitt, "Direct Participation in Hostilities" and 21st *Centaurus Armed Conflict*, P.519.

damages through the modern technologies. Therefore those acts should be deemed as active participations. In Civilianization of battle civilians are involving directly by way of context and hiring which are prohibiting under IHL. However, these methods are considered as direct participation and they are illegal combatants. There is question arising regarding the human shield in hostilities that whether they are considered as direct participants or active participants. It is concluded that because of intention of voluntary human shield, they can be considered as direct participation and involuntary human shields are not direct participants in hostilities for balancing military necessity and protection of civilians. When analyzing the contemporary challenges in defining civilians, there are so many questions are arising on distinguishing the technical military objectives and participations of civilians are beyond the level of directly part in hostilities. In those circumstances there are no adequate laws to protect the civilians and distinguish the

combatants, civilians and military objectives in the modern battle front. The developments should be there in battle front, at the same time directions and regulations should be given by adequate laws. Then only humanity and the military advancement can be balanced in war. Thus this chapter finally finds that there is no adequate laws to protect the civilians in armed conflicts.

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Evaluation of the nutrition knowledge of athletes in Sri Lankan Universities: Special references of University track & field athletes

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DOI: 10.29322/IJSRP.9.08.2019.p92148

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92148>

Abstract: *Nutrition knowledge is especially important to develop the mental and physical health. Nutrition knowledge, broadly defined, refers to knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations. The main purpose of the study was to evaluate sports nutrition knowledge in Universities sports students. Data were obtained from the 90 respondents which included the organizational manager and questionnaires were carried out with a range of people relevant to the field of study. In this research approach, explanatory research style and deductive research approach knowledge may need to be updated. The stratified random sampling method was used to collect data. Data collection occurred using a single case design, which includes questionnaire and Survey. SPSS software was used for the data analysis proceed. Nutrition knowledge questionnaire which was designed to study to examine athletes' knowledge. According to, nutrition knowledge can be grouped into three categories- Feeling towards nutrition statement, sources of information and experiences. Researcher tested a reliability validity test: Cronbach's Alpha 0.811. Researchers used Independent t-test and one-way ANOVA analysis to identify the difference between demographic factors and nutrition knowledge. Results suggest that Overall, 68.37% of participants achieved an NKS. The remaining 31.62% of participants is not received an NKS. There was no difference between sports nutrition knowledge among male student and female student-athletes and There was a difference between sports nutrition knowledge and according to universities. Collectively, participants responded they would be most likely to consult an athletic Trainer over other resources when obtaining current information regarding nutrition. Results indicate there is still a need for further sports nutrition education. Additionally, participants perceive that having a dietitian on their athletic staff would be advantageous for obtaining nutrition information and in achieving a healthier diet and improved performance.*

Key Words – Knowledge, Nutrition, Sport Athletes

1. INTRODUCTION

In general, neither athletes nor coaches have sufficient knowledge on nutrition to create an environment that can result successfully in enhanced performance and optimal health. The importance of nutrition education is increasingly recognized at present, and there is a consensus that people's food choices, dietary practices, and physical activity behaviors influence health. Nutrition knowledge was found low for the students enrolled in universities to become prospective teachers and coaches and they were not aware of the importance of the nutrition for performance.

A body without knowledge is like a house without a foundation (Hebrew proverb). The desire for knowledge, like the thirst of riches, increases ever with the acquisition of it (Laurence Sterne). Follow knowledge, like a sinking star, beyond the utmost bound of human thought (Alfred, Lord Tennyson) (dictionary, n.d.). Knowledge mean Information, understanding, or skill that

you get from experience or education. Awareness of something, the state of being aware of something. (Dictionary, 1828). Nutrition is an important component of any physical fitness program. The main dietary goal of active individuals is to obtain adequate nutrition to optimize their health and fitness or sports performance. (Ozdoğan & Ayse Ozfer Ozcelik, 2011)

2. METHODOLOGY

The most important stage of a study is the sampling and consequently it had to be handled properly. Therefore, the target group of this study was the track and field athletes in Universities. In the research, sample is represented by the track and field athletes who are arriving to University. Considering current athletes' participation one hundred and twenty (120) athletes were selected as sampling. In this case, stratified sampling was as followings.

Under stratified sample, the sample were consisting on three universities which have the best performance from SLUG¹. The stratified sample was used to administer questionnaire for athletes. While collecting data from above samples.

The questionnaire included the following components: basic nutrition knowledge and sports nutrition knowledge, personal feelings towards sports nutrition statements, sources used to obtain current nutrition information and sports nutrition experience.

Different methods were not used to execute this questionnaire and it was created in one same pattern. Because the researcher did not have an opportunity to understand their education level and psychological level as they could be different. Moreover, Likert scale selection method was employed in this questionnaire for the convenience of the analysis

Table 1: Components of the questionnaire

Variables	Question Numbers	Total number of question
Nutrition knowledge	Q1-Q27	27
Feeling towards sports nutrition statements	Q28-Q33	06
Sources of nutrition information	Q34-Q40	07
Sports nutrition experience	Q46-Q52	07
General Question	Q41-Q45	05
Total Number of Questions		52

It is explained below how the questionnaire was processed in a systematic way in order to get useful information the survey.

The basic nutrition and sports nutrition statements were scored following the system used by Nordstrom et al. Statements answered correctly were given a score of 1, and statements answered incorrectly, including those with the answer “Don’t Know,” were scored as 0. The overall score was referred to as the Nutrition Knowledge Score (NKS).

Statistical Package for the Social Sciences (SPSS) version 22.0 was utilized to analyze the data gathered. The means of the NKS for each year 1st, 2nd, 3rd & 4th group were calculated. A one-way analysis of variance (ANOVA) was conducted to examine the NKS between each of the year. A t-test determined whether any knowledge differences existed between males and females. The Likert-scale statements regarding feelings towards sports nutrition statements and the sources from which participants indicated they currently receive nutrition information were assessed using descriptive statistics, and a one-way ANOVA was done to

¹ Sri Lanka University Games

compare the responses between years. Participant characteristics and demographics and questions regarding experience with a dietitian were evaluated using frequencies and descriptive statistics. A *p* value with a significance of < 0.05 was used for comparison.

3. ANALYSIS OF THE DATA

A summary of Participant characteristics and demographics are displayed in below table.

Table 2: Summary of Participant

Characteristic	Category	N	%
Gender	Male	45	50
	Female	45	50
University	Jayawardhanapura	30	33.3
	Sabaragamuwa	30	33.3
	Peradeniya	30	33.3
Academic Year	1 st Year	12	13.3
	2 nd Year	30	33.3
	3 rd Year	25	27.8
	4 th Year	23	25.6
Faculty	Agriculture	20	22.2
	Applied Science	10	11.1
	Art	29	32.2
	Management	23	25.6
	Science	8	8.9
Current Residence	On campus	50	55.6
	Off campus	40	44.4

Feeling towards sports nutrition statements

Mean scores and standard deviations representing participants' feelings towards six statements pertaining to sports nutrition are displayed in below table. Most participants agreed to the statements that the food an athlete consumes is likely to affect his or

her performance ($1.88 \pm .65$) and that nutrition counseling would be important to the athlete who is trying to change his or her weight ($2.03 \pm .741$). Having a dietitian/nutritionist on their team's staff does or would help them achieve a healthy diet (2.12 ± 0.762) and Having a dietitian/nutritionist on their team's staff does or would help them improve their athletic performance (2.52 ± 0.915). Participants tended to remain neutral towards the statement the caffeine has been shown to improve endurance performance ($2.53 \pm .997$). Many participants disagreed with the statement that learning about nutrition is not important for athletes because they eat so much food they always get the nutrients their bodies need (3.07 ± 1.149).

Table 3: Feeling towards sport nutrition knowledge

Statement	N	Mean ± SD
Caffeine has been shown to improve endurance performance.	90	2.53 ± 0.997
The type of food an athlete eats affects his or her performance.	90	1.88 ± 0.650
Learning about nutrition is not important for athletes because they eat so much food they always get	90	3.07 ± 1.149

the nutrients their bodies need.		
Nutritional counseling would be important to the athlete who is trying to change his or her weight.	90	2.03 ± 0.741
Having a dietitian/nutritionist on my team's staff does or would help me achieve a healthy diet.	90	2.12 ± 0.762
Having a dietitian/nutritionist on my team's staff does or would help me improve my athletic performance.	90	2.52 ± 0.915

Sources of nutritional information

Displayed in below table are the means and standard deviations corresponding to the resources in which participants indicated they would be likely to use to obtain current nutrition information.

Table 4: Sources of nutritional information

Resources	N	Mean \pm SD
Athletic Trainer	90	2.06 \pm 0.952
Coach	90	3.26 \pm 1.268
Academic Journals	90	3.52 \pm 1.183
Magazines	90	3.67 \pm 1.180
University Nutrition/Health Courses	90	2.67 \pm 1.006
Dietitian/Nutritionist	90	2.37 \pm 0.953
Physicians	90	2.08 \pm 0.915

As a group, participants selected athletic Trainer as the resource they would be most likely to consult, as represented by

a mean of 2.06 \pm 0.952. Physicians (2.08 \pm 0.915), Dietitian/Nutritionist (2.37 \pm 0.953), University Nutrition/Health Courses (2.67 \pm 1.006), and coaches (3.26 \pm 1.268) completed the top five resources. Academic journals (3.52 \pm 1.183) and Magazines (3.67 \pm 1.180) were less likely to be selected as resources by participants.

Sport nutrition Experiences

Responses to the questions regarding sports nutrition experience are shown by Universities in below table. Most participants, regardless of universities, indicated they have not ever taken a college courses in which nutrition was included as part of the courses, have not practice sports activities in collaboration with the University of the institution or other non-club and have not also feeding through the knowledge of the institutions. Some participants (n = 48) indicated they have received education in relation to banned substances, on the other hand Some participants (n = 42) indicated they have not received education in relation to banned substances

When asked about whether their athletic department has a dietitian/nutritionist, approximately 72.2% (n = 65) of the participants responded “No” or “Don’t Know.” Approximately 27.8% (n = 25). Over greater than half of the participants in Jayawardhanapura and Sabaragamuwa Universities indicated their athletic departments have a dietitian/nutritionist. Fifty-three (53.9%) student-athletes indicated they had access to a dietitian/nutritionist elsewhere on campus.

Table 5: Sport nutrition Experiences

Experiences	Jayawardhanapura (n=30) (%)	Sabaragamuwa (n=30) (%)	Peradeniya (n=30) (%)	Total (n=90) (%)
Have you ever taken a college course(s) in which nutrition was included as part of the course(s)?				
Yes	16(53.3)	10(33.3)	09(30.0)	35(38.9)
No	14(46.7)	20(66.7)	21(70.0)	55(61.1)
Have you ever consulted with a dietitian/nutritionist concerning your diet?				
Yes	21(70)	25(83.3)	10(33.3)	56(62.2)
No	09(30)	05(16.7)	20(66.7)	34(37.8)
Does your athletic department have a dietitian/nutritionist?				
Yes	23(76.7)	29(96.7)	13(43.3)	65(72.2)
No/Don't know	07(23.3)	01(3.3)	17(56.7)	25(27.8)
If your team does not have a dietitian/nutritionist, do you have access to a dietitian/nutritionist?				
Yes	20(66.7)	20(66.7)	13(43.3)	53(58.9)
No	10(33.3)	10(33.3)	17(56.7)	37(41.1)
Have you received education in relation to banned substances? on campus?				
Yes	24(80)	14(46.7)	10(33.3)	48(53.3)
No	06(20)	16(53.3)	20(66.7)	42(46.7)
Do you also practice sports activities in collaboration with the University of the institution or other non-club?				
Yes	15(50)	11(36.7)	09(30)	35(38.9)
No	15(50)	19(63.3)	21(70)	55(61.1)
Have you also feeding through the knowledge of the institutions?				
Yes	06(20)	10(33.3)	08(26.7)	24(26.7)
No	24(80)	20(66.7)	22(73.3)	66(73.3)

Hypothesis is formulated to identify difference between demographic characteristics and Nutrition knowledge. In this case as statistical tool, independent t-test and one way ANOVA were used by the researcher.

The hypothesis that there would be a difference in sports nutrition knowledge between male student-athletes and female student-athletes was rejected. Using a sports nutrition knowledge questionnaire adapted from Hornstrom et al. (2011), no significant difference in knowledge was observed between gender. (Significance value/p = .966). Levene’s test was significant and significant value was .007. Therefore, population had variances among samples. The second hypothesis that there would be a difference between in sports nutrition knowledge and universities were accepted. Nutrition knowledge scores amongst Jayawardhanapura student-athletes were significantly greater than those of Sabaragamuwa student-athletes and Peradeniya student-athletes (F = 59.798, p = .000) in this study. Involving University athletes have also suggested Jayawardhanapura student-athletes have greater knowledge. Third hypothesis that there would be a difference between in sports nutrition knowledge and academic year of universities was rejected. no significant difference in knowledge was observed between academic year (F =.551, p = .649). The fourth hypothesis that there would be a difference between sports nutrition knowledge according to the faculty were accepted. Nutrition knowledge scores amongst Science and Applied Science faculties’ student-athletes were significantly greater than those of other student-athletes (F = 3.029, p = .022) in this study.

Overall, 68.37% (n = 62) of participants achieved an NKS. The remaining 31.62% (n = 28) of participants not received an NKS. The mean NKS for the entire sample was 17.78 ± 4.89.

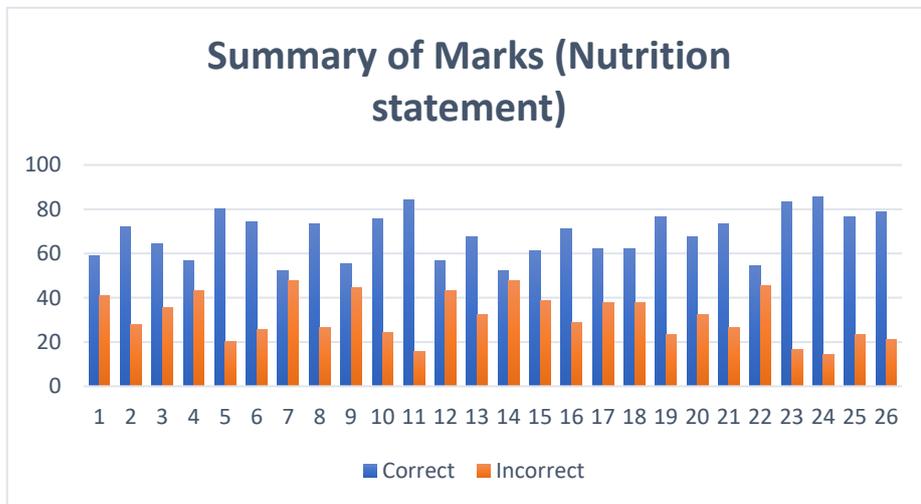


figure 1: summary of marks (nutrition statement)

4. DISCUSSION

This study evaluated sports nutrition knowledge and experiences with amongst track and field athletes across Universities. The first hypothesis was that there would be a difference in sports nutrition knowledge between male track and field student-athletes and female track and field student-athletes. Secondly, it was hypothesized that there would be a difference in sports nutrition knowledge between

track and field student-athletes across Universities. Then, hypothesis was that there would be a difference in sports nutrition knowledge between academic year. Finally, it was hypothesized that there would be a difference in sports nutrition knowledge between track and field student-athletes' faculties.

5. CONCLUSION

An evaluation of sports nutrition knowledge between male student-athletes and female student-athletes revealed that there was no significant difference in knowledge across gender. However, University of Sri Jayawardhanapura student-athletes had significantly greater sports nutrition knowledge than other university student-athletes. An evaluation of sport nutrition knowledge between student athletes across academic year first, second, third and fourth revealed that there was no significant difference in knowledge across academic years. However, Science faculty and Applied Science faculty student athletes had significantly greater sports nutrition knowledge than other faculty student athletes. Results indicated that there is still a need for further sports nutrition education in the University student-athlete population. Lastly, student-athletes indicated that having a dietitian on their athletic staff would be advantages for obtaining nutrition information and in achieving a healthier diet and improved performance.

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Root Canal Morphology of Mesio Buccal Root of Permanent Maxillary First Molar Teeth in Himachal Pradesh (India) Population, Using A - Tooth Clearing Technique

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DOI: 10.29322/IJSRP.9.08.2019.p92149

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92149>

I. INTRODUCTION

Those who have dissected or inspected many [bodies] have at least learnt to doubt; while others who are ignorant of anatomy and do not take the trouble to attend it are in no doubt at all". (Giovanni Battista Morgagni) .

Since prehistoric times, when people have had issues with their teeth, there have been other people there to help. How we care for our teeth has changed over the past several thousand years, and today we call the professionals who care for our teeth dentists. Evidence of dental decay has been found in teeth from skulls that are 25,000 years old and archaeologists have evidence of the first dental fillings in teeth from people who lived around 8000 BC.¹ Determining the racial affinity of an unknown individual from dentition for identification is indeed a difficult endeavor. However, there are certain dental characteristics which are predominant in certain racial groups and these contribute important indicators in the identification process. Inherited dental characteristics are modified by prenatal and postnatal environmental and nutritional conditions. They can also become less discernible due to admixture of the various races.² Recognition of variations in root canal anatomy is an essential prerequisite for successful endodontic diagnosis and treatment. The complexities of internal anatomy are often masked by the external surfaces, which have a relatively simple and uniform anatomy. Internal complexities of the root canal are genetically determined and have definitive importance in anthropology, thereby necessitating the identification of root canal morphologies of different ethnic populations.³ Dental caries, because of its ubiquitous nature, remains one of the most prevalent afflictions of mankind. This disease can aptly be termed as a scourge of modern civilization. No nation or continent has escaped the ill effects of this deadly malady.⁴ Permanent first molar teeth are frequently affected by caries at an early age and may require root canal treatment for long-term retention. The morphology of both permanent first molars has been studied and it is accepted that the mesial root of maxillary first molars and the distal roots of mandibular first molars often have more than one canal. In general, the second canal of the

distal roots of mandibular first molars is more easily located and treated than the second canal in the mesio buccal root of maxillary first molars which tends to be elusive.⁵ The maxillary permanent first molar tooth has been described as "possibly the most treated least understood posterior tooth". The form and number of root canals in the mesio buccal root is principally determined by the deposition of secondary dentine. Generally an important aid in detection of extra root canals is careful study of radiographs. However when dealing with maxillary first molars an extra mesio buccal canal is rarely seen on the original examination film, due to its small size and close relationship to the main mesio buccal canal.⁶ Various researches concluded that failure to find and treat existing MB2^{6,7} .canals would decrease the long-term prognosis. If the initial treatment was completed by the same operator, it would be very challenging to detect a missed MB2 canal in retreatment without new technology.⁸ False assumptions about the root canal anatomy of teeth may lead to misdiagnosis, improper debridement, step formation and breakage of instrument during root canal treatment. Problems faced during endodontic treatment of permanent molar teeth indicate the need for increased knowledge of the anatomy of root canal systems.⁹

II. AIM

To investigate the root canal morphology of mesio buccal root of maxillary first permanent molar teeth collected from various dental clinics in Himachal Pradesh (India) population.

III. OBJECTIVES

- To study
- (i) The morphology of Mesio buccal root.
 - (ii) To determine the frequency of Mesio buccal 2 canal in the mesio buccal root.
 - (iii) Root canal configuration using Vertucci's classification.
 - (iv) Presence and location of lateral canals and intercanal communications.
 - (v) Presence and location of apical Foramen.

IV. METHOD

Extracted teeth were collected from various government run and private clinics of Himachal Pradesh and then were stored in Chloramine T solution (HEZE Kingvolte chemical co.ltd. China). Hard and soft tissue deposits were removed with the help of ultrasonic scaler and scrubbed under running tap water. Samples were then kept in 5.25% Sodium Hypochlorite (Dentpro, Amrit chemicals Ltd, Mohali, Punjab, India) for 30 minutes for removal of organic debris. The pulp chamber was accessed using round bur (Mani) and Endo Z bur (Dentsply) in a high speed Air rotor hand piece (NSK Japan). Teeth were kept in 5.25% Sodium Hypochlorite (Dentpro, Amrit chemicals Ltd, Mohali, Punjab, India) for 30 min for the dissolution of the pulp remnants. After this the teeth were then washed under running tap water and kept overnight to dry. India ink (Himedia Laboratories Pvt. Ltd., Mumbai, India) was then injected into the root canals using syringe with 27 gauze needle (Sterican, Braun Medical India Pvt. Ltd., Mumbai, India) under negative pressure at the apical end using suction apparatus till the ink crossed the apex. After injecting the ink the teeth were kept to dry overnight. Samples were then kept in freshly prepared 5% Nitric Acid solution (Aries Laboratories, Ahmedabad, India) for 3 days for decalcification, the solution was changed daily, and manually agitated threetimes daily. Demineralisation was assessed with the help of radiovisiography. The decalcified teeth were then rinsed under running tap water for 4 hours and dehydrated in solution of 70%, 80%, 95% ethyl alcohol (Changshu Yanguan Chemicals, China) successively for 24 hours.

V. MATERIALS AND METHOD

Dehydrated samples were then placed in Methyl Salicylate (Vikas Pharma, Mumbai, India) to enhance translucency for 3 days and then observed under

Steriomicroscope for:

- (i) The morphology of mesiobuccal root.
- (ii) To determine the frequency of mesiobuccal 2 canal in the mesiobuccal root.
- (iii) Root canal configuration using Vertucci's classification.
- (iv) Presence and location of lateral canals and intercanal communications.
- (v) Presence and location of apical foramen.

VI. RESULT

1. The morphology of mesiobuccal root

The mesiobuccal root is broad bucco-lingually and slender mesio-distally.

ROOTS PRESENT:

Out of 600 permanent maxillary first molars 593 teeth had 3 roots (98.83%) 1 tooth had 4 roots (.16%)

6 teeth had 2 roots (1%) which had mesiobuccal and distobuccal roots fused but all had 3 separate canals.

VII. NUMBER OF APICAL FORAMEN:

Out of 600 mesiobuccal roots 312 roots have single apex. (52%)

Out of 600 mesiobuccal roots 288 roots have two or more canals (48%)

VIII. DISCUSSION

The clinical impact of missed anatomy can be clearly demonstrated with the large number of re-treatment case reports available in the literature; in the majority of these cases, failure of endodontic therapy is associated with untreated canal space. Localization and treatment of the missed anatomy typically leads to complete clinical and radiographic healing. Finally, untreated canal space may be associated with a remarkable variety of symptoms ranging from a symptomatic teeth to acute responses to hot and cold stimuli and from slight sensitivity to percussion and/or palpation to acute abscesses. The variability of symptoms and diagnostic and therapeutic difficulties make the treatment of missed anatomy a challenge for the general dentist.² Thorough knowledge of tooth anatomy and the incidence of aberrancy in regional population being treated by the dentist can thus be helpful. Tooth clearing technique has been used by various researchers since over 100 years to study the human dental pulp morphology. It is easy to perform, inexpensive and has considerable value in the study of root canal anatomy, for it gives a three dimensional view of the pulp cavity in relation to the exterior of the tooth. Combination of nitric acid and methyl salicylate was used in the present study as was found to be the best (Gupta et al 2014)¹⁴ for three dimensional view of root canal morphology. Regarding three separate root anatomy Cleghorn et al¹¹ analysed data from four anatomical studies and found that the maxillary molar normally has three roots (96.2% of 416 teeth) which is in coincidence with the results of our study that is, 1 tooth (16%) was found with four roots. The fourth root was conical in shape and about half the length of mesiobuccal and distobuccal roots and present between the distobuccal and mesiobuccal root. In the samples six teeth (33%) were found with fused roots (distobuccal and Mesiobuccal roots) and all of them had separate root canals¹. The result of study conducted by Yang et al⁹ found 2% maxillary molars with distobuccal and palatal root fused in Chinese population. No tooth was found with single root, rest 593 teeth had three roots which is in coincidence with our study³³. According to Cleghorn et al³⁵ two roots were found in 16 (3.8%) of the teeth studied, the incidence of one root or four roots is very rare and cannot be evaluated from case reports which support the results of the present study. Prevalence of MB2 in permanent maxillary first molar teeth of Himachal Pradesh population was found to be 65.16% which is supported by the study conducted by Gupta Vishesh et al¹⁹ in 2016, they reported the occurrence of 69.2%. Heeresh Shetty et al¹⁵ also reported the prevalence of MB2 in South Indian population to be 86.36%, also Kishore Gopalakrishna Naik et al (2016)²² by clearing method found 84% MB2, the higher incidence can be due to regional difference between north Indian and south Indian population. Wasti et al reported (2001)²¹ found the presence of 53% four root canals in three rooted 30 maxillary molars of South Asian Pakistani's by tooth clearing. Alavi et al(2002)¹⁷ reported incidence of 65% two root canals in mesiobuccal root of indigenous Thai population. The two separate canals till the apex 2-2 Vertucci's Class IV had the second largest prevalence 19% after Vertucci's Class I 34.84%

in the mesiobuccal canal. The 3-3 vertucci's class VIII was not found in any MB root canal while only 2 teeth presented with 1-2-1-2 type of root canal. Satoru Matsunaga et al⁶⁵ found that in maxillary first molar palatal roots, none of the canals were completely separated, and most of the canals were Type I, which are single canals. As for the incidence of root canals with ramifications, Type I-a, in which there are no accessory root canals, comprised 65.6 %, while Type I-b, which show apical ramifications, comprised 31.1 %. Type I-c, which shows lateral canals, demonstrated the lowest incidence at 3.3 %. The presence and location of apical foramen have a wide variance, the mesiobuccal root contain the maximum number of foramen. L. Benan Ayranci et al¹² also reported that the morphology of apical foramina in the Turkish population present highly complex anatomical variations. This study found that the mesiobuccal root had a single foramen in 315 (52.5%) teeth while 285 (47.5%) teeth had two or more than two foramen. Thomas et al (1993)⁶⁷ reported an occurrence of 46.3% two or more foramen. In the present study the apical foramen of the mesiobuccal canal did not open at the anatomical apex in 231 (38.5%) teeth in rest 369 (61.5) teeth the apical foramen opened at the anatomic apex. The recognition and management of canal isthmus and accessory root canals is a factor that may improve the success rate of surgical endodontic treatment. These anatomical structures can act as reservoir for bacteria or necrotic pulp tissue and may account for the failure of endodontic treatment. The present study shows intercanal communications in²³ mesiobuccal roots 16% and these isthmuses were present in middle third of the root. Weller et al⁸ presented the concept of a partial isthmus and reported a 100% prevalence of an isthmus at the apical 4 mm level of the MB roots with two canals. Teixeira et al¹² also found the incidence of canal isthmus was greatest at the apical 3 to 5 mm level of the MB root of maxillary first molars. Tam and Yu¹⁵ differentiated between the accessory root canals and canal isthmi and reported that 12.5% of the maxillary first molars have one or more accessory root canals located between the mesiobuccal (MB1) and the mesiolingual (MB2) root canal. It was observed that the mesiobuccal second canal was thinner than the main mesiobuccal canal. These mesiobuccal second canal (MB2) canals then followed a torturous route towards the apex to open at an independent apical opening which is present at a lateral position to the anatomical apex or join the main mesiobuccal canal to open as one apex. The clearing technique revealed that the complex anatomy and the tortuous pathway of the root canal system justify the difficulties in penetrating the entire length of the MB canal, showing that achieve patency in the MB2 canal is much more challenging than locating them. Achieving patency of MB2 canal is much more challenging than locating them. According to Tauby et al¹⁶ it was only possible to achieve patency in 50.9% on MB2 canals in the endodontic treatment of first molars,

IX. CONCLUSION

The result of our study concludes that the incidence of two or more canals in permanent maxillary first molars of Himachal Pradesh (India) population is about 65%. Keeping in view this higher prevalence of the second canal the clinicians should always rule out the presence of mesiobuccal II canal. The

presence of separate apical foramen in more than 48% cases necessitates that the MB II canal should not be left untreated to avoid failure of the endodontic treatment. The second mesiobuccal canal found in most of the cases was thinner and had torturous course with intercanal communications and lateral canals so the role of thorough irrigation protocol is necessary. Further more studies are required to demystify the maxillary molar teeth for a better understanding of the tooth morphology and get best results for its root canal treatments. e MB2 canal.

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Effect of Katuk Leaf Extract (*Sauropus Androgynus*) on Production and Quality of Friesian Holstein Peranakan Cow Milk in Enrekang Regency, Indonesia

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DOI: 10.29322/IJSRP.9.08.2019.p92150

<http://dx.doi.org/10.29322/IJSRP.9.08.2019.p92150>

Abstract- This study aims to determine the effect of giving katuk and gamal leaves to the production and quality of cow's milk at the beginning of lactation. This research was conducted in Enrekang District Dairy Farm using Randomized Block Design (RBD) with 4 treatments and 4 replications for each treatment combination. The total unit experiment is 16. The material used consists of forages (80%, 75%, 70%, 65%); concentrate (20% per treatment); gamal leaves (5%, 10%, 15%) and katuk leaves (130 g, 150 gr, 170 g). The tools used are cage equipment, milk measuring instruments (liters). The results showed that giving katuk leaves significantly affected milk production, crude protein, crude fat, potassium and phosphorus. Forage 65% + 20% concentrate + 15% gamal leaves + katuk leaves 170 gr / head increase milk production 10.92%, crude protein 3.89%, crude fat 3.69% calcium 0.42 and phosphor 0, 68% compared to other treatments. The results showed that katuk leaves in feed gave a good response to increase the production and quality of milk in dairy cows.

Index Terms- katuk leaves, production and quality, FH dairy cattle

I. INTRODUCTION

Milk is an important food ingredient in meeting nutritional needs. Besides being a high source of protein, milk also contains calcium which is important for bone formation ingredients. In cow's milk also contains essential amino acids which are important for the body's metabolic processes. Protein from cow's milk has an important role in the body as a regulator of metabolic processes, because proteins will be synthesized into various types of enzymes that function to regulate cell activity.

The level of production of cow's milk is strongly effected by the quality of feed given to cattle. The higher the quality of feed given, the higher the milk production from the cow. Cow milk production in smallholder farmers in Indonesia averages only 10-15 liters / day / head. The production level is still relatively low compared to the production of Friesian Holstein cow milk in the Netherlands which reaches 30-40 liters / day / head. This difference can be effected by the different genities between breeders in Indonesia and those in the Netherlands. other factors

that also effect milk yields, namely climate and management. It is known that in the European Continent has a cold climate, it affects the living needs of Friesian Holstein cattle which are very suitable in cold climates. Besides the effect of climate, cow milk production is also effected by good management levels. The management includes feed management, home management, time management and so on. The need for nutrition of Holstein Friesian breeders is very much supported by the quality of the feed provided. Feed quality will also affect the level of production and the quality that will be produced. In addition to the quality of feed, the level of milk production can also be affected by the presence of hormones. Hormones that affect the level of milk production, namely the hormone lactogen. The lactogen hormone will be secreted and produced when the dairy cow has undergone the birth process. And the number of lactogen hormones can also decrease when cows have long experienced the lactation process. It should be noted that katuk leaves (*Sauropus Androgynus*) have become the trust of the general public to increase and facilitate the production of ASI (Mother's Milk). In katuk leaves there is a substance called Laktogagum which functions as an enhancer and facilitator of ASI production. According to Selvi & Basker (2012) katuk leaves contain tannins, saponins, alkaloids, flavonoids, glycosides and phenols. Saponin compounds, flavonoids and alkaloids have a working mechanism to increase testosterone levels so that katuk leaves have the potential to be used as aphrodisiacs, which are sexual stimulants and increase libido low (Andini 2014). High prolactin levels will increase, accelerate and facilitate breast milk production. Inspired by the content in the katuk leaves which can increase milk production, the idea was to provide katuk leaf extract to the Friesian Holstein breeders. The results of the study by experts also said that the administration of katuk leaves in the Friesian Holstein breeders was able to provide a positive response to the increase in milk production. Levels of provitamin A carotene, vitamins B, C, protein and katuk leaf minerals are also high (Selvi and Basker 2012). The high content of provitamin A (β carotene) is one of the factors that play a role in increasing milk production, presumably because β carotene can improve antioxidant status in milk udder so that the function of epithelial aveolar cells is well preserved (Aréchiga et al. 1998).

The content of β carotene is an important factor for animal reproduction and has a specific function that cannot be replaced

by vitamin A (Vienna, 2008). The vitamin E content of katuk leaves is 426 mg / kg, besides the katuk leaf vitamin C is also quite high, which is 136 mg / 100 g dried (Petrus, 2013). Katuk leaves contain isoflavonoids of 143 mg / g which resemble estrogen and can slow down the reduction of bone mass. Katuk leaves also contain saponins which are efficacious as anticancer, antimicrobial and enhance the body's immune system. Katuk leaves are rich in chlorophyll which is equal to 8% of dry matter (Andarwulan et al., 2010; Andini, 2014). This research is expected to give responsibility to the treatment being tested.

II. MATERIAL AND METHOD

A. Research Sites

The study was conducted in Enrekang Regency. This study lasted 240 days. Measurement of samples for milk production is carried out in the field and analysis of the quality of milk is carried out in the Livestock Chemistry Laboratory, Faculty of Animal Science, Hasanuddin University, Makassar.

B. Research Material

The material used is forage consisting of forages (80%, 75%, 70%, 65%); concentrate (20% per treatment); gamal leaves (5%, 10%, 15%) and katuk leaves (130 grams, 150 grams, 170 grams). use 16 dairy cows, with a body weight of 300-400 kg, with lactation of 1-6 months. The equipment used by salther scales to measure the amount of feed consumption, measuring cup for measuring milk production in liters, buckets for storing milk during milking and plastic bottles to take milk samples and other equipment.

C. Research Design

The study used a Randomized Block Design (RBD) with 4 treatments and 4 replications (Gomez and Gomez, 2015) consisting of, Treatment P1 = Forage 80% + 20% concentrate, P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 grams of katuk P3 leaves = Forage 70% + 20% concentrate + 10% gamal leaves + 150 g katuk leaves, P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 gram leaves katuk.

D. Method of Collecting Data

The research cows were given forage, gamal leaves, concentrates and katuk leaves for one month continuously for adjustment and data collection carried out for 14 days. Each cow is placed in an individual cage randomly and given an estrak katuk leaf that has been mixed with elephant grass (*Pennisetum purpureum*), gamal and concentrate. The changes observed were: a) Milk production (measured by liters) milking twice a day (milk amount milking results in the morning and evening), b) At the end of the study each treatment was taken 0.25 liters of milk each in the morning and evening milking to analyze the quality of milk, fat content, protein content and minerals (calcium, phosphorus,) The data obtained was processed and analyzed by variance analysis according to the Randomized Block Design (RAK) pattern, (AOAC, 1984).

E. Data Analysis

Data were analyzed using SPSS 16 Software Program based on Randomized Block Design and Repeated by 3 times.

III. RESULT AND DISCUSSION

Milk Production

The results of the study regarding the effect of katuk leaves on the production and quality of FH dairy cow milk can be seen in Table 1 as follows:

Table 1. Average Milk Production (l / tail / day) in Holstein Fries (FH) Dairy with supplementation, forage, gamal leaves and katuk leaves (*Sauropus androgynus*) at different levels.

Deuteronomy	Treatment			
	P1	P2	P3	P4
1	5,44	5,60	9,25	10,88
2	6,65	7,12	10,45	11,06
3	6,99	7,18	9,89	11,43
4	7,81	9,10	10,05	10,34
Total	26,89	29,00	39,64	43,71
Averag	6,72±0,	7,25±0,	9,91±0,	10,92±
e	25 ^a	36 ^b	64 ^c	0,59 ^d

Description: Different superscripts on the same line show a significant effect (P <0.05)

P1 = Forage 80% + 20% concentrate P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 gram katuk leaves P3 = Forage 70% + 20% concentrate + 10% gamal leaf + 150 gram katuk leaves P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 grams of katuk leaves

Based on Table 1 shows that giving katuk leaves (*Sauropus androgynus*) at different treatment levels significantly affected FH dairy cow milk production. The highest average milk production (liters / head / day) during the study on treatments P4, P3, P2, and P1. This production average shows an increase in milk production, where the increase from P1 to P2 is 0.53%, P1 to P3 is 3.19%, and P1 to P4 is 4.2%. Dairy cow milk production in this study is classified as low, because the age range of 2-3 year dairy cows is young and is in the lactation period I and II. The results of Marwah's research (2010) state that the nutrients present in katuk leaves in the form of proteins and other active substances can effect the increase in milk production. This means that by giving katuk leaves to dairy cows, it can increase milk production and can meet the nutritional adequacy needed both in basic living needs, milk production and the need for growth for young livestock. However, the results of this study did not show a significant effect on the increase in milk production of FH dairy cows, this was due to the low level of katuk leaf administration.

Suprayogi A. et al. (2013) said that the dose of IPB-3 product with a dose (dose) was given per consecutive day in each group of 100g (P-100), 150g (P-150), 200g (P-200), in cattle milk approximately 10 days before birth until approximately 2 months the results show a good response to milk production parameters. It also strongly supports his research that was conducted in 2000 that the efficacy of katuk leaves on milk production in lactating sheep, although the study still used 70% crude alcohol extract and the

suspension of katuk leaves dried but gave a good response. Another study also using the katuk leaf hexane fraction also showed signs of increasing milk production compared to the control group in experimental lactation mice. (suprayogi. 2015) Until now it has been known that the active compounds in hexane (nonpolar) solvents are active compounds that play a role in increasing milk production.

Quality of Milk

The results of the study on the effect of katuk leaf supplementation (Sauropus androgynus) on the milk quality of Holstein Friesian (FH) dairy cows in Enrekang Regency can be seen in Table 2.

Table 2. Coarse Protein and Coarse Fat, Calcium, and Phosphorus of FH Dairy Cow milk by giving different leaf levels of katuk.

Variable	Treatment			
	P1	P2	P3	P4
Crute protein (%)	3,08 ± 0,13 ^a	3,48± 0,35 ^b	3,65 ± 0,33 ^c	3,89 ± 0,72 ^d
Fat Grade (%)	2,31 ± 0,28 ^a	3,12 ± 0,17 ^b	3,19 ± 0,48 ^c	3,69 ± 0,35 ^d
Calcium	0,11± 0,18	0,12 ± 0,15	0,13 ± 0,38	0,14 ± 0,46
Phospor	0,14± 0,18	0,15 ± 0,27	0,15 ± 0,58	0,19 ± 0,45

Description: Different superscripts on the same line show a significant effect (P <0.05)

P1 = Forage 80% + 20% concentrate P2 = Forage 75% + 20% concentrate + 5% gamal leaf + 130 gram katuk leaves P3 = Forage 70% + 20% concentrate + 10% gamal leaf + 150 gram katuk leaves P4 = Forage 65% + 20% concentrate + 15% leaves of gamal +170 grams of katuk leaves

Crude protein

Based on the results of the study (Table 2) showed that the treatment with katuk leaf administration had a significant effect (P <0.05) on crude protein, crude fat. The results of this study indicate that there is an increase in the quality of milk, especially in crude protein content. It can be assumed that katuk leaves can maintain milk protein content even though it has not shown a higher number. Increased levels of protein in milk depends on the intake of protein in animal feed which forms amino acids and is absorbed by the body through blood (Mugen, 1987). The value of milk protein is effected by the administration of concentrate. The higher the concentration, the higher the level of milk protein (Sukarni 2006). In addition, the results of the Garantjang and Mide (2011) study state that katuk leaves added to feed can increase milk protein for dairy cattle. The addition of katuk leaves gives a positive response to the quality of milk.

Milk protein is determined by the nutritional content of food intake during the period before and after childbirth. The content of milk protein levels is positively correlated to feed energy, especially soluble carbohydrates. Its availability facilitates the

formation of propionate so that it reduces the need for amino acids for gluconeogenesis which makes amino acids more available in the small intestine and protein synthesis in milk cells (Dwicipto, 2008).

Fat Grade

The average crude fat content of milk in each treatment is shown in Table 2. Milk Fat Grades in each treatment showed values above SNI where SNI standards were 3.00 (SNI, 2011). This is because the nutrient consumption of feed in the ration is sufficient for the needs of FH dairy cows, because milk Fat Grades are effected by the nutrients contained in the feed. If the amount of feed given has a low quality, it will affect the quality of FH dairy cows. Dwiyanto (2011) reports that milk Fat Grades are different, effected by several factors such as nation, individual, lactation stage, season, nutritional status, feed type, health and age of livestock. Foods with low crude fiber content can reduce milk Fat Grades and also reduce milk production slightly.

Milk Fat Grades are effected by various factors including the availability of milk fat forming precursors, where the main precursors are acetic acid and beta-hydroxy butyrate. Ghani (2010) continued, which states that milk Fat Grades are effected by feed because most of the milk components are synthesized in the udder from simple substrates derived from feed. Forage feed is closely related to the fat content of milk, because the fat content of milk is effected by the production of acetic acid in cattle rations derived from high-fiber, crude fibrous feed ingredients.

Calcium and phosphorus levels The results of the variance analysis showed that katuk leaves at levels that were not significantly different (p > 0.05) on calcium and phosphorus. The highest mineral (Ca, and P) content in treatments P4, P3, P2 and P1. The results obtained indicate that the levels of Ca and P in milk are still normal or still in accordance with the standard, in accordance with the opinion of Rahman et al. (1992) that mineral elements in milk are relatively present in a fairly high concentration of Ca: 0.112% , P: 0.095%, K: 0.138%, Mg: 0.013%, Na: 0.095%, Cl: 0.109% and S: 0.01%. This is reinforced by Anonim (2002) that milk for dairy cows is rich in minerals Ca, P, K, Cl and Zn, but low in minerals Mg, Fe, Cu and Mn. Mineral element Ca is not found in the katuk leaf supplement composition used . Even so, the mineral content of Ca obtained from the supplementation of sweet potato leaves in milk is still less than the control treatment with a difference of 14% and 13% at levels 3 kg and 6 kg, respectively. The low mineral content of Ca in katuk leaf supplementation may be caused by Ca content in animal feed such as legumes in this case gamal and grasses which are supplemented with katuk leaves have been fulfilled or sufficient. In accordance with the opinion of Anonim (2002) that legumes are usually rich in minerals Ca,k, Mg, Fe, Cu, Zn, Co, Ni and S, then the grass contains a lot of minerals Ca, Mg, Fe, Zn, Mn, Mo and Si. This is then reinforced by the opinion of Hadiwiyoto (1994) that the Ca content in milk is constant. Efforts to increase the Ca content in milk by providing foods that contain a lot of Ca salt cannot have a real effect.

In the supply of dairy cow feed ingredients must consider the factor of palatability, nutritional value, availability and not compete with human needs and affordable prices. Dairy cow feed should consist of two feed groups, namely forage feed and concentrate feed. Forage is the main food for ruminants because

through fermentation in the rumen by microbes, and can provide energy to meet basic life needs. While feed concentrate is a mixture of feed ingredients that are rich in energy and protein, which is useful for increasing the quantity and quality of lactating dairy cows. The composition of milk can change at each level of lactation where very large changes occur at the beginning and end of lactation (Saleh, 2004).

IV. CONCLUSION

Based on the results of the study it can be concluded that giving katuk leaves to the level of 170 grams / head / day increases milk production to 45% and the quality of FH dairy cows especially protein levels and milk fat levels. But it did not significantly affect the mineral content of calcium and phosphorus. The use of katuk leaves as a supplement in the dairy ration at levels above 170 grams / head / day will probably show more significant results, but further research is needed to determine the maximum leaf level of katuk on improving the quality of milk in FH dairy cows.

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