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Research on the Impact of Chinese Investment on Cambodian Economy

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Abstract- With the establishment of the China-ASEAN Free Trade Area and the deepening of bilateral economic cooperation, especially the implementation of China's "One Belt, One Road" strategy, more and more Chinese companies have entered Cambodia, and their investment in Cambodia is increasing and investing. The quality is also increasing. While China's investment in Cambodia continues to deepen cooperation between the two sides, it also has an important impact on Cambodia's economic development and growth. Especially with the support of the preferential policies of the Chinese and Cambodian governments, the impact of Chinese investment on the Cambodian economy has become more and more obvious. In this context, what is the development of China's investment in Cambodia and the environment in which Cambodia attracts Chinese investment? What is the impact of Chinese investment on the Cambodian economy? What is the specific impact? It is a very practical question worth exploring. This paper uses literature analysis, empirical research and other methods to analyze the impact of Chinese investment on the Cambodian economy from both theoretical and empirical aspects. Firstly, the related background, significance, purpose, and method of this research are introduced. At the same time, the related research literature at home and abroad are summarized and the relevant theoretical foundations are summarized, which lays a solid theoretical foundation for the specific research of this paper. The quantity, region, and industry analysis the status of China's investment in Cambodia. Then it analyzes the impact of Chinese investment on Cambodia's economic from both theoretical and empirical aspects. Finally, according to the research results, it proposes to promote further China's investment in Cambodia and Cambodia, economic policy recommendations.

Keywords- Chinese investment; Cambodia; Economic; Impact.

I. INTRODUCTION

Since the 1990s, the economies of all countries in the world have developed rapidly, and China has followed the pace of globalization. China has proposed a strategy of utilizing the resources of both domestic and foreign markets. China hopes that its enterprises will be able to step out of the world. One of the strategies. Since 1998, Chinese companies have begun to go abroad, especially in Southeast Asia. China has developed a "One Belt, One Road" strategy to open up the economy to the world and to achieve win-win and inclusive cooperation with all countries. On the stage. At present, China has already achieved more success in the process of going out of more and more enterprises and has much promoted the economic development of local countries or regions. In this context, China-ASEAN economic cooperation has deepened and China's investment in Southeast Asia has increased. China's investment in Southeast Asia has also become a hot issue in theoretical and academic research. Although the theoretical circles have rich research on Chinese investment and ASEAN, there are still few studies on Chinese investment and Cambodia, and there is no direct research on the impact of Chinese investment on Cambodian economy. Therefore, this study can theoretically enrich and improve the research content of the role of Chinese investment in Cambodian economic development. At the same time, it will analyze the practices and policies of attracting investment in Cambodia., which can also provide theoretical guidance for Chinese enterprise investment and the introduction of Chinese capital in Southeast Asian countries.

II. CHINESE INVESTMENT AND CAMBODIAN ECONOMY

Cambodia is not only an essential member of ASEAN, but also a relevant country along the Belt and Road in China. The development of trade relations between China and Cambodia is also very rapid. China has invested heavily in the Cambodian market and has made significant contributions to the economic development of Cambodia.

Chap Sotharith (2010) compares and analyzes the status of foreign trade, foreign investment, foreign aid cooperation and economic effects of China, Japan and South Korea during the period 1994-2009, and believes that China has a positive impact on Cambodia's social and economic recovery and growth. Cambodian scholar Song Chunben (2012) summarized the current situation of Cambodia-China trade in the article "Strengthening China-Cambodia Economic Cooperation" and made recommendations for strengthening trade relations between the two countries.

Li Weiguang (2016) pointed out that in recent years, China has paid more and more attention to the economy of ASEAN countries. The economic exchanges between the two countries have become more frequent. Investment has become one of the critical forces for ASEAN to attract foreign investment. China has invested in ASEAN countries. The increase shows that China is paying more and more attention to the investment markets of the 10 ASEAN countries, and China and ASEAN have already gone through the golden decade together. The economic cooperation between the two sides has become more consolidated, and China's efforts to establish countries along the "One Belt, One Road" have been established. With closer economic cooperation, the Cambodian countries should fully seize the opportunity to participate in the China-ASEAN Free Trade Area and the "One Belt, One Road" construction, give full play to the country's advantages and attract more Chinese and foreign investment in Cambodia. China has become one of the largest foreign-funded countries in Cambodia, but there are also problems in attracting direct investment from China in Cambodia, such as small investment scale, backward economic development level, back infrastructure, and unstable political environment. It has affected the quantity and quality of Cambodia's direct investment in China.

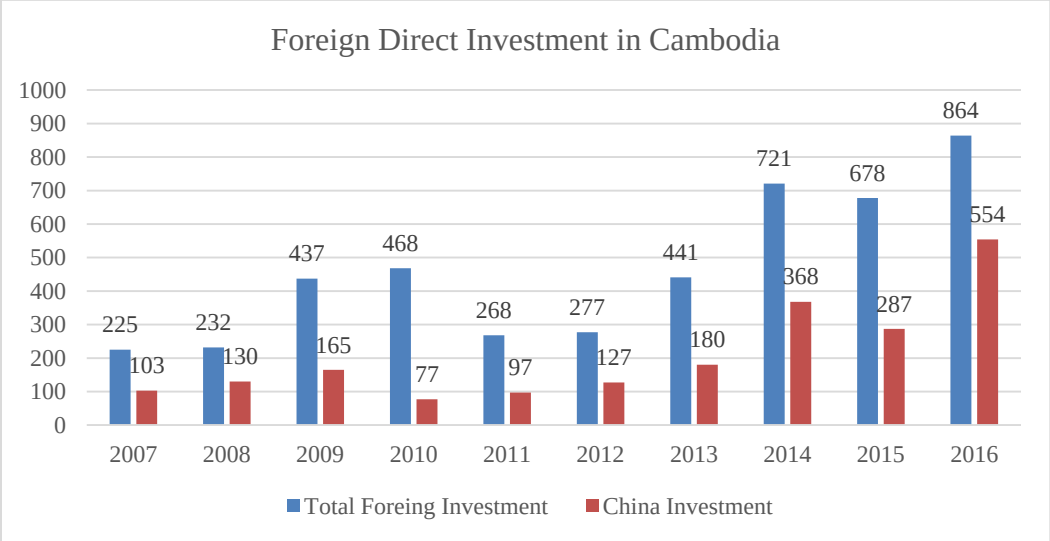
Li Honglei (2017) starts from the main areas of China's investment in Cambodia and analyzes the current situation and characteristics of China's investment in Cambodia from a micro level. It shows that Chinese companies have a significant investment in Cambodia and their placement is good. Besides, the comparison between the successful case of Chinese companies investing in the Sihanoukville Special Economic Zone in Cambodia and the failure of Chinese enterprises to invest in the Myitsone hydropower station in Myanmar shows that Cambodia's investment environment is suitable for investment, Cambodia's relatively stable political situation and the critical domestic political figure Hun Sen. Support for Chinese companies is an essential reason for the success of Chinese-funded enterprises in the Sihanoukville Special Economic Zone project.

Through the review and statistics of related materials, the statistics of China's investment in Cambodia in the past decade are shown in the following table:

Table1：Statistics on foreing direct investment in Cambodia from 2007 to 2016 Unit: million dollars

Year	Total Foreign Investment	China Investment	Increase	Proportion	Ranking
2007	225	103	25.95%	45.78%	1
2008	232	130	26.21%	56.03%	1
2009	437	165	26.92%	37.75%	1
2010	468	77	-53.33%	16.45%	2
2011	268	97	25.97%	36.19%	2
2012	277	127	30.92%	45.85%	1
2013	441	180	41.73%	40.81%	1
2014	721	368	104.44%	51.04%	1
2015	678	287	-22.01%	42.33%	1
2016	864	554	93.03%	64.12%	1

Chart 1: Foreign Capital Investment in Cambodia Unit: million dollars



According to the above statistics, we can see that: First, China has long been the primary source of foreign investment in Cambodia, China's total investment in Cambodia ranks first in Cambodia's foreign investment for a long time, and China's investment accounts for the main proportion of Cambodian investment. Secondly, China's total investment in Cambodia has increased rapidly, and in a few years, China's investment in Cambodia has increased by more than 20% over a long period of time.

III. AN EMPIRICAL ANALYSIS OF THE IMPECT OF CHINESE INVESTMENT ON CAMBODIAN ECONOMY

1. Research Hypothesis

This paper studies the impact of Chinese investment on Cambodia's economic growth. Therefore, this paper empirically assumes that Chinese investment has a significant impact on Cambodia's economic growth, and this effect is positive, that is, Chinese investment can promote Cambodia's economic growth. According to the above theoretical analysis of the impact of Chinese investment on Cambodia's economic development, it can be seen that the impact of Chinese investment on the Cambodian economy are multifaceted. It can not only make up for the capital shortages in Cambodia's economic development, but also promote Cambodia's economic development technology. The increase will increase the employment and income levels of Cambodia and encourage the modern management of Cambodian enterprises and the development of foreign trade.

First, the growth of a country's economy undoubtedly requires a higher economic development technology, while Chinese investment can promote the growth of Cambodia's economy by supporting the development of Cambodia's economic development technology. Second, economic development and growth are carried out by a country or region. When the income of each is raised, Chinese investment can increase Cambodia’s income and employment. When the individual’s work is solved and the income increases, then the economic growth of the entire country is inevitable. Also, in economic development, the enterprise are the most basic and important part, only when the enterprise develops and expands, can it promote economic growth. Chinese investment can promote the modern management of Cambodian enterprises, increase the efficiency of enterprises through management, and achieve the growth of Cambodia's GDP and economic growth; In economic development, investment, exports, and consumption are three carriages. Chinese investment can promote the development of Cambodia's foreign trade, and it can also encourage the economic growth of its economy by increasing its international business. Based on the above analysis, this paper proposes a research hypothesis: Chinese investment has a significant impact on Cambodia's economic growth, and Chinese investment can promote Cambodia's economic development.

2. Variable Setting

This paper empirically studies the impact of Chinese investment on Cambodia's economic growth, so Cambodia's economic growth is chosen as the explanatory variable in this empirical study. In this paper, considering the availability of data and the versatility of indicators, it is decided to select the GDP growth rate to measure Cambodia's economic growth. Therefore, the explanatory variables in this paper can be expressed explicitly as the growth rate of Cambodia's GDP, expressed explicitly by RGDP.

Due to the considerable absolute value of China's FDI in Cambodia, to make the empirical analysis more scientific and reasonable, this paper will take the logarithm of the total value of China's FDI to Cambodia as a specific explanatory variable, which can be expressed as Lncfdi.

Through the review and summary of the relevant research literature, and referring to the selection of factors affecting Cambodia's economic growth in other scholars' proper research, this paper will choose Cambodian export trade (Lntrad), human resources (wofo), and total foreign investment (Lntfdi). Factors were used as control variables in the study.

In summary, the summary of all variables in the empirical study in this paper is shown in the following table:

Table 2: Summary of variables

Variable Type	Name	Express compliance	Meaning
Explained variable	Cambodian Economic Growth	RGDP	GDP Growth Rate in Cambodia
Explained variable	China Investment	Lncfdi	China's total direct investment in Cambodia
Explained variable	Export trade	Lntrad	Cambodia's total foreign trade exports
Explained variable	Human Resources	wofo	Proportion of social labour force in Cambodia
Explained variable	Total foreign investment	Lntfdi	Cambodia attracts foreign capital investment

3. Sample Selection and Data Sources

This paper studies the impact of Chinese investment on Cambodia's economic growth. Therefore, the sample selection of empirical research in this paper will select relevant data from Cambodia and China's relevant data on Cambodia investment as a sample of this study. Consider the availability and authenticity of relevant data, this paper will select Cambodia's 2001-2014 GDP donation, export trade volume, total social labor force, total foreign investment, and China's total investment in Cambodia as research sample.

There are three main sources of relevant data in this study: one is that Cambodia's annual GDP growth rate in 2005-2017 is obtained through direct access; the other is Cambodia's yearly total export trade, foreign investment and China's total in 2005-2017. Cambodian investment is collected by logarithm on a direct data basis. Third, data is collected by simple calculations on raw data. The annual social labor share of Cambodia in 2005-2017 is captured in this way.

Through the above two ways, we finally collected all the variable data of Cambodia's GDP growth rate in 2005-2017, China's investment in Cambodia, export trade, human resources and total foreign investment.

4. Model Setting

In the construction of the empirical research model in this paper, the multiple linear regression model will be selected for empirical analysis. Combined with the choice of explanatory variables, explanatory variables and control variables, a basic multiple regression model will be constructed as shown in the model (1):

$$RGDP = \alpha 0 + \alpha 1cfdi + \alpha 2trad + \alpha 3wofo + \alpha 4tfdi + \mu \qquad \text{model (1)}$$

In order to make the variable model more economically meaningful,, the basic model is improved, and the model of Chinese investment in Cambodia, total investment in Cambodia, and Cambodian export trade is logarithmically established (2), and in the end The analysis uses the model (2) for analysis.

$$RGDP = \alpha 0 + \alpha 1lncfdi + \alpha 2lntrad + \alpha 3wofo + \alpha 4lntfdi + \mu \qquad \text{model (2)}$$

In the above two models, RGDP represents Cambodia's annual GDP growth rate, cfdi represents China's total direct investment in Cambodia each year, trad represents Cambodia's total annual export trade, and wofo represents Cambodia's annual social labor share, tfdi said Total foreign investment in Cambodia.

5. Empirical Analysis

5.1 Sample Descriptive Statistics

In this paper, the relevant data of Cambodia from 2005 to 2017 is taken as a sample. After the data is processed, the data is entered into the Stata software, and the descriptive statistics of the full sample data in this empirical study are finally obtained. The specific data is as shown in the table 3:

Table 3: Descriptive statistical analysis results

Variable	Observation Number	Average Value	Standard Deviation	Minimum Value	Maximum Value
RGDP	14	7.821429	3.437391	0.1	13.6
lntrad	14	3.713832	0.5998647	2.704711	4.671052
wofo	14	0.7394407	0.1409695	0.5199	0.8524
lncfdi	14	4.512248	1.314786	1.064711	6.317165

lntfdi	14	5.358716	1.246305	2.612273	6.761573

Source: This study is organized

According to the above table, the descriptive statistical analysis shows that the minimum economic growth rate of Cambodia is 0.1, the maximum is 13.6, the average is 7.8, and the standard deviation is 3.43. This shows that Cambodia's economic growth in the past 15 years is not stable. The fluctuations are large, and the slowest growth rate is only 0.1% in 2009, and the fastest growth is 13.6 in 2005. The average export value of Cambodia's foreign trade is 3.71, and the variance is 0.599, indicating that Cambodia's export trade in the past 15 years is relatively volatile and relatively stable. The average population of Cambodia's labor force is 0.73, and the variance is 0.14, which indicates that Cambodia's labor force population is relatively high. The labor force population in the past 15 years is relatively abundant and relatively stable, providing sufficient human resources for Cambodia's economic development. The average value of China's investment in Cambodia is 4.51, and the standard deviation is 1.31, indicating that China's investment in Cambodia is unevenly distributed, and the annual difference is large. This is related to the development of the world economy, China's foreign policy and economic development, and the domestic environment of Cambodia. There is a close relationship; the average foreign investment of Cambodia is 5.35, and the difference is 1.24. It is similar to the variable China's investment in Cambodia, and the distribution is uneven and fluctuating.

5.2 Correlation Analysis

In order to preliminarily verify the possibility of the research hypothesis proposed in this paper and to test whether there is a correlation between the variables in the empirical model, this paper analyzes the correlation between variables based on the relevant data of Cambodia 2005-2017. After the data is directly imported into the Stata software, the correlation analysis results of the sample data can be directly output. The results are shown in Table 4:

Table 4: Correlation analysis statistics

	RGDP	lntrad	wofo	lncfdi	lntfdi
RGDP	1				
lntrad	0.241**	1			
wofo	0.261***	0.771***	1		
lncfdi	0.078***	0.915***	0.631***	1	
lntfdi	0.151***	0.929***	0.795***	0.922***	1

Note: ***,**,* are significant at 1%, 5% and 10% levels.

According to the above table, the statistical analysis of correlations between related variables shows that there is a positive correlation between the variable Cambodian export trade and the variable Cambodian economic growth. The correlation coefficient is 0.241, and it is significant at the level of 5%. There is a positive correlation between Cambodia's economic growth; there is a positive correlation between the variable Cambodian social labor force population and the variable Cambodian economic growth, the correlation coefficient is 0.261, and it is significant at the 1% level, indicating the variable Cambodian society. The proportion of labor force has a positive correlation with Cambodia's economic growth; variable China has a positive correlation between Cambodian investment and variable Cambodian economic growth, the correlation coefficient is 0.078, and it is significant at the level of 1%, indicating that China's investment and Cambodia's economy are preliminary. There is a positive correlation between growth; there is a positive correlation between the total foreign investment of Cambodia and the variable Cambodian economic growth, the correlation coefficient is 0.151, and it is significant at the level of 1%, indicating the total foreign investment and the economic growth of Cambodia. Positive relationship.

In addition, the relationship between other variables, the variable social labor population and the export trade have a positive correlation, and is significant at the 1% level; the variable China has a positive correlation between Cambodian investment and variable export trade. And at the 1% level, there is a positive correlation between the variable Chinese investment and the variable social labor population, and significant at the 1% level; the final variable foreign investment total has a positive correlation with several other variables. Both are significant at the 1% level.

5.3 Regression analysis

In the empirical analysis of the impact of Chinese investment on Cambodia's economic growth, this paper establishes model 1 and model 2, and chooses model 2 for regression analysis. The relevant data of each variable of the model are processed and input directly into Stata software. The final regression results can be obtained by issuing relevant commands, as shown in Table 5.

Table 5: Estimated results of the impact of Chinese investment on Cambodia's economic growth

	(1)
VARIABLES	RGDP
Lncfdi	4.489**
	(1.75)
Lntrad	4.864*
	(1.10)
wofo	1.342**
	(0.07)
Lntfdi	2.919*
	(0.91)
Constant	20.278***
	(2.21)
Observations	14
R-squared	0.6432
F Test	1.10（0.0038）

Note: 1) Standard errors in parentheses; 2)***,**,* are significant at 1%, 5% and 10% levels.

According to the statistics of the regression estimation of the impact of Chinese investment on the Cambodian economy according to the above table, it can be seen that the R of the regression model is 0.6432, indicating that the fitting degree of the model reaches 64.32%, that is, the degree of interpretation of the explained variable by the explanatory variable. It reached 64.32%; the P value of the F test was 0.0038, less than 0.01, indicating that the model rejected the null hypothesis at the 1% level, that is, the linearity of the model passed the test, and the regression results could be interpreted and analyzed.

According to the regression results of the above table, it can be found that there is a positive correlation between the explanatory variables of China's investment in Cambodia and the economic growth of Cambodia. The correlation coefficient is 4.489, and it is significant at 5%, indicating that when China When Cambodia’s investment does not increase by 1%, Cambodia’s economic growth will increase by 4.489%; the correlation coefficient between the control variable Cambodia’s export trade and the economic growth of the explanatory variable is 4.864, and it is significant at the 10% level, indicating that Cambodia’s export trade is increased by 1 %, Cambodia's economic growth will increase by 4.864%; the control variable social labor population ratio and the explanatory variable Cambodia's economic growth correlation coefficient is 1.342, and is significant at 5%, indicating that when the Cambodian social labor force increased by 1%, the Cambodian economy Growth will increase by 1.342%; the correlation coefficient between the total foreign investment of controlled variables and the economic growth of the explanatory variable is 2.919, and is significant at the level of 10%, that is, when the total foreign investment increases by 1%, Cambodia’s economic growth will increase. 2.919%.

5.4 Robustness Test

The main purpose of the robustness test is to judge the analytical methods in the empirical research and the explanatory strength of each index. When some variables or parameters in the model change, the final empirical results are basically consistent. In the study of this paper, the measurement of Cambodia's economic growth can be measured directly by gross domestic product, in addition to the GDP growth rate that can be used. Therefore, this paper will be selected from the method of replacing the explained variables. The test of robustness replaces the GDP growth rate of the dependent variable in the model with GDP, and the specific regression results are shown in Table 6:

Table 6: Regression analysis of the impact of Chinese investment on Cambodia's economic growth

	(1)
VARIABLES	RGDP
Lncfdi	3.995**
	(2.70)
Lntrad	3.164*
	(11.27)
wofo	0.821**
	(2.98)
Lntfdi	0.726*
	(1.58)
Constant	5.827***
	(56.31)
Observations	14
R-squared	0.9937
F Test	57.27（0.0000）

Note: 1) Standard errors in parentheses; 2) ***, **, * indicate significant levels at 1%, 5%, and 10%.

According to the statistical analysis of the robustness of the above table, there is a positive correlation between Chinese investment and Cambodia's economic growth. It is significant at the level of 5%; there is a positive correlation between variable export trade and economic growth, At the level of 10%; there is a positive correlation between the variable social labor population and economic growth, and is significant at the level of 5%; there is a positive correlation between the variable foreign investment and economic growth and is significant at the 10% level. It is consistent with the regression results, so we can think that this investment in China is robust to the empirical return of Cambodia's economic growth.

6. Empirical results

According to the above empirical research analysis, four conclusions can be obtained:

1. China's investment has a relatively noticeable impact on Cambodia's economic growth. Increasing China's investment can further promote Cambodia's economic growth, which also verifies the correctness of the research hypothesis;

2. Export trade has a positive effect on Cambodia’s economic growth. The government should encourage Cambodians to increase productivity and reduce imported products.

3. The proportion of Cambodia's human labor population is of considerable significance to its economic growth. The increase in the proportion has contributed to Cambodia's economic growth;

4. Foreign investment also has a positive effect on Cambodia's economic growth.

IV. CONCLUSIONS AND POLICY RECOMMENDATIONS

1. Conclusion

This paper conducts a specific study on the impact of Chinese investment on Cambodia's economy by using the methods of empirical research and literature research. Three conclusions are drawn in this paper:

1. China is one of the primary sources of investment in Cambodia, and China's investment in Cambodia is highly concentrated, both in the investment industry and in the investment region.

2. Cambodia has a good investment environment, which attracts many countries such as Japan, Korea, China and some European and American countries. Among them, Cambodia's investment environment also has a particular attraction to China's investment.

3. China's investment has obviously promoted Cambodia's economic growth.

2. Policy recommendations

Since Chinese investment has a more significant impact on Cambodia's economic growth, as Cambodia itself, it should formulate more preferential policies to create a better investment environment to attract and protect Chinese investment and thus promote its economic growth. First, we must further strengthen cooperation with China, establish closer economic and cultural ties, and attract more Chinese investment. Second, we must introduce more preferential policies, create a pleasant investment environment, and create a safe and reliable environment for Chinese investment. The third is to adjust the structural adjustment of the industrial structure and make full use of the capital, technology and experience of foreign capital to enhance the level of economic development of the country.

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The Impact of Job Dissatisfaction on Extrinsic Factors and Employee Performance in Textile Industries

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ABSTRACT

The objective of current paper assess the job dissatisfaction's impact with the extrinsic factors on performance of employees. Current thesis applies Herzberg's two-factor theory to investigate the effects of job dissatisfaction on employees performance. Seven point Likert scale is used for survey purpose. Descriptive statistics, Reliability test, Pearson correlation, Analysis Of Variance (ANOVA), t test and multiple regression techniques are employed for data analysis. In textile industry, the result shows that job dissatisfaction factors effects negatively to extrinsic factors and employees' performance. The result suggested that management of Textile industries should employed the Hygiene factors of Herzberg two-factor theory on their organization to improve the performance of individual as well as for organization.

KEY WORDS: Employee performance, Hygiene factors, Job dissatisfaction, Textile industries

INTRODUCTION

The purpose of current study is to determine the impact of job dissatisfaction on extrinsic factors and employees performance. This study provides good amount of knowledge for improving the employee performances.

Adnan (2003) asserted that job satisfaction is a great subject discuss in organization. Without satisfaction, an organization success cannot achieved its goals therefore priority will be given to satisfy the employees (Spector, 1997). Textile industries are one of them. Several organizations cannot recognize the importance of employees' satisfaction. Reducing the areas, which create dissatisfaction among employees, can be done through properly applying the hygiene factors as considered by Herzberg two-factor theory (Yim et al., 2018). The hygiene factors of two-factor theory of Herzberg are company policy, working condition, relationship with peers, relationship with supervisors, money and work security (Suprianto et al., 2018).

Job satisfaction subsidizes a countless role on employees' performance in textile industry. Satisfaction of employees is an imperative matter for all organizations together with the textile industry. The textile industry is more concentrated to increase the output level of employees as well as organization. Textile industrial employees rises their level of satisfaction level through contribution, involvement, motivation and expression of their thoughts that ultimately help to increase the reputation of industries (Khan et al., 2014).

LITERATURE REVIEW

Dahlqvist and Matsson (2013) argued that the main factors, which influence the employee performance, are rewards. Rewards cause satisfaction with both intrinsically and extrinsically and makes the employees' work more productive (Maksuc, 2016). Emeka *et al.*, (2015) asserted that performance depends on many factors like job security, employees' satisfaction, training and development, compensation, appraisals, positive feedback, intrinsic and extrinsic rewards. Through motivation, employees do their best work even in strenuous circumstance and face the greasy challenges easily (Jones & Sloane, 2007).

According to Dahlqvist and Matsson (2013) studied that the job satisfaction and job dissatisfaction influence the employees' performance. Job satisfaction is increase by intrinsic motivational factors such as advancement, achievement, work itself, recognition and growth (Herzberg *et al.*, 1959; Herzberg *et al.*, 1966). Factors, which decrease job dissatisfaction, are company policy, good working conditions, job security, supervision, relationship with peers and money (Herzberg *et al.*, 1959; Herzberg *et al.*, 1966). Job satisfaction increase the employee's satisfaction and job dissatisfaction decrease the employee's satisfaction and result in poor performance.

The variables that creating job dissatisfaction are poor policies, insecurity and poor training (Okpara, 2004). The clashes between lower and upper staff create uncomfortable and frusted environment (Arnetz, 1999; Lane, Esser, Holte, & McCusker, 2010; Raziq & Maulabakhsh, 2015). Job dissatisfaction occur when employees feel anger, depression and resentment in their job (Matthews, 2011). Job dissatisfaction is process where employees are not comfortable at their workplace (May, 1978). Dissatisfaction happens when employees do not want to do work because of unhappiness of their work (Locke, 1976). According to Herzberg (1959), it has argued that job dissatisfaction can decreased with a number of ways. For example, by providing extrinsic motivational factors properly to employees such as makes good company policies, provide work security, money, positive relationship of supervisors, flexible working condition and good relationship with peers. According to Herzberg *et al.*, (1966), hygiene factors eliminate job dissatisfaction but absence of hygiene factors cause dissatisfaction.

Job satisfaction is defined as feelings of person, which contributes positive role (Aziri, 2011). While job dissatisfaction factors are contributing negative role for an individual and organization (Ali et al., 2008).

METHODOLOGY

In current thesis, research methodology is very important portion for analysis of data. The data was gathered through questionnaires. For this purpose, 325 copies of questionnaire were collected from textile industry. Reliability test was conducted through SPSS version 20.0. Pearson correlation, t test, ANOVA and multiple regressions techniques were used for analysis of data. In this regard, Jarque Bera test employed. On basis of Jarque Bera, all variables used in multiple regression were normally distributed. Convienence non probability technique and random sampling techniques were used in present study. The selected area is Hyderabad, Sindh.

RESULTS AND DISCUSSIONS

Descriptive Statistics of Job Dissatisfaction of textile Industry

The descriptive statistics of job dissatisfaction are shown in table 1.

Table 1 of Statistics of job dissatisfaction of textile industry

		JD41	JD42	JD43
N	Valid	325	325	325
	Missing	0	0	0
Mean		2.7805	2.7597	1.6762
Median		3.0000	2.0000	2.0000
Std. Deviation		.67215	.89717	.68755
Minimum		1.00	1.00	1.00
Maximum		3.00	3.00	3.00

Job dissatisfaction consists of three item statements as shown in table1. The mean of individual items as job dissatisfaction question no 41 (JD41), job dissatisfaction question no 42 (JD42) and job dissatisfaction question no 43 (JD43) showed the disagree and strongly disagree degree of statements. Job dissatisfaction decrease the level of performance among employees due to which employees will not take interest in their work and unable to achieve the tasks. Job dissatisfaction create the negative impact to employees as well as organization.

Reliability Test of Job Dissatisfaction of textile Industry

Reliability test of job dissatisfaction are represented in table 2.

Table 2 of Reliability Statistics of job dissatisfaction of textile industry

Cronbach's Alpha	N of Items
.887	3

Cronbach alpha have tested for this research for all variables. The overall cronbach alpha of job dissatisfaction items are statistically good results as shown in table 2. The results have recommended that data have internal consistency and have applied for proceeding the analysis. Results demonstrated that job dissatisfaction is negatively impact on performance of employees.

Pearson Correlation of Job Dissatisfaction with Hygiene Variables of textile Industry and employee performance

As the correlation shows all negative values in textile industry, so the result shows that all the extrinsic variables as independent variables effects negatively to job dissatisfaction. There is no relationship between independent variables with job dissatisfaction. Further the result shows that job dissatisfaction also effects negatively to employee performance as dependent variable. There is no relationship between dependent variable with job dissatisfaction. Dissatisfaction makes employees performance poor that ultimately diminish the productivity of organization, high turnover, impolite behavior and so many issues will incurred. Textile industries are focused on these issues and properly employed Hygiene factors on their organizations for growing and improving the performance of employees and organizations.

Multiple Regression Of Job Dissatisfaction With Hygiene Variables of textile Industry

According to table 3.1, multiple regression model described the correlation coefficient that indicated relationship's strength of independent variable with job dissatisfaction, which is 0.728. The coefficient of determination is mentioned by R square is 0.530 and Adjusted R square is .530. This model have explained

the variance which described that six independent variables have explained 53.0% of variation in job dissatisfaction.

By measuring through ANOVA as shown in table 3.2, the F-statistic is 1810.618, which show high strength of model. As a result, the model has given a good description of association among explained and unexplained factors. From the Coefficient's table 3.3, all extrinsic variables have negative significant association with job dissatisfaction.

Tables 3 of multiple regression of extrinsic variables and job dissatisfaction of textile industry

Table 3.1 of Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.728[a]	.530	.530	.05715

a. Predictors: (Constant), rp, m, wc, ws, cp, rs

b. Dependent Variable: AVJD

Table 3.2 of ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.477	6	5.913	1810.618	.000[b]
	Residual	31.409	318	.003		
	Total	66.886	324			

a. Dependent Variable: AVJD
b. Predictors: (Constant), rp, m, wc, ws, cp, rs

Table 3.3 of Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.193	.039		82.326	.000		
	cp	-.640	.017	-.406	-37.735	.000	.422	2.369
	ws	-.412	.026	-.170	-15.998	.000	.434	2.306
	rs	-.596	.032	-.213	-18.647	.000	.375	2.669
	m	-.364	.012	-.225	-31.557	.000	.958	1.044
	wc	-.324	.013	-.206	-24.286	.000	.679	1.473
	rp	-1.063	.016	-.641	-65.777	.000	.514	1.947

a. Dependent Variable: AVJD

Multiple Regression of job dissatisfaction and employee performance

In table 4.1, multiple regression of job dissatisfaction with employee performance shows the strength of correlation coefficient R that is 0.597, this value shows strong correlation. The coefficient of determination is mentioned by R square is 0.356 and Adjusted R square is .356. This model have explained 35.6% of variation in job dissatisfaction.

By measuring through ANOVA table 4.2, the F-statistic is 5318, which show high strength of model. As a result, the model has given a good description of association among explained and unexplained factors. From the Coefficient's table 4.3, job dissatisfaction has negative significant association with employee performance.

Tables 4 of multiple regressions of job dissatisfaction and employee performance of textile industry

Table 4.1 of Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.597[a]	.356	.356	.04045

a. Predictors: (Constant), AVJD
b. Dependent Variable: dep

Table 4.2 of ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.702	1	8.702	5318.000	.000[b]
	Residual	15.747	323	.002		
	Total	24.449	324			

a. Dependent Variable: dep
b. Predictors: (Constant), AVJD

Table 4.3 of Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.939	.003		362.859	.000		
	AVJD	-.361	.005	-.597	-72.925	.000	1.000	1.000

a. Dependent Variable: dep

CONCLUSION

Job satisfaction is a key tool within the organization whereas job dissatisfaction creates a negative impact on hygiene factors as well as employee performance. Textile industry enhances and improves the employee's job satisfaction by facilitating them suitable hygiene factors, which will increase their status, confidence, style of communication and manage the industrial matters. The result demonstrated that performance of employees is extremely motivated that created a negative link amongst job dissatisfaction and employee performance as well as job dissatisfaction and extrinsic factors that eventually generate negative future impact on performance of the industry. The results suggested that high hygiene factors in textile industry provided the opportunities to take an interest in the job and create effective leadership. The employee turnover rate is much lower due to proper and flexible environment. Textile industry saves their money, make effective products and high profit by concentrating on employees' satisfaction.

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A Review on Enhancement of Heat Transfer through Fins

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Abstract-The cooling performance of electronic device, engine etc is a biggest challenge and an area of concern. As the poor cooling performance is observed from the conventional method of cooling. There are various researches which are happening in this field to improve the performance of fins and to enhance the heat transfer. In this paper an attempt is made to summarize the various researches that were conducted on the fins. The main aim of this review paper is to analyse the thermal properties of fin by varying its certain parameters like geometry of fins, material used, number of fins, thickness of fins etc. From this review it is observed that the heat transfer performance of fins obtained from the experimental method is in close approximation with the finite element analysis and the method of numerical solution.

Index- Fins, Fin material, Geometry of fins, Heat transfer enhancement.

INTRODUCTION

Heat transfer by convection between a surface and the fluid surrounding can be increased by attaching to the surface thin strips of metal called fins. Fins are the extended surfaces purposely provided at a place from where heat is to be removed. The fin increases the effective area of a surface there by increasing the heat transfer by convection. A fin is a type of heat exchanger that transfers the heat generated by a mechanical or an electronic device to a fluid medium, often air or a liquid coolant, where it is dissipated away from the device, there by allowing regulation of the device's temperature at optimum levels. Fins are extended surfaces used for dissipating heat from the hot surfaces. The ability to dissipate heat from the surfaces greatly affects the device efficiency. As fins are widely used for cooling, the main objective of this review paper is to obtain the optimum design of fin for heat transfer by varying certain parameters.

LITERATURE REVIEW

Pankaj Rao et al [1] has studied to improve the heat transfer characteristics and to investigate the performance of fin efficiency by using fin of different materials in pin fin apparatus for both natural and forced convection. From the experimental analysis, the heat transfer of fin for different materials is analysed and experimental results shows that the efficiency of aluminium is greater than brass and mild steel fin.

P Moorthy et al [2] The aim of this paper is to investigate the effect of fin shapes on the performance of compact finned flat tube heat exchangers. The three fin shapes considered are plain, wavy and rectangular grooved fins. From this study, it was found that the rectangular fin has the highest heat transfer performance compared to wavy and plain fin. The highest efficiency was achieved by plain fin with the least heat transfer performance. It is observed that the rectangular fin is suited for application which priorities thermal performance over hydraulic performance or efficiency.

M.Vara Prasad et al [3] The fabrication of trapezoidal and rectangular fins of variable fin cross section is done. With the help of the experimental set up made under different heat input conditions the temperature variation along the length of fin is measured. From the experiment it is found that the heat transfer coefficient is more in forced convection than in natural convection in both the fins. It is also observed that when compared to both the fins the heat transfer coefficient is twice in trapezoidal fin than the heat transfer coefficient in rectangular fin in both the natural and forced convection.

P.Kaviyarasu et al[4] In this experiment ,an aluminium 6063 rod for three various surface roughness has been fabricated and tested for the heat transfer coefficient and heat transfer rate. Comparing the smooth surface rod, rough surfaced aluminium 6063 rod is having the high heat transfer coefficient and heat transfer rate. Also compared with the free, the forced convective transfer can replace more amount of heat from the pin fin material.

Laxmi Narayana Pidda et al [5] In this study an attempt is made to fabricate cylindrical pin fin made of brass, aluminium, copper, mild steel and composite bar and analysed their performance in terms of temperature distribution along the fin. The main objective is to compare the different type material with composite material. The study of variable thermal conductivity with its resultant impact on the performance of fins becomes imperative. Both increase and decrease of thermal conductivity of

metals with temperature occurs in practice depends upon the material and the range of temperature involved. Further experimental investigation and thermal analysis on nano particle copper coating over aluminium cylindrical pin fin is done.

Zaharaddeen Aminu Bello et al [6] Experimental analysis is done to determine the effectiveness, efficiency, heat transfer rate and heat transfer coefficient for three pin fins with different shapes of the same aluminium material length is done. The theoretical values of temperature for all three fins are slightly greater than the practical values because of heat lost by radiation. The heat transfer rate for free convection has greatest value in case of circular fin, followed by triangular fins and the least is square fin, but in case of froced convection circular fin has the greatest value followed by square fin and the last is triangular fin. The triangular fin has the highest effectiveness in both free and forced convection.

N. Sethuraman et al [7] The performance analysis is carried out using simulation and experimental method. Experiment carried out for different geometry by using different heat inputs. The results show that the rate of heat transfer is high, for with insulated triangular fin followed by without insulated triangular fin, the results also show that the rate of heat transfer is high for tapered pin fin followed by pin fin. For all the conditions the temperature at the tip of the fin has to be the same as that of the air. But in reality, the temperature of the fin is not same as that of ambient temperature this shows that heat transfer is enhanced.

G. Kiran Kumar [8] Heat transfers from the condensers (heat exchangers) can be increased by extended surfaces called fins. The rate of heat transfer through condenser depends on fin material, spacing between the fins, geometry of the fin and its thermal conductivity. This experimental work focuses on effect of condenser fin geometry on the performance of the condenser. Heat transfer rate through the condenser is calculated for different fin geometries. The rate of heat transfer through the condenser is maximum for rectangular fin geometry compared to circular fin geometry of the condenser. Heat transfer rate is increased for the rectangular fin geometry, because rectangular fins have more surface area.

Devendra J waghulde et al [9] Experimental investigation and Finite element analysis is carried out on the thermal behaviour of cylinder with different fins of varying fin thickness and geometry. Results obtained from Finite element analysis are in close approximation with the results of experimental method. FEA and Experimental results shows that the temperature distribution is maximum for the cylinder with rectangular fin of 3.5 mm fin thickness for aluminium alloy 6061 and minimum for triangular fin of 2.5 mm thickness for aluminium alloy 6061.

G.Babu , M. LavaKumar [10] The main aim of the project is to analyse the thermal properties by varying geometry, material and thickness of cylindrical fins. Model is created using pro/Engineer and the analysis is done using ANSYS. The materials and geometry used for analysis are aluminium alloy 204, aluminium alloy 6061 and magnesium alloy with rectangular, circular and curved shapes. By observing the analysis result it is clear that aluminium alloy 6061 with thickness of 2.5 mm, circular fin is better because the heat transfer is more. Theoretical calculation shows that using circular fins the heat lost is more, efficiency and effectiveness is also more.

Sandhya Mirapalli, Kishore. P.S [11] Heat transfer analysis is carried out by placing rectangular and then triangular fins. Analysis is carried out by varying the temperatures on the surface of the cylinder from 200°C to 600°C and varying length from 6cm to 14 cm. output parameters such as rate of heat flow, heat flow per unit mass, efficiency and effectiveness are determined. Comparisons are presented with rectangular fins. By varying the length of fin from 6cm to 14cm and maintaining base temperature at 600°C, the results obtained are Heat flow from triangular fin is increased compared to rectangular fin, Rate of heat flow per unit mass of rectangular fin is decreased compared to triangular fin. Efficiency of triangular fin is decreased and effectiveness of triangular fin is increased compared to rectangular fin. By varying base temperature of fin from 200°C to 600°C keeping the length fixed at 10 cm, the results obtained are Heat flow from triangular fin is increased compared to rectangular fin, Rate of heat flow per unit mass of triangular fin is increased compared to rectangular fin, Efficiency of triangular fin is decreased and effectiveness of triangular fin is decreased compared to rectangular fin.

Mayank Jain et al [12] The main aim of the project is to analyse the thermal heat dissipation of fins by varying its geometry. The main objective is to increase the heat transfer rate of fin which could be achieved by modifying certain parameters and geometry of the same. The modelling software used is CREO parametric 2.0. The analysis is done using ANSYS14.5. By observing the analysis results it is found that triangular fin with aluminium alloy 6061 as material is better since the temperature drop and the heat transfer rate in a triangular fin is much more compared to others. The theoretical calculations done to determine the heat lost, effectiveness and efficiency of the fins are well supported by the practical results obtained using the software.

L. Natrayan et al [13] The main aim is to analyse the thermal properties by varying geometry of cylinder fins. The 3D model of the geometries is created using SOLIDWORKS 2016 and its thermal properties are analysed using Ansys Workbench R 2016.The variation of temperature distribution over time is of interest in many applications such as in cooling. Analysis is carried out for cylinder fins using Aluminium alloy 6061 material. Design of fin plays an important role in heat transfer. There is a scope of improvement in heat transfer of air cooled engine cylinder fin if mounted fin's shape varied from conventional

one. Wavy fin shaped cylinder block can be used for increasing the heat transfer from the fins by creating turbulence for upcoming air. Improvements in heat transfer can be compare with all the four models of the engine fins geometry by CFD analysis and its flow characteristics are studied for all the geometries it is found that the curved fins provide better result when compared with all the other geometries.

Mukesh Didwania et al [14] This paper presents the result of study and analysis of rate of heat transfer and pressure loss for different shape fins with rectangular duct when surface area is same for all. Rectangular, Cylindrical(Circular) are the two shape fins used for analysis. The purpose of this study is to determine the optimum dimensions and shapes for rectangular longitudinal fins and cylindrical pin fins by including transverse heat conduction. Further the present study investigates the effect of a variable heat transfer coefficient on the optimum dimensions of the aforementioned fins. It is found from the results that the heat transfer rate is maximum for circular fin and minimum for rectangular fin. Pressure loss is minimum for circular fin and maximum for rectangular fin in the duct, From the above it can be concluded that circular fin is optimum fin for maximum heat transfer.

Subodh Kr. Sharma et al [15] The main emphasis of the work is to find the best suitable geometry and material for the fins. By reviewing the literature survey, the selection of the geometry and material for fabrication is done. The fabricated models are mounted on a base plate and are heated by heaters for a certain period of time. The temperature is then noted down at various points with the help of infrared gun and the best geometry and the material for the fins is found out. From the experiment it can be concluded that triangular geometry is more suitable as the heat dissipation from the triangular fin is more, and copper is the most suitable material as the heat dissipation from copper is more. But for manufacturing purpose, the factors to be considered are cost, weldability, density, machinability of material etc. If the parameters like costs, weight are considered, then Aluminium can be used as a substitute material instead of copper as heat transfer rate differs only by a small amount.

CONCLUSION

From the literature review, it is clear that the design of fin plays an important role in heat transfer. The thermal analysis of fins is studied by modifying certain parameters such as geometry, material, thickness etc. The heat lost, effectiveness and efficiency of the fins can be determined. We can observe that the results obtained from the finite element analysis are in close approximation with the results of experimental method and numerical solution.

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Acoustic Correlates of Stress in Nepali Language

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Abstract- Stress provides an acoustic cue to a syllable, word or a part of a sentence to convey different intents without changing the meaning. The acoustic correlates of stress comprises of increased fundamental frequency, intensity, duration and vowel quality. These acoustic measures vary according to the structure of the language. There are no reports on the acoustic correlates of stress in Nepali. Hence, the present study aims to investigate the acoustic correlates of stress in Nepali language. A total of 20 native speakers of Nepali language in the age range of 18 to 30 years participated in the study. Ten bi-syllabic words consisting of an adjective and a noun were chosen. The participants were asked to read the two word phrases with and without stress on the adjectives that were marked in italics. The variations in stressed and unstressed conditions were analyzed for the marked adjectives. The peak fundamental frequencies (Fo), peak intensity (dB), duration (msec) were extracted from the adjectives of the 10 phrases using PRAAT (Version 5.3.17) software. S-ratio was also computed for the acoustic measures of stress for both the stressed and unstressed conditions. Descriptive analysis revealed increase in the Means of peak fundamental frequency (Fo), peak intensity (Io) and duration (Do) and t-test revealed significant increase in Fo and Io in both conditions. However, Do revealed no statistical significance in stressed and unstressed conditions.

Index Terms- Stress, Fundamental frequency, Intensity, Duration, Nepali.

I. Introduction

Stress is used to emphasize a word and to bring about difference in meaning. Stress is defined as an utterance of syllable with greater effort than other neighboring syllables in a word or words in a sentence (Jones, 1950). Stress in literature is seen in many categories. Acoustic correlates of emphatic stress were focused in recent studies. “Emphatic stress in a phrase or sentence is used to indicate the word, which needs to be focused to indicate the syntactic relationships between words or parts of word, and has a linguistic function in distinguishing between a compound and a noun” (Savithri, Rohini & Sairam, 2003). Studies done earlier has shown that, the acoustic correlates of stress vary from language to language and stressed syllables are usually associated with one or more of the following properties i.e., raised fundamental frequency, increased loudness, greater duration, and different vowel qualities (Liberman, 1960). In languages such as English (Bolinger, 1958), Polish (Jassem, Morton, Steffen, 1968) and French (Rigault, 1968), fundamental frequency was observed as the primary acoustic correlate of emphatic stress, whereas duration was reported to be major correlate in languages such as Swedish (Westin, 1966), Italian (Bertinetto, 1980) and Estonian (Lehiste, 1968). In the Indian context, research on acoustic correlates of stress in words were carried out in Kannada (Savithri, 1999), Konkani (Kumar, 2009), Tamil (Balasubramanian, 1981) which indicated increased duration in stressed conditions. In addition, peak intensity was the major cue for stress in languages such as Telugu (Sitapati, 1936 and Srinivas, 1992) and Tulu (Manjunath, Teja, Sneha, Dattatreya, 2012). Among Indo-Aryan languages Hindi, duration and fundamental frequency was observed as the major acoustic correlates of stress.

Nepal is a country enriched with many languages, however not much has been explored on the acoustical characteristics of stress Hence, there is a need to enlighten and research about the acoustic characteristics of stress in Nepali language too. Given Nepal’s multiple language environments, with 4 constitutionally accepted languages, about 126 mother tongues spoken in and around the country. Nepali language is a well developed Eastern Pahari group of Indo- Aryan language spoken in East and adjacent south central regions. It is considered as one of the Eastern Pahari group of Indo-Aryan language. Nepali has a rich vocabulary and has been considered as a highly developed language by the linguists (Nakkeerar, 2010). With a rich grammatical structure, the present study aimed at analyzing the acoustic correlates of stress in Nepali language.

II. Method

2.1. Participants

The participants taken in the study were 20 young adults (10 males and 10 females) in the age range of 20-30 years. The native language of the subjects was Nepali. Participants included in the study were non-smokers having no oro-facial anomalies and neurological related issues.

2.2. Test Materials

Ten two-word Nepali phrases were provided to the participants. The first word in each phrase was an adjective and the second word was a noun. The adjectives were bi-syllabic. A list of the ten phrases is provided in Appendix- A.

2.3. Instrumentation

Audio recordings were carried out using the Praat software (Version 2.3) installed on a laptop. The speech sample were then stored in the computer hard disk. The sampling rate was at 22 kHz, 12 bit quantization. The speech samples were recorded with

the microphone placed about 10 cm from the mouth and was connected to the laptop.

2.4. Procedure

Speech samples recorded for each participant were carried out in a quiet room. The participants were instructed to read each of the ten phrases in two conditions i.e., Unstressed (US) and Stressed(S) condition. The 10 phrases were read in 2 conditions. First, the participants read it as naturally as possible and then stressing the adjective in each of the phrases. Before the start of the recording, the participants practiced the phrases. Fundamental Frequency (F0), Intensity (I0) and Duration (D0) were extracted using Praat software. Table 1 shows the ten two-word phrases in Nepali provided to the participants for both the conditions.

Table 1: Ten Nepali phrases

SL.No	Ten Phrases
1	dherailuga:
2	ra:mrotaSbir
3	mi:thomasu:
4	ra;totSura
5	chokhopani:
6	Thulogadi
7	ta:jakha:na
8	Khalijhola
9	Sunsandarbar
10	sojhi a:ma

2.5. Statistical Analysis

Paired t-test was used to find out Mean and Standard Deviation (SD) values for each acoustic parameter in stressed and unstressed condition. Peak fundamental frequency, peak intensity and duration were calculated using SSPS (Statistical Package for Social Sciences) version 17.0.

III. Results and Discussion

3.1. Peak Fundamental Frequency (F0)

Table 2 shows the Mean and SD values obtained for the 10 phrases in stressed and unstressed conditions. As shown in Figure 1, the mean fundamental frequency obtained for all the ten adjectives under study in unstressed condition was 245.083 Hz (SD=84.28) and in stressed conditions, it was 302.32 Hz (SD=120.69). On statistical analysis, paired t-test revealed no significant difference (t=-4.97; p=0.0004) between unstressed and stressed conditions. Overall, there was an increase in peak fundamental frequency (F0) for Stressed (S) condition compared to Unstressed (US) condition.

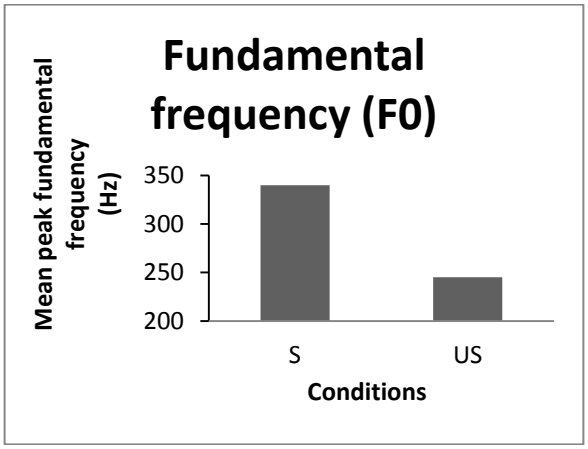

Fig 1. **Mean fundamental frequency in Hz unstressed (US) and stressed (S) conditions**

Table 2. Mean, standard deviation and t-test values of peak fundamental frequency for all the ten adjectives in unstressed (US) and stressed (S) condition

Words	Peak fundamental frequency (Hz)		
	US	S	t-value
/dherai/	221.39 (57.49)	321.17 (118.89)	-5.411 (0.000)
/ra:mro/	238.56 (67.90)	331.79 (122.03)	-5.735 (0.000)
/mi:tho/	252.83 (95.837)	319.71 (115.70)	-4.372 (0.000)
/ra;to/	235.01 (66.34)	345.15 (105.95)	-7.509 (0.000)
/chokho/	267.44 (88.15)	375.96 (127.41)	-5.141 (0.000)
/thulo/	249.95 (101.91)	341.41 (128.39)	-4.337 (0.000)
/ta:ja/	227.45 (76.03)	284.44 (99.81)	-3.939 (0.001)
/khali/	226.65 (79.10)	358.23 (131.02)	-5.825 (0.000)
/sunsan/	256.47 (105.14)	354.03 (132.30)	-4.128 (0.001)
/sojhi/	275.08 (104.92)	366.48 (125.37)	-3.349 (0.003)
Mean	**245.08 (84.28)**	**302.31 (120.69)**	**-4.975 (0.0005)**

3.2. Peak intensity (I0)

Table 3 displays the mean and SD values of peak intensity obtained for all the ten adjectives in the two conditions. The mean peak intensity obtained for all the ten adjectives included in the study was73.71 dB (SD=3.96) in unstressed conditions and in stressed conditions, it was 79.98 dB (SD=4.33) as shown in Figure 2. The statistical analysis is results showed a significant difference between unstressed and stressed conditions (-7.72; p= 0.000). Overall there was an increase in peak intensity (I0) for Stressed (S) condition compared to Unstressed (US) condition.

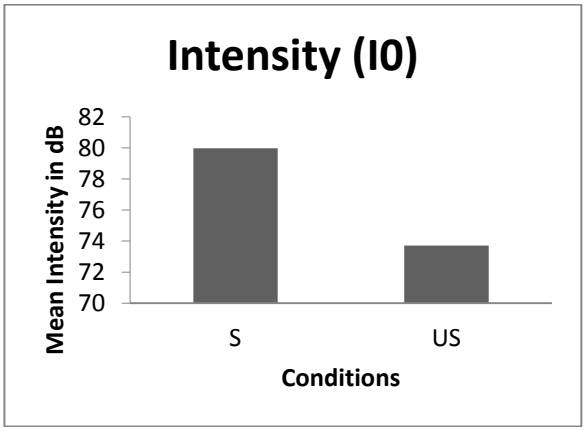

***Fig 2*. Mean peak intensity in dB for unstressed (US) and stressed (S) conditions**

Table 3. Mean, standard deviation and test values of peak intensity for all the ten adjectives in unstressed (US) and stressed (S) condition

Words	Duration (msec)		
	US	S	t-value
/dherai/	473 (117.07)	511 (172.47)	-1.357 (0.191)
/ra:mro/	521.5 (119.26)	590.5 (161.85)	-1.832 (0.083)
/mi:tho/	515 (127.05)	559 (147.14)	-1.936 (0.068)
/ra:to/	531 (137.45)	550 (102.91)	-0.937 (0.361)
/chokho/	505.5 (138.85)	517.5 (83.85)	-0.459 (0.652)
/thulo/	453.30 (130.15)	474.5 (98.06)	-0.832 (0.416)
/ta:ja/	477 (124.73)	512.5 (68.97)	-1.550 (0.138)
/khali/	479.5 (126.88)	487.5 (77.93)	-0.348 (0.732)
/sunsan/	695 (147.34)	639.8 (103.96)	1.535 (0.141)
/sojhi/	578 (139.87)	593.5 (89.28)	-0.627 (0.538)
Mean	**470.78 (130.87)**	**543.58 (110.64)**	**-0.8343 (0.332)**

3.3. Duration (D0)

The mean and SD values of duration obtained for all the ten adjectives in both the conditions as shown in Table 4 and Figure 3. The mean word duration obtained for the ten adjectives selected in unstressed condition was 470.78 msec (SD=130.87) and in stressed condition, it was 543.58 msec (SD=110.64). The mean duration was higher in stressed condition compared to that of unstressed condition. The results of statistical analysis showed no significant difference between stressed and unstressed condition (t=-0.8343; p=0.332). Overall there was an increase in duration (D0) for Stressed (S) condition compared to Unstressed (US) condition.

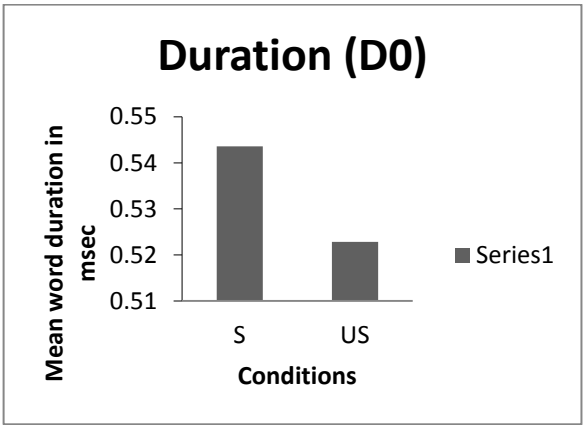

***Fig* 3. Mean duration in msec for unstressed (US) and stressed (S) conditions**

Table 4. Mean, standard deviation and test values of duration for all the ten adjectives in unstressed (US) and stressed (S) condition

Words	Peak Intensity (dB)		
	US	S	t-value
/dherai/	73.94 (3.60)	79.59 (4.25)	-7.28 (0.000)
/ra:mro/	73.67 (4.41)	80.46 (4.23)	-9.407 (0.000)
/mi:tho/	74.86 (4.31)	80.47 (4.01)	-5.858 (0.000)
/ra:to/	73.56 (4.20)	79.12 (4.21)	-9.513 (0.000)
/chokho/	74.27 (4.72)	80.28 (4.83)	-6.835 (0.000)
/thulo/	76.65 (4.11)	82.07 (3.44)	-5.450 (0.000)
/ta:ja/	72.61 (3.63)	80.42 (4.17)	-10.431 (0.000)
/khali/	72.46 (3.14)	78.83 (4.03)	-8.212 (0.000)
/sunsan/	71.42 (3.41)	78.45 (5.44)	-7.045 (0.000)
/sojhi/	73.70 (4.01)	80.07 (4.80)	-7.139 (0.000)
Mean	**73.71 (3.96)**	**79.98 (4.34)**	**-7.72 (0.000)**

3.4 **S-Ratio**

S-Ratio was calculated as the difference between Stressed and Unstressed conditions for Peak fundamental frequency, peak intensity and duration. The values obtained for (Fo) was 99.95Hz, (Io) was 6.68 dB and (Do) was 0.03 msec. There was a

trivial difference observed in the fundamental frequency of Stressed and Unstressed conditions.

IV. Discussion

The finding for the acoustic correlates of stress in Nepali language is one of the first attempts. The peak fundamental frequency (f0), peak intensity (dB) and duration (msec) were extracted from the adjectives and both conditions were compared. The results concluded fundamental frequency, peak intensity and duration is higher in stressed than in unstressed condition. The S-ratio for peak fundamental frequency, peak intensity, and duration of words was 99.95 Hz, 6.68 dB and 0.03 msec respectively.

The results of the study concluded that there is significant difference between fundamental frequency and intensity and no significant difference in duration of words. The primary acoustic correlates of stress in various language such as Polish (Jassem et al, 1968), English (Bolinger,1958) and French (Rigault, 1962) is different in fundamental frequency where as for Swedish (Westin, Buddenhagen & Obrecht 1966), Italian (Bertinetto, 1980), and Estonian (Lehiste,1968) had duration as the major correlates. Recent studies also show that, Kannada (Savithri, 1999), Konkani (Kumar & Bhat 2009), Tamil (Balasubramanian, 1981), had duration as the major correlates for acoustic stress, whereas according to Sitapati (1936) and Srinivas (1992), intensity was reliable acoustic correlate of stress in Telugu language.

In the present study, peak fundamental frequency and peak intensity show significant difference between unstressed and stressed conditions which correlates with the study done by Manjunath et.al (2012). Hence, these literature reviews support the concept that an acoustic correlate of stress differ across language and depends upon the structure of language.

V. Conclusions

The recent study of acoustic correlates of stress was studied in Nepali speaking of both male and female subjects. The results visualize that there is a significant increase in peak fundamental frequency and peak intensity repeatedly, in stress condition. Thus, it is possible that a Nepali speaker uses peak fundamental frequency and peak intensity as a cue to indicate stress.

Acoustic parameters

1. Peak fundamental frequency (o) was measured as the maximum pitch in the utterance in Hertz (Hz)
2. Peak Intensity (Io) was measured as the maximum intensity in the utterance in dB.
3. Duration (Do) was measured as the time difference between the starting and end point of the utterance in milliseconds.
4. S-ratio was measured by taking the difference between stressed and unstressed conditions for all the above mentioned acoustic parameters.

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The Awareness on Passive Smoking among Smokers in Mukim Sg Pelek, Sepang, Selangor, Malaysia

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Abstract- Tobacco smoking is one of the biggest public health threats to the world, not only harmful for the smokers but also for the second-hand smokers. This study aims to assess the awareness on passive smoking among smokers' villagers in Sg Pelek, Sepang, Selangor. A cross sectional study was done by using simple random sampling. Respondents that fulfill the inclusion & exclusion criteria were interviewed with validated questionnaires and data were analyze using SPSS. The prevalence of smoking was 13.9%. The awareness on passive smoking among smokers was 42.4% and 57.1% of them still smoke in front of others despite of having the awareness. In order to make the public places in Malaysia as smoke free zones, an integrated effort needs to be initiated by various authorities. The perception of secondhand smoke health effects among Malaysians should also be instilled.

Index Terms- Smoking, Passive smoking, Awareness, Villagers, Selangor.

I. INTRODUCTION

The tobacco epidemic is one of the biggest public health threats to the world which kills six million smokers and 890 000 non-smokers [1]. In a study done in a rural area in Negeri Sembilan, the prevalence of current smokers was 34.2% [2]. However, the National Morbidity and Health Survey done in 2015, shows approximately 22.8% of Malaysian population aged 15 years and above were smokers [3].

Tobacco use is harmful not only for the smokers but also for the second-hand smokers, also known as passive smokers as it can cause disease, disability, and death [4]. The process of non-smokers who breathe the same toxic chemicals in tobacco as the smokers do is called involuntary smoking or passive smoking [5]. Out of six million deaths due to smoking, 10% is attributed to the exposure of second-hand cigarette smoke [6]. Second-hand smoke also causes numerous health problems in infants and adults including asthma attacks, respiratory infections, ear infections, sudden infant death syndrome, coronary heart disease, stroke and lung cancer [7].

A study done in a district of India reports that 51% of the respondents have an above average awareness on the dangers of passive smoking [8], while 56.1% of respondents in Southern Nigeria had high knowledge on the negative impact of smoking on health and well-being [9]. In a study among working Malaysian adults' states 99.5% felt that people should not smoke in front of children [10].

Thus, this study was designed to determine the awareness on passive smoking among smokers in Mukim Sungai Pelek, Sepang, Selangor. Therefore, findings can then be used to increase the awareness on passive smokers among the smokers specifically and residents generally, by implementing health communication to change their attitudes towards passive smokers.

II. RESEARCH METHODOLOGY

A cross-sectional study was conducted in a village area in Mukim Sg Pelek, Sepang, Selangor. The area which majority is Chinese population has 2000 residents with 450 houses. Simple random sampling was done to select the number of houses and respondents with the estimation of 262 sample size. All Malaysian who were above 18 years old, not mentally retarded, deaf and mute were selected as respondents.

Data was collected through assisted interview using a questionnaire from National Health Morbidity Survey 2015 [11].

The data has been analyzed using descriptive statistics to get the frequency and relative frequency (percentage) for smoking and awareness. The association was determined by Pearson chi-square test. The level of significance was set at $p < 0.05$ and confidence level at 95%.

III. RESEARCH FINDINGS

A total of 238 participants participated in this study, giving an overall response rate of 91%.

Table 1. Prevalence of smoking status among respondents

Smoking status	Frequency	Percentage
Yes	33	13.9
No	205	86.1
Total	**238**	**100.0**

The prevalence of smoking is 13.9% (Table 1).

Table 2: Smoking status by socio-demographic (N= 238)

Sociodemographic Factors	Smoking status			P-Value
	Yes n (%)	No n (%)	TOTAL n (%)	
Age				
18 - 29	4 (12.9)	27 (87.1)	**31 (100)**	
30 – 39	5 (18.5)	22 (81.5)	**27 (100)**	
40 – 49	7 (18.9)	30 (81.1)	**37 (100)**	
50 - 59	7 (13.7)	44 (86.3)	**51 (100)**	
≥ 60	10 (10.9)	82 (89.1)	**92(100)**	
Gender				
Male	27 (27.6)	71 (72.4)	**98 (100)**	**0.00**
Female	6 (4.3)	134 (95.7)	**140 (100)**	
Education level				
No formal education	2 (5.6)	34 (94.4)	**36 (100)**	**0.23**
Primary education	14 (20.6)	54 (79.4)	**68 (100)**	
Secondary education	14 (15.1)	79 (84.9)	**93 (100)**	
Tertiary education	3 (7.3)	38 (92.7)	**41 (100)**	
Marital status				
Single	2 (4.4)	43 (95.6)	**45 (100)**	**0.01**
Married	27(15.5)	147 (84.5)	**174 (100)**	
Divorcee/Widow	4 (21.1)	15 (78.9)	**19 (100)**	
Occupational status				
Unemployed	5 (6.7)	70(93.3)	**75 (100)**	**0.00**
Govt. / Semi-govt.	0	10 (100)	**10 (100)**	
Private employee	7 (17.1)	34 (82.9)	**41 (100)**	
Self-employed	13 (28.3)	33 (71.7)	**46 (100)**	
Housewife	4 (9.3)	39 (90.7)	**43 (100)**	
Student	0	2 (100)	**2 (100)**	
Retiree	4 (19.0)	17(81.0)	**21 (100)**	
Household income				
Less than RM1000	10 (14.3)	60 (85.7)	**70 (100)**	
RM1000 - RM4999	20 (13.8)	126 (86.3)	**146 (100)**	
RM5000 - RM9999	3 (20.0)	12 (80.0)	**15 (100)**	
Above RM10000	0	7 (100)	**7 (100)**	

The higher prevalence is among age 40-49 years (18.9%), male (27.6%), with primary education (20.6%), divorcee / widow (21.1%), self-employed (28.3%) and those who have household monthly income RM 5000 – 9999 (20%) (Table 2).

Table 3: Smoking trend among smokers

Smoking trend	n	%
Age start smoking		
< 18	13	39.4
18 - 25	17	51.5
26 - 33	2	6.1
34 - 41	1	3.0
Duration of		
< 5 years	1	3.0
5-10 years	1	3.0
10-15 years	6	18.2
> 15 years	25	75.8
Money spent (RM)		
< 100	17	51.5
100 - 199	3	9.1
200 - 299	4	12.1
>300	9	27.3
Intention to quit		
Yes	19	57.6
No	14	42.4
Cessation barriers		
Addicted	16	48.5
No intention	11	33.3
Withdrawal	3	9.2
Peer pressure	1	3.0
Coping with stress	1	3.0
Habitual	1	3.0
Total	**33**	**100**

Majority of the smokers start smoking at the age of 18 – 25 years old (51.5%), smoke more than 15 years (75.8%), spend less than RM 100 for cigarettes in a month (51.5%) and have intention to quit smoking (57.6%) (Table 3).

However, among the barriers towards smoking cessation are addicted (48.5%), no intention to quit (33.3%) and withdrawal symptoms (9.2%).

Table 4. Awareness on passive smoking among smokers

Awareness status	Frequency	Percentage
Yes	14	42.4
No	19	57.6
Total	**33**	**100.0**

Among the smokers, 57.6% are not aware regarding passive smoking (Table 4).

Table 5. Association between awareness on passive smoking and smoking in front of others

Awareness status	Smoking in front of others		Total n (%)	P value
	Yes n (%)	*No n (%)*		
Yes	8 (57.1)	6 (42.9)	14 (100)	0.966
No	11 (57.9)	8 (42.1)	19 (100)	

Among smokers who have awareness on passive smoking, 57.1% still smoke in front of others. However, statistically, there is no significance association between smokers who have awareness on passive smoking and smoke in front of others (P>0.05) (Table 5).

IV. DISCUSSIONS

The prevalence of smokers in our study was lower than the prevalence of smokers which conducted by NHMS 2015 (20.9%) [12]. The difference is likely due to the populations included in the national survey were both from urban and rural populations while our study was conducted in a rural area. A study done in China showed that the smoking prevalence among rural-urban migrants increased (28.4%) after they moved to the city, due to life stress (19.5%) and high work stress (21.6%) [13,14]. However, our result was quite similar with a study done in Sepang, Selangor in 2018 with the prevalence of 13.3% [15].

Studies done by Gallus and Nurulfarahin report that the prevalence of smokers are higher among males (59.8% and 37.9%, respectively) [16,17], which are consistent with our finding. This might be due to a social norm in Malaysia to have male smokers (40%) and they are less motivated to quit smoking (59.4%) as compared to females (66.9%) [18,19]. Our finding also showed that 33.3% of the smokers have no intention to quit smoking. Majority of them have started smoking at early age and have been smoking more than 15 years. These caused the addiction to nicotine that reduces the likelihood among males to cease smoking [20], which was the highest barrier towards smoking cessation in our study.

The perception that not much benefit will be gained from smoking cessation might also contribute to the prevalence of no intention to quit smoking, as smokers who are ambivalent of benefit in quitting had 2.1 times higher odds of planning to quit compared to smokers who saw little benefit in quitting [20, 21]. However, studies show many smokers use smoking as coping for stress with prevalence of 3.3% and 20.5% [22, 23].

This might also explain the higher prevalence of smoking among our divorcee/widow respondents (21.1%) which was similar to a study conducted by Lim and Gaafar [20, 24]. Both report the prevalence are 36% and 31.3%, respectively. Whereas, a study on smoking that has been conducted in Korea states that the smoking rate for the unmarried is higher than for the married in both genders, with the highest rate observed in men (78.2%) [25].

The education generally has the strongest influence, where high school dropouts have odds of smoking 3.7 times larger than for college graduates and respondents without formal education are 2.09 more likely to smoke than those with tertiary education [20]. Other studies conducted in Malaysia among adult and elderly, both show a higher prevalence of smokers among those who only had primary educational level with 25% and 17%, respectively [12, 27].

Not more than half of the residents were aware of passive smoking (45.8%) but the prevalence was compared to a study done in an urban area in Bangladesh (22%) [28]. These might be due to having the thought of smoking would affect the smokers only instead of harming passive smokers as shown by a study on smoking-related knowledge and education level in China in which there is a significant difference between thinking smoking will harm themselves (p = 0.0002) and considering smoking will harm others (p = 0.0001) [29].

In a study done on tobacco smoke exposure towards children, 31.4% of respondents claimed that there are family members who smoke in the house and majority (89.8%) of them have good knowledge on tobacco smoke exposure especially towards children [15]. This is consistent with other studies on second hand smokes (SHS) with more than 90% of respondents are aware on passive smoking [30. 31]. However, our respondents have much lower percentage in awareness on passive smoking, which might be due to lack of knowledge about the health effects on passive smokers, as the higher the education, the more the awareness regarding health hazards of SHS, where 53.7% illiterate respondents considered SHS to be harmful, the number increased significantly to 82.4% in respondents having education up to intermediate or above [32].

Another study done among higher institution community, reports that 68.7% of respondents preferred to move away from the smoking area due to high level knowledge regarding negative effects of smoking to the surrounding people [33]. Knowledge was also a significant predictor of respondents' attitude, as it was positively correlated with attitude (p<0.001) which mean the higher the knowledge, the more negative the attitude towards smoking [34]. Although statistically there was no association between smokers who have awareness on passive smoking and smoke in front of others, but 57.1% of them still smoke in front of others.

V. CONCLUSION AND RECOMMENDATION

The prevalence of smokers is significantly low. However, more than half of the smokers were not aware about passive smoking.

Thus, an integrated effort need to be initiated by various authorities to make the public places in Malaysia as smoke-free

zones and to critically instill the perception of secondhand smoke health effects among Malaysians.

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Sustainable Reserve Food Garden Program and Its Implication for Food Security in Pacitan Regency Indonesia

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Abstract- Food is a basic human need so that it must be fulfilled qualitatively and quantitatively. This prompted the government to issue a policy in the form of a sustainable food house area program. The purpose of this study was to determine the implications of sustainable reserve food garden (SRFG) area programs for the sustainability of food fulfillment in Pacitan Regency, East Java, Indonesia. This research was conducted in the Dersono Village (Pringkuku Sub-regency), Tahunan Baru Village (Tegalombo Sub-regency) and Nanggungan Village (Pacitan Sub-regency), Pacitan Regency. Field data were taken by observing the condition of the home garden of the SRFG program participants, which includes the elements of the yard and the types of constituent plants. In addition, interviews were also conducted with the community regarding the benefits of home garden plants to support food needs, as well as with local governments regarding the plan, implementation and evaluation of SRFG program activities. The results showed that the plants planted in the SRFG participant's house were mostly food crops that had benefits for staple foods, vegetables, fruits, medicines and ornamental plants. The significances of the implementation of the SRFG have had the result of decreasing the cost of community consumption, increasing community income and increasing soil cover in the home garden area. The implementation of SRFG also provides economic, environmental and social services for the community. The local government seeks to provide assistance, guidance, monitoring and evaluation of the development of the SRFG so that the program runs sustainable. The local government provides assistance, guidance, monitoring and evaluation of the development of the SRFG so that the program runs sustainable

Keywords: continuous, interview, need, observation

I. Introduction

Food is the most important human need in his life. Food in the scope of life of nation and state is one of the important commodities. Food security up to the household level has a very basic development perspective. This is because access to a balanced supply of food and nutrition is one of human rights. In addition, the process of establishing quality human resources is strongly influenced by the success of meeting the adequacy of food needs and food security [1].

Food security is a condition where all households have both physical and economic access to obtain sufficient food to meet the needs of all family members. In addition, food security is also a condition where households are not at risk of losing both physical and economic access to food. Food security is the determination of the concept of food security, namely purchasing power or income to meet living costs [2]. The status of food security of each household or individual is usually determined by the interaction of agro-environmental, socioeconomic and biologic factors [3]. National food resilience & independence must start from the household. The use of yard for household food development is a strategy to realize household food independence. Home yards are one of the family's economic resources. The yard also has the functions of ecology, aesthetics, socio-culture and other environmental services which are also important, so the development of this home yard is in line with the concepts of sustainable development [4]. Utilization of home yards is a strategic step in supporting food security, however, the use of home gardens that are still traditionally have constraints such as narrow land area and tend to narrow, human resource capacity is still low, planted commodities are still limited, lack of availability of land management technology the yard and the production orientation that is limited to meet household needs and has not seen market aspects. Considering this, the sustainable food house area program (SRFG) is carried out to provide incentives to optimize the management of the home yard [5]. This was also supported by Presidential Regulation No. 22 of 2009 concerning the Policy for Accelerating the Diversification of Local Resource-Based Food Consumption.

The SRFG program was first implemented in Pacitan Regency which continues to develop as a form of diversifying food crops through optimizing home yards. This is important, because Pacitan Regency is a dry hilly area that can rely on home gardens as a source of food. Increasing the SRFG program activities in Pacitan Regency both in quantity and quality need to be improved, besides being able to meet food needs at the family level, it can also be an example or other regional model in utilizing home yards through

SRFG. The purpose of this study is to study sustainable food house area programs and their implications for food and ecological fulfillment and regional government efforts to support the sustainability of the SRFG program.

II. METHODS

This research was conducted from January to September 2018 in three villages as follows Nanggungan Village (Pacitan Sub-regency), Tahunan Baru Village (Tegalombo Sub-regency) and Dersono Village (Pringkuku Sub-regency), Pacitan Regency (Figure 1).

Figure 1. Research Location in Pacitan Regency, East java, Indonesia

Data collection is done by distributing questionnaires, field observations and interviews. The questionnaires were used to analyze the economic impact of implementing SRFG with five answer choices. The observations were done to observe of the conditions of the SRFG program home yard to analyze the ecological and social impacts of the implementation of SRFG. The interviews were carried out with the community regarding the benefits of home garden plants to support food needs, while those with regional governments were done regarding planning, implementing and evaluating SRFG activities. Questionnaire data analysis was used in the environmental scale with the perception level grouped into five categories (Table 1).

Table 1. Categories of public perception

Score	Category
1 to 1.8	Very un-supported
1.8 to 2.6	Unsupported
2.6 to 3.4	Fair
3.4 to 4.2	Supported
4.2 to 5	Very supported

The results of observations and interviews were analyzed with descriptively. The descriptive qualitative research seeks to describe and interpret what happened.

III. RESULTS AND DISCUSSION

A. Recipient elements of SRFG participating houses in Pacitan Regency

The yard is a land that is around the house and has a bond with the owner the houses of the community participating in the SRFG program have almost the same elements as other yards, except that the participants of the SRFG have additional components such as nurseries, demonstration plots sometimes have fish ponds. The other elements of the yard include:

- The fence is a yard divider with other land usually from a wall or composed of various types of plants
- Front yard is a land in front of a house that is often cleaned and planted with plants that have aesthetic value but often planted with fruit, vegetables and other food crops.
- Right and left yards are a yard that located on either side of the house, usually used as a place to hang out or plant fruits, vegetables and other food ingredients.
- *Mburitan* is a yard that is on the left and right side of the house which is usually used as a place to hang out or plant fruits, vegetables and other food ingredients.
- Home open dumping is a hole made to remove household waste
- Home waste disposal is a hole made to dispose of household waste
- Livestock cages are a place for raising people on a small scale, usually animals that are farmed are native chickens, goats, cows, manila ducks or rabbits. Most of the plants planted in the SRFG participating house are food crops that have benefits for staple foods, vegetables, fruits, medicines and ornamental plants.

B. Implementation of SRFG in Pacitan Regency

Implementation of yard utilization program policies by paying attention to various programs that have been running. Before the SRFG program, other programs based on the utilization of home gardens were also carried out such as the Acceleration of Diversification of Food Consumption, and the Women's Movement for Optimizing the Yard [5]. Increased Food Diversification (Food Diversification) with the aim of increasing food diversity, according to regional characteristics programmed by the Ministry of Agriculture [6].

The food diversification policy starts from the Presidential Instruction (Inpres) No. 14 of 1974 concerning Efforts to Improve the People's Food Menu and until the last through Presidential Regulation No. 22 of 2009 concerning the Policy for Accelerating the Diversification of Local Resource-Based Food Consumption. The government has made various efforts to diversify food, but in reality the level of public consumption still relies on the main food, namely rice and the level of consumption which is still below the recommended fulfillment of nutrition. The steps taken by the government are through the use of land with the use of local resources managed by households, namely the home yard [3].

Optimizing the home garden is a policy program of the Ministry of Agriculture regarding SRFG or Sustainable Food House Estate Development. SRFG is a form of visualization of Presidential Regulation No. 22 of 2009 concerning the Policy for Accelerating the Diversification of Local Resource-Based Food Consumption as well as an update on the program for Accelerating Diversification of Food Consumption (P2KP) and the Women's Movement for Optimizing the Yard [3]. The Rationale for the Development of the SRFG Model follows up on the direction of the President of the Republic of Indonesia at the event the Food Security Council Conference on national food security and independence must start from the household. Furthermore, other policies came out related to the development of SRFG such as Decree of the Minister of Agriculture of the Republic of Indonesia Number 12/Kpts/Kn.210/K/ 02/2016 concerning Technical Guidelines for the Movement of Accelerating Diversification of Food Consumption in 2016 and Decree of the Minister of Agriculture of the Republic of Indonesia Number 08/Kpts/Rc.110/J/01/2017 Regarding the Technical Guidelines for Optimizing the Land Use of the Yard through the SRFG in 2017.

Relatively fast adoption of SRFG in Pacitan Regency was supported by the issuance of regional policies in the form of Regent Pacitan Instruction to the community in the Pacitan region to develop and implement the SRFG model and Instruction of the East Java Military Command which was followed up by the Pacitan Military Office to members to develop the SRFG at the Military office location and the Military Office. In addition, the Pacitan Regency Food Security Office has a growth target and the development of SRFG villages is 12 villages per year in addition to being active in various SRFG activities at the provincial and national levels. In 2016 the village programmed to become SRFG village was Mendolo Kidul Village, Punung Sub-regency, Krajan Village, Sudimoro Sub-regency and nine villages in the Nawangan Sub-regency. Another study reported that this program has been effectively implemented in Kediri Regency East Java, with a value of 78.41%, where the accuracy of the target was 88.40%, program socialization was 78.10%, program objectives were 82.47%, and program monitoring was 70.67%. The supporting factors of the program are effective program objectives, effective methods and socialization media, complementary understanding of the socialization material, the ability of the Farmer Women Group in effective plant preservation, the benefits of the effective M-KRPL program for Farmer Women Group members, and continuity bookkeeping activities and making reports on the use of funds [6].

C. Impact of SRFG in supporting the level of household consumption and supporting sustainable ecology in Pacitan Regency

The implementation of the SRFG Program in Pacitan Sub-regency has a positive impact on the community's economy. There are two positive impacts of the SRFG program. The first positive impact of the SRFG program is that the community can save on expenses for daily food consumption, especially the costs of purchasing animal vegetables and food (eggs and poultry meat). The positive impact of the second SRFG program was that they can sell the harvest from the development of the SRFG to get additional income when the production of vegetables and livestock exceeds their daily needs. Community members of the SRFG program can also get additional income from the sale of plant seeds and processed crops and livestock, including aquaculture.

Based on the public perception that the SRFG program in Nanggungan Village is included in the category of very supported cost savings for daily food consumption, vegetable production, livestock and fisheries that exceed the needs can be sold to obtain additional income with a value of 4.5. Whereas in Dersono and Tahunan Baru Villages, the categories assisted them with a score of 4.2 and 4.0 (supported).

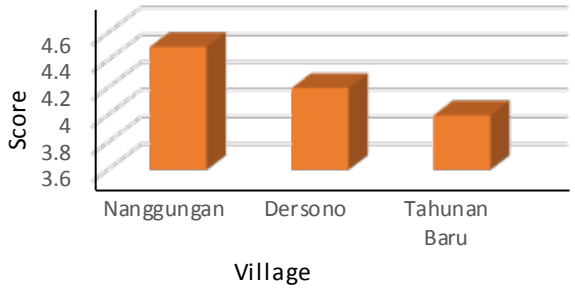

Figure 2. SRFG positive impact on the community economy

The participants of SRFG program in Dersono Village stated that the community has received a varied income increase, between IDR 5,000.00 - IDR 15,000.00 per day. People in Nanggungan Village claimed to have increased their income from the SRFG program under Rp. 5,000.00 per day, whereas the income in Tahunan Baru Village Community increased between IDR 5,000 IDR 10,000 per day.

The ecological impact of the SRFG program is the conservation of rural landscape culture, namely the existence of a yard. Besides that, there is also a conservation of flora and fauna due to cultivation activities. The existence of gardens in the SRFG program strongly supports ecosystem services, especially in terms of provisioning of food, maintaining layers of top soil, producing carbon stocks, and oxygen supply. Some studies that have been carried out recognize the positive impact of home gardens to food and services and provide additional numbers such as income and livelihood opportunities for resource-poor families and provide a number of ecosystem services [7]. A study in America showed that Community Gardens sustainable development policies by linking issues of health, education, community development and food security with the use of green space in towns and cities. The article concludes that the use of urban open spaces for parks and gardens is closely associated with environmental justice and equity [8].

D. Government support for sustainability of SRFG

Support from government officials can be done in various ways. One of the supports that the government can provide especially the Village Government to the SRFG program is with budget support. Budget support can be done by allocating a budget for the SRFG program. Budget allocation in the village for the SRFG program can be done through the Village Revenue and Expenditure Budget or APBDes. The allocation of the village budget for the SRFG program is very necessary because it can help improve the SRFG program. The existence of budget support for the SRFG program is expected to develop the SRFG program. Budget support from the Village Government also indicates a village contribution to the implementation and development of the SRFG program.

In addition to budget support, giving awards to the people who preserve the SRFG program also needs to be done. The SRFG program is not a fleeting program but awards people who preserve the SRFG program. This is to foster enthusiasm for the community in preserving the SRFG program. The awarding of the community to preserve the SRFG program will make the community motivated in preserving and improving the SRFG program. The community will compete to get awards by trying to preserve and improve the SRFG program. Therefore, the Pacitan Regency Government must accommodate the award in the form of a competition or competition event. The Pacitan Regency Government can hold an SRFG competition between villages. The race was given to all villages that organized the SRFG program. The race will determine the champion or who is entitled to an award because it has preserved the SRFG program well. The award must be based on an independent and objective assessment. Awarding the preservation of the SRFG program can be given to villages (groups) or individuals.

Another thing that is not less important is the intensity of the SRFG program instructor to go into the field. As mentioned in the previous section, one of the problems in the implementation of the SRFG program is the presence of an SRFG program extension agency that is still low to go to the field. In fact, extension workers are very trusted by the community who preserve the SRFG program. Information and advice provided by extension agents is always trusted and implemented. However, the lack of intensity of

extension workers to go into the field has made the community unable to preserve the SRFG program to the fullest. This is because no one guides and answers the problems experienced by the SRFG program community. In the future, the intensity of the extension agent going into the field must be increased. The Pacitan Regency Government through the Office in charge of the SRFG program must make a mandatory schedule for extension agents to go into the field. The schedule must contain the intensity of extension agents to come to the field. The schedule made is an obligation that must be adhered to by the instructor. Therefore, there must be sanctions for extension agents who do not take to the field on schedule. An intense schedule and sanctions for those who violate will make the instructor more diligent and disciplined in plunging into the field. The more diligent and disciplined the discipline goes into the field, the problems faced by the people who preserve the SRFG program will be minimized.

The SRFG program in Pacitan Regency has in fact a positive impact on changes in the ecology of the area that is the location of the program. One positive impact on ecological change is that the environment around the house is more beautiful. To improve the SRFG program to the community. The local government provides assistance, guidance, monitoring and evaluation of the development of SRFG so that the program runs on an ongoing basis

IV. CONCLUSION

Most of the plants planted in the SRFG participating house were food crops that have benefits for staple foods, vegetables, fruits, medicines and ornamental plants. The implications of the implementation of SRFG have the effect of decreasing the cost of community consumption, increasing their income and land cover in the area of the home garden. The regional government provided assistance, guidance, monitoring and evaluation of the development of SRFG so that this program successfully implemented as planning basis.

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Dengue Encephalitis with Unilateral 3rd Nerve Palsy

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Abstract- Dengue encephalitis with cranial mononeuropathy is a rare entity. Imaging being non-specific, diagnosis of the condition relies on detection of NS1 antigen and IgM antibodies in CSF. Treatment relies on maintenance of airways, adequate hydration and nutrition along with monitoring of vitals without any need of antivirals or antibiotics. Prompt recognition of the condition is necessary firstly due to the potential mortality associated with the condition and secondly to avoid unnecessary administration of drugs. Here we report a case of 25 year old female who presented with fever, vomiting and altered sensorium, had an isolated left 3rd nerve palsy, was investigated to have dengue encephalitis accounting for the same, was managed conservatively, discharged with stable vitals and resolution of the symptoms and normalisation of lab parameters.

Index Terms- Dengue encephalitis; Mononeuropathy; Neurotropism

I. Introduction

Neurological manifestations in dengue infection, caused by Dengue virus, a single-stranded RNA virus of the Flaviviridae family are relatively uncommon. It includes encephalitis, encephalopathy, neuromuscular disorders and neuro-ocular disorders with cranial mononeuropathy being a rare manifestation.[1]Dengue encephalitis is a rare entity which occurs due to direct neuronal infiltration by the dengue virus.[2,3]Here we report a case of dengue fever with encephalitis with unilateral 3rd nerve palsy.

II. CASE REPORT

A 25 year old female presented with the complaints of fever along with chills since last 5 days,multiple episodes of vomiting since last 2 days and decreased responsiveness since last 1 day. On examination patient was drowsy,Pulse-88/min,BP-100/60mm Hg, blanchable rashes were present, Chest, CVS, P/A examinations revealed no abnormalities, CNS examination revealed absent meningeal signs, pupils unequal in size with left sided pupil fully dilated not reactive of light(Fig 1),bilateral plantar being non-responsive, Fundus examination was normal. Investigations revealed Hb-7.7g/dl,Hct-23.7%,MCV-110 fl,MCH-36.4pg,Platelet-18,000/µl,TLC-4500/ µl(N-25%,L-60%,M-15%),peripheral smear didn't show any hemoparasites, RBCs showed moderate anisocytosis with macrocytes, normocytes and elliptocytes,Na/K-135/4.2 meq/L,Urea/Creatinine-35/0.4 mg/dl,Total Bilirubin-o.4 mg/dl,AST/ALT/ALP-451/114/182 U/L,INR-0.99,ABG,Chest X-ray,ECG , NCCT head revealed no abnormalities. CSF study revealed 110 cells with 98% lymphocytes,2% neutrophils,Protein-109mg/dl,Sugar-47mg/dl.USG abdomen revealed Gall bladder wall edema.She was started on IV acyclovir and artesunate along with crystalloids.Her fever subsided after 3 days,sensorium improved but there was persistent headache,nausea and absent vision in the left eye.She now had developed ptosis of the left eye with fully dilated pupil suggestive of 3rd nerve palsy(Fig 2).A repeat fundoscopic examination revealed Grade 1 papilledema.Meanwhile her serum for Dengue IgM came out to be positive,Malaria serology,Scrub typhus serology and Typhidot IgM were negative.An MRI brain was done which revealed altered signal intensity in left cerebral peduncle,bilateral medial temporal lobes,bilateral hippocampi,corpus callosum splenium and left parasagittal occipital lobe,iso-hypointense on T1,hyperintense on T2/FLAIR(Fig 3,4).The MRI findings were suggestive of encephalitis,likely of viral etiology.To look for the etiology,CSF for HSV IgM,JE serology,CBNAAT were sent which were negative, but was positive for Dengue IgM. Thus a diagnosis of Dengue encephalitis with left 3rd nerve palsy was established.IV Acyclovir was discontinued,repeat fundus examination revealed no papilledema,headache subsided consequently.Her vision improved,ptosis subsided and the left pupil was sluggishly reactive to light after ten days of treatment, LFT showed resolution of the derangement(AST/ALT/ALP-56/25/134). Patient was discharged with stable vitals,resolution of symptoms after two weeks and follow up after one month revealed no abnormalities.

Fig 1 showing dilated left pupil

Fig 2 showing left sided ptosis

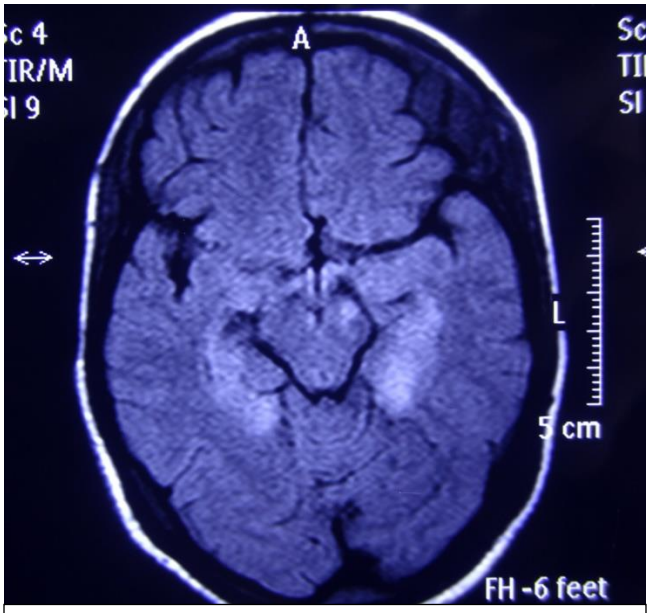

Fig 3 showing T2 FLAIR MRI image with hyperintensity noted in bilateral medial temporal lobes.

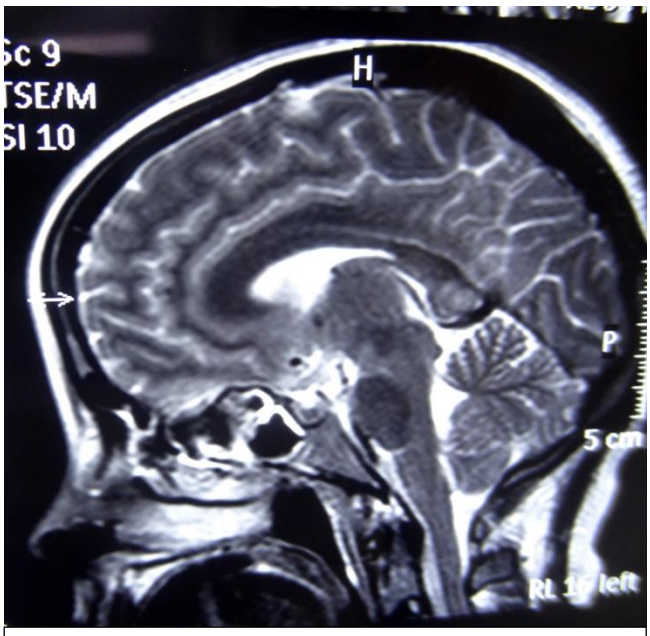

Fig 4 showing T2W MRI image with hyperintensity noted in corpus callosum

III. DISCUSSION

The incidence of dengue encephalopathy ranges from 0.5 to 6.2 %.[4] The proposed possible mechanisms responsible for the same being liver failure (hepatic encephalopathy), cerebral hypoperfusion (shock), cerebral edema (vascular leak), deranged electrolytes, and intracranial bleeding due to thrombocytopenia or coagulopathy, which is secondary to hepatic failure.[5] In a subset of patients the cause for neurological injury could not be elicited even after excluding the above-mentioned indirect mechanisms which raises the possibility of direct neuronal injury due to the dengue virus.[3] Neurotropism and CNS invasion in Dengue virus(DENV) infection has been demonstrated in recent years and detection of viral antigen in brain tissue and DENV RNA amplification in the CSF support the invasive neurotropism of DENV.[5] DENV-2 and DENV-3 serotype infections and young age have been found to be the risk factors for dengue encephalitis.[2] The mortality associated with the condition may be high and the prognosis depends on the causal factors,associated comorbidities and early supportive treatment.[6] Dengue encephalitis is manifested by a reduced level of consciousness, headache, fever, nausea and vomiting, seizures, focal neurological deficits, and behavorial symptoms.[7] There aren't any specific neuroimaging findings suggestive of dengue encephalitis and brain MRI may be normal or show some focal parenchymal abnormalities.[4] These include symmetric gyral edema,altered signal intensity involving bilateral temporal perisylvian regions, hippocampi, and cingulated gyri;[8] thalamus, pons, and bilateral cerebellum cortex can be involved as well.[9]Meningeal enhancement has also been seen on postcontrast MRI.[10] To differentiate between dengue encephalitis from encephalopathy, CSF analysis has been helpful. A lymphocytic pleocytosis with mild increase in CSF protein can be found in

the CSF of patients with dengue encephalitis although a normal CSF cellularity does not exclude the diagnosis.[4] Dengue encephalitis is confirmed by the presence of dengue NS1 antigen and DENV-specific IgM antibodies in the CSF.[9] The management of dengue encephalitis is primarily supportive with maintenance of airway,adequate hydration and nutrition and monitoring of consciousness level without any role of antivirals.[5] Though the ophthalmic complications associated with dengue infection were once thought to be rare,the incidence has increased in the time being with more reported cases with maculopathy being the most common complication whereas retina vasculopathy, optic neuropathy and cranial nerve palsy,the lesser common ones.[12] Although the exact mechanism is incompletely understood,the pathogenesis in dengue-related neuro-ophthalmic complication is believed to be immune mediated and the delayed onset of visual symptoms of up to 1-week following dengue infection favours the same.[11] The overall prognosis for dengue-related ocular complications has been found to be good, and complete recovery coincided with improved platelet counts.[11,12]

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Students' perception of use of social media as interactive resources for teaching and evaluation in University of Maiduguri, Nigeria

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Abstract- This study investigated students' perception towards the use of social media tools as interactive resources for teaching and evaluation in the University of Maiduguri. A survey of 2,466 undergraduate students was carried out in two semesters. The students were the 200 level of a 4/5 -year degree programme in 2017/2018 session offering Educational psychology in the Faculty of Education. The aim was to determine the students' perception on the use of social media tools for interaction in their educational pursuits for teaching and evaluation. 11 Social media tools were identified by the students. Students have used a variety of social media tools to submit assignments, write projects and share educational materials with lecturers and co-students. The most preferred social media tools identified by students are Facebook, Whatsapp, Google Plus, Instagram, and YouTube. Majority of the students spend 1-5 hours engaging in social media activities per day. Female students spent more time in social media than their male counterparts. Due to the inaccessibility of Wi-Fi, students spend huge amount of money buying data from different network providers. The study recommended that the University should provide the cloud for easy access to networks. Interactive boards provided by the University could not be used due to lack of Wi-Fi facility. There should be more training and retraining of staff to engage students in social media to facilitate e-learning that is the global best practice.

Index Terms- social media, interactive resources, teaching, evaluation

I. Introduction

There has been increase in the use of different types of social media in personal life, school, institutions and government. For instance, twitter, blogs, social network sites, wikis, online forums and many others. For example the use of medial as YouTube, Facebook, Instagram, WhatsApp, etc has increasing occupied the centre stage in communication, teaching and evaluation in the drive for new pedagogy.

Globally, the growth in the use of media in teaching and learning has become more relevant and acceptable. In an earlier study carried out by Hussain (2012) among University students, it was found that 90% of were inclined to using Facebook. The further revealed that students used social media for exchanging academic activities, developing social networks, sharing learning experiences with colleagues and international community. In a similar study by Bexheti, Ismalli, Cico, (2014), attempt was made to differentiate between two kinds of use of social media: for example, for personal use only with no connection to teaching responsibilities. And the use in teaching and learning. The results of the study showed that there was no significant difference in the in the experience, and age of teachers when it comes to the use of social media. A study on Saudi Middle school teachers and students use of social media, smart phones were found to be the best device used by both teachers and students. The study reported that both teachers and students were willing to use social medial in education as they all believe that it will enhance their educational experience although the practice was significantly low then (Abdulkareem, 2015).

II. Types of Social Media Tools for Teaching and Learning

Most scholars have studied the impact of social media tools on learning and predicted that they have revolutionized education while others viewed them as potential minefields (Dijck & Poell, 2018). It imperative to note that social media contributes to learning but that there are some disadvantages which users need to be aware of. This might not be different from what Dijck and Poell (2018) said about minefields in social media and education. There are several social media tools that can be used in teaching and learning but the question remains whether teachers and students know about them and their viability for educational experiences. For example;

1. Voice thread- this media allows teachers and students upload and share images, videos and document and then have an online conversation about each other's post through videos, audio (Meyer, 2015).
2. Diigo- according to Meyer (2015), this tool allows users bookmark Web pages from a browser or computer and it saves them to their Diigo account in the cloud. It helps people to annotate and highlight Web pages to assist with research.
3. Scoop.it – is indeed an online content curation and publishing tool that let users search for Web resources related to topics of interest, post them on their personal

Scoop.it page along with notes and then publish their scooped content to a blog or other online media.

4. Instagram- this is an online social network for sharing photos and videos. It can be used in classroom situation, teaching practice classrooms, practical classes etc.
5. Pinterest – is a social bookmarking tool for online images
6. Feedly – is an online feed aggregator for blogs and other sites that use RSS or Atom Syndication. Feedly users can subscribe to feeds and then receive updates to those blogs and sites

Source: www.pustechnology.com (Meyer, 2015).

III. Social Networking Tools

Social networking tools can be powerful ways for students to learn, engage, and network if they can be shown how these can be integrated into their classes (https://www.uky.edu). It important that to outline the ethos for social media tools in the classroom and for the purpose of class evaluation and assignments. The following are social networking tools that schools can use:

1. Sharing – essentially, social networking tools are good for sharing resources. Depending on which platform you choose to use, sharing can take place very publicly, e.g. the use of twitter and Pinterest handles, WhatsApp, Diigo and Google + groups. In the same way, apps like Evernote provide the opportunity for students to work together on a collection of resources.
2. Collaboration – according to this source https:www.uky.edu, sharing can lead directly into collaboration, where students can use tools like Google Docs, Evernote and Workpress to collaboratively work together. Files can be shared, edited synchronously and asynchronously, and students' contributions can often be tracked.
3. Exchange- accordingly, one of the strength of social networking tools is that they are designed largely for discussions and as such an exchange of ideas. In some cases, these might have been reduced to 'likes', little 'hearts'. The ability to to embrace the potential of social networking tools teachers and students can receive feedback and ideas from much larger audience.
4. Creativity- students often come up with creative ways themselves to use and engage with their preferred social networking tools. In this regard, assignments no longer need to be solo-authored, static, paper-based affairs but instead include a wider range of resources, sources and students outputs https:www.uky.edu/celt/instructional-resources

Social media are sometimes accessible by different means including and not limited to *wireless fidelity* or what is simply known as Wi-Fi (Gookin, 2019). In any case, to surf the internet, one has to be in possession of a computer with an internet browser as well as an active internet connection (https://www.computerhope.com). Students face issues with Wi-Fi connection (Burgess, 2018). The modern classroom is an interactive space to foster collaborative learning, digital problem-solving and increase student engagement (https://resourced.prometheanworld.com). But what students face in most Universities in Nigeria is rather pathetic and contrary to global best practice. Most campuses in Nigerian Universities do not operate internet services. This is the reason most Universities cannot foster collaborative learning or increase student engagement.

IV. Students' Perception on Learning with Social Media

It is impotent that students' perception remain critical as education is turning towards making teaching and learning student-centred as against the traditional teacher-centred approach. According to Neier and Zayer (2015), recent studies has discussed the opportunities associated with the use of social media tools in the classroom, but has not examined the perceptions students themselves hold about its usefulness in enhancing their learning. Assessing students' perception learning through social media, Jamari, Mohammed, Zaid and Abdulla (2017) found that the most popular social media used by students in Malaysia Peninsular included Facebook, Whatsapp and Instagram.

Students' perception was found favourable towards social media networking in Bangladesh. Shohrowardhy and Hassan (2014) concluded that discussed their survey findings which explained that whileThey further opined that s In Hurt's study,Finally Hurt et al (2012) recommended this social networking tool it intellectual discourse.

V. Teaching and Evaluation with Social Media

Teacher who knows how to use social media is a boon to the modern classroom (www.wabisalrsrning.com). The blog further explained that having social skills can strengthen teacher-student connection. However, it can be a challenge to incorporate social media into lessons because there are many landmines for teachers to navigate for example, setting guideline, accessibility at school and student safety. Guides to using social media by teachers include the use of Edudemic i.e.

- ✓ Dipping into social media in the classroom- via Edsurge
- ✓ Guide to using Twitter in your teaching practice- via KQED
- ✓ Twitter for teachers- via Scholastic Instructor
- ✓ One-stop-you- need-to-know guide to twitter- via Davis Truss' blog
- ✓ 50 ways to use twitter in the classroom- TeachHUB

Source: www.edutopia.org

Anecdotal literature on social media have revealed that that assessment for learning have suffered so many setbacks due to theoretical underpinnings. For example, a number of teachers made test in classrooms substantially lacked reliability and validity. It means the tests and examinations are meant just for students promotion and graduation (Taras, 2010, Stobart, 2008, & Black et al, 2003). UTLC, (2016) gave a generic categorization of assessment to include written examination, written submission, portfolio, project output, 0ral assessment, group written submission, group presentation and practical

assessment. These generic categorization of assessment has been shown to be limited to two main assessments; formative and summative assessment (William, 2000). It is imperative to note that assessors sometimes relegate the functions of these assessments for social or political reasons (Taras, 2005). For instance, Salikin and Tahir (2017) investigated social media-based approach in writing among University students in Indonesia, the results showed that the use of social media did not significantly improve students' writing skills and that there were specific factors that hindered students achievement from developing writing skills. This finding perhaps explains the shortage of the right applications and programmes for writing different categories of tests or examinations.

VI. Methodology

The survey consisted of 2,466 questionnaire forms administered during lectures to 2,466 students that were at 200 level of their study in the University. The age mean = 23. 67 and standard deviation of 3.97 shows the students are younger and within the active years for the social media tools usage. There were 1,731 male students representing 70.2%) while the female students were 735 representing (29.8%).The students for this present study included Faculty of Education and students from department of nursing studies of college of Medicine. The students are required to credit the course, EDU 202: Educational psychology 2 units. The instrument for data collection included a 48-item question. The reliability index of the questionnaire was r = .84 which was good to be used for data collection. Information on questionnaire included personal information of respondents, types of social media tools used personally and by institution for teaching and evaluation. Teachers involvement in the use of social media tools for teaching and evaluation.

VII. Results and Data Presentation

Data for this study was presented as follows:
Students' demography information

Sex	Number	Mean	Standard dev.
Male	**1731**	**23.67**	**3.97**
Female	**735**	**23.64**	**3.76**

Result showed that there were 1731 male students with age mean of 23.67 and standard deviation of 3.97. while the female students were 735 with the mean ages of 23.64 and standard deviation of 3.76.

Distribution of types of social media tools used by students

Types of social media	Male (%)	Female (%)
Facebook	1703 (73.%)	627 (26.9%)
Whatsapp	1731 (100%)	735 (100%)1
Twitter	109 (41.8%)	152 (58.2%)
Instagram	188 (53.6%)	162 (46.4%)
Pinterest	0 (0%)	0 (%)
LinkedIn	18 (27.3%)	48 (72.7%)
Snapchat	135 (39.5%)	207 (60.5%)
YouTube	1711 (98.84%)	732 (99.59%)
WordPress	0 ()%)	0 (0%)
Uber	412 (23.80%)	238 (32.38%)
Google Plus	1731 (70.2%)	735(29.8%)

Hours per day used on social media by students

Hours per day	Male	Female
1-5 hours	1197 (69.2%)	703 (95.6%)
6-10 hours	534 (72.65%)	32 (4.35%)
11- 15 hour	0	0
16-20 hours	0	0
20 hours and above	0	0

The most preferred social media tool used by students

Most Preferred tools	Male (%)	Female (%)
Facebook)	1703 (69.1%)	712 (28.9%)
Whatsapp	1709 (69.3%)	733 (29.7%)
YouTube	1711 (69.4%)	731 (29.6%)
Google Plus	1700 (68.9%)	733 (29.7%)
Instagram	1613 (65.4%)	729 (29.6%)

The most preferred social media tool used by students were five. Student agreed that these can used for teaching as well as sharing of educational information, and evaluation. Considering the percentage of male and female in this study, it appears the female students preferred the use of all the social media more the male students.

VIII. Discussion of Findings

This study was designed with the view to assess the perception of students towards the use of social media tools for learning and assessments in the University. The study was carried out on 2,466 students offering Educational Psychology in Faculty of Education, University of Maiduguri. Male students were 1,731 and the female 735. Of these numbers 703 (73%) male students and 627 (26.9%) female students had android phones, iPad or tablets. The rest who appeared not to have android phones said they use friends or siblings devices and computer centres or personal computers to carry out social media functions. While some of the students were not on some social media, however, 100% of them used the Whatsapp. The next highest social media being used by the students included the YouTube and Facebook. They use YouTube for specific and similar topics being taught online by experts other than their lecturers. By this, the generic categorisation used by UTLC, (2016) for assessment that is, written examination, written submission, portfolio, project output, 0ral assessment, group written submission, group presentation and practical assessment could be deployed using these social media students are already familiar with. The University has for a long time engaged students in computer-base testing (CBT) for semester examinations. Most of the students gained entry into the University through the Joint Admission Matriculation Board (JAMB) which is the examination body for University admissions (JAMB, 2019). Snapchats are additional social media used by students though at personal level. The use of WordPress, Pinterest, LinkedIn was very insignificant owing to the fact that students are not familiar with their uses. Of the eleven social media tools listed in this study, students were most acquainted and preferred just five namely; Facebook, Whatsapp, YouTube, Google Plus and Instagram.

These are very important tools that can be put into use by lecturers for teaching and evaluation, especially the Google Plus, YouTube and other social media mentioned earlier in the study. This has been collaborated by Davis (2015) who opined that though it can be daunting if not properly managed to yield the desired results because according to Davis, there are many grey areas for teachers to navigate for example, setting guideline, accessibility at school and student safety. The use of Google Plus by students to carry out assignments and research work for their projects is evident by the amount they often spend to purchase data due to lack of Wi-Fi service on campus. Students lamented huge sums of money they spend to purchase data for browsing to do academic work. In situation like this, it is imperative to select few social media tools. This might be the reason why students have no wider knowledge of other social media tools.

Preliminary investigation done by the researcher in the University revealed that Interactive White Boards were installed in some lecture halls with public address systems but are seldom used by lecturers. Apparently, the resources have not been used due to lack of WIFI on the campus. Worse still, in most times due to lack of electricity or inadequate knowledge of the use.

Data in the study showed that while 95.6% of the female students engaged in social media between 1-5 hours per day, just 69.2% of the male students do similar thing. This shows that the females were more engrossed in the use of social media than the males. In this case, depending on the usage, if the University could design suitable platforms for student-lecturer interaction, the female students would derive greater benefits as well. This reflects the views of Emmanuel (2016) that, understanding the evolutionary pattern is the key that unlocks which social media platforms college will continue to use most.

IX. Conclusion/Recommendation

On the basis of the findings in this study and the limitations thereof, it was concluded had positive perception towards social media tools for teaching and evaluation. They are eager to use the different types of social media to learn and do all forms of assessment in the University. The study recommends therefore that the University should take steps to introduce e-learning platforms that would facilitate teaching and evaluation. It is not enough to conduct Computer Base Testing but do not use the tools for teaching.

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Kumarsambhavam Panels of National Museum of Nepal: Study of Tangible and Intangible Features

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Abstract- The stone sculptures of Kumarsambhavam, displayed here in the stone work section of the National Museum, Nepal, are known as the important narrative panels of Lord Kumar the son of Mahadeva and Parvati. There are five different sculptures which describes the nativity story of Kumar. Kumarsambhavam is a Sanskrit poetry written by a famous Sanskrit poet Kalidasa in 4th century A.D. It is believed that the narrative panels are based on the version of the story of the poetry as mentioned above. No doubt, the Nepalese artists of ancient period perfectly carved the main notion of such poem as narrated by the renowned poet Kalidasa in his literature. These sculptures are regarded as the master pieces of aesthetic appeal of the artists especially the form of stone work of ancient Nepal. Through the sculptures, the artist has tried to describe the stories like Parvati in penance Arpana, Shiva in the disguised form of young Bramhachari, Shiva Parvati in amour, dancing Shiva Parvati and Shiva Parvati with infant Kumar celebrating his birthday in their beautiful imagination and creation. There are some studies regarding the Kumarsambhavam panels, but there is still a lack of research and publication as its perspectives of tangible and intangible features. Keeping it in mind, this article is prepared to provide the proper solution of the problem.

Index Terms- Kumarsambhavam panels, stone sculpture, tangible, intangible, features, dating issue.

I. Introduction

In the real sense, culture represents a system of tangible and intangible components. Tangible components of culture represents material culture and comprises productive force and physical elements necessary to support human life, such as clothing, tools, food, buildings, paintings, and many other cultural objects and artifacts. Intangible elements represent non-material culture and refer to values, beliefs, attitudes, morality, ethics, spirituality, traditions, and customs *(Reisinger, 2009, p. 90)*. Apparently, culture exists everywhere, at various levels of society, and everyone belongs to at least one, super-national level (western and eastern civilization), at the national level (American, French, Japanese), at the ethnic level (Chinese and Malay of Malaysia), and so on. Culture can also be applied to other social units such as occupational group (lawyers, accountants, physicians etc.), corporations (IBM, Shell, and Disney) and even tourism sectors (restaurants, hotels, airlines) *(Kunwar, 2015, p.3)*. As per the above mentioned components culture can be classified into numerous forms. Whereas, viewed from material and non- material perspectives it can be classified into tangible and intangible, two different forms.

II. Methodology

The article is based on descriptive and analytical research designed. Both primary and secondary data have been used in this study. For this article the essential primary data and information have been collected by doing frequent surveys of National Museum in *Chhauni*. The secondary data and sources are considered important factor for this study which has been collected through the previous research work as well as published and unpublished literature. Regarding the *Kumarsambhavam* panels, we can find some studies have been carried out by different native scholars and from aboard as well. No doubt, all the studies and publications concerning these panels help to provide the description and artistic appeals of the sculptures. But there is still a lack of specific research as it's the perspectives of tangible and intangible features. Hence, realizing a strong need for the study, an effort has been made to respond afore mentioned research gaps. In this respect, this article entitled *Kumarsambhavam Panels of National Museum of Nepal: Study of Tangible and Intangible Features* is expected to address the need to some extent.

III. Analysis to the Panels

Different Hindu religious scriptures like *Ramayan, Mahabharat, Puran, Meghaduta, Raghubansa, Kumarsambhavam* mentions the description about the *Kumar*, his birth, his parents and cause of his birth in the universe very clearly. In these texts *Shiva, Ganga, Agni, Swaha, Kritika* and others are mentioned as the father and mother of Kumar. During the epic period *Kartikeya* was venerated as the God of war. According to *Pauranic* literatures, *Tarakasur*, a demon was blessed that he could only kill by five years infant baby and non others which brought massive movement in the heaven. *Kumar* is known to have born from Lord *Shiva* and Goddess *Parvati* in order to kill the demon *Tarakasur (National Museum,2018,pp.17)*.

Kumarsambhavam is an image of narrative panel which represents the nativity scene of Lord Kumar the son of *Mahadev* and *Parvati*. The subject of these reliefs has been identified by N.R. Banerjee as *Parvati's* Penance as described by *Kalidasa* in *Kumarsambhavam*. In this respect, *Banerjee* mentions that Sati,

daughter of *Daksha*, had been married to Shiva, but was moved to her shocking death at the uncalled for insult to her husband deliberately meted out by her father at a sacrifice to which he, i.e. Shiva, had not been invited. She was reborn thereafter as the daughter of *Himavan* (Himalaya) and *Menaka* as *Parvati*, and was form in her resolve to have Shiva again as her lord and husband even in her reincarnation. Soon after she came of age she repaired to the hills and began her austere penance to gain the favour and hand of Shiva. The story of her penance has come down to us from the *Brahma Purana, Kalika Purana* and the *Varaha Purana* respectively. The quintessence of the event was culled by *Kalidasa*, as early as the fourth century A.D., and rendered into exquisite poetry in his famed *Kumarasambhavam,* dealing with the events leading to the birth of *Kumara* or *Karttikeya* (*Banerjee, 1968, p. 27*).

Thus Pal mentions that, it seems abundantly clear that the sculptures could not have used *Kalidasa's* , the *Kumarsambhavam* as their textual source for these reliefs. A for more likely source is the *Kumarsambhava* section of the *Matsya Purana* or perhaps the lost fourth *Pada* of the *Devi Purana*, which treated the same theme and probably formed the basis for both *Kalidasais* and *Matsya Purana* versions (*Pal, 1974,p.151*). In fact *Kalidasa's* version of the *Kumarasambhavam* has been built dealt with very graphically in five disjointed panels of limestone, which anciently formed the veneer stones of a temple, undoubtedly of Shiva. Stone temples of the *Sikhara* type, commonly prevalent in India, were obviously not unknown in Nepal even in the early days of the *Lichchhavi* rule (*Banerjee,1968,p.28*).

The narrative panels displayed here in the stone work section of the museum are based on the version of the story mentioned on the Sanskrit poetry *Kumarsambhavam*, composed by a famous Sanskrit poet *Kalidasa*. By analyzing its Mongolian physical structures, hair ,dress, garments, ornaments and other sculptural features some scholars have viewed that these panels are not related with the story of *Kumarsambhavam* and other description available in the *Pauranic* literatures (*Chhetri & Rayamajhi, 2060, pp. 105-106*). A very interesting piece of sculptured relief of this trend like Temptation of Mara of National Museum comes from *Nagaltol* (fig. 32 and 33). Presumably narrating the legend of the *Kumarshambhavam* the relief actually purports to present a very sweet sensuous domestic scene with love, care and tenderness. The soft sensitivity of the plastic treatment, the vibrant composition, the leader curvaciousness of line, the graceful movement of figures and the fine and subtle display of light and shade make it a most interesting human document. The rhythm of the sweeping curves adds a peculiar charm, which is unmistakably informed by the warmth of the senses (*Ray, 1973, p. 35*).

Nepalese artists perfectly caught the theme as narrated by the renowned poet *Kalidesa* and beautifully depicted their imagination in these panels. These panels were recovered from *Kathesimbhu* and *Naghaltol,* Kathmandu. In Nepal the tradition of engraving *Kumarshambhavam* panels existed from the *Lichchhavi* period. The five panels concerned with the story of *Kumarshambhavam* which are displayed in national museum, are known as the beautiful examples of stone work. The stories like *Parvati* in penance *Arpana*, Shiva in the disguised form of young *Bramhachari*, *Shiva Parvati* in Amour, Dancing *Shiva Parvati* and *Shiva Parvati* with infant *Kumar* celebration his birthday is depicted in different panels on the basis of the theme as narrated by the renowned poet *Kalidesa*.

The first panel (pl. no.1) discovered from *Naghaltol,* is now displayed in the museum which represents the story of *Parvati* in penance *Arpana.* As par the records maintained by the museum it was collected and registered in 2030/05/02 with the size of 94 cm and 41 cm in length and breadth respectively. This is the longest panel at *Naghaltol* shows a hilly background within a framework of a flower- bearing tree on either side. This is the scene of *Parvati'*s penance as depicted by *Kalidasa* (*Banerjee,1968,p.29*). In this panel, there are three human figures which are depicted in different physical postures and expression. In the middle, there is a beautiful carving of goddess *Parvati* in seating posture as a penance within the cave. *Parvati* has two hands which perform different business. The right is rising toward her head putting the elbow on her thigh presenting *karna mudra* (gesture) whereas; the left one is trying to carry the flower pot given by another female figure. Goddess *Parvati* has been sculptured with big and lengthy hands, legs and fingers which are the main physical features of the figure.

Apart from these, due to the broken condition we couldn't observe the overall facial structure of the figure of *Parvati.* There is a transparent garment on the upper part while the lower part of the body is seemed to have been cover by a decorative drapery. We can observe the beautifully adorn hair dress on the head. These are the major dresses and ornaments which is seemed to be used in the figure of *Parvati*. But regarding the image of female Nepalese art historian, Joshi isn't agreed to the figure of goddess *Parvati*. He viewed that the female figure might be the icon of queen or woman possessor (*Joshi, 2032,p. 31*). There are two female figures seated on the right and left side of Goddess *Parvati*. On the right side two handed female figure sits and serves the feet of *Parvati* through a hand, as a maidservant. Unfortunately, remaining one hand is already broken. There is another figure of maidservant on the left which serves the flower pot through her left hand and right seems busy catching the elbow of *Parvati*. There are two trees on both flanks of the cave where we observe beautiful carving of a deer on the right and a wild boar on the left of the bottom and also a bird sitting on a branch of the tree.

The second panel (pl. no. 2) represents the story of Shiva in the disguised form of young *Bramhachari* with its beautiful engraving. Record of the museum tells that this sculpture was collected and registered in 2030/05/01 by measuring the length 53 cm and the breadth 41 cm. This panel was also recovered from *Naghaltol.* There are two human figures and a deer on the middle portion of the panel. Among the figures, *Banerjee* interprets the scene as that where Siva, disguised as a young and attractive *Bramhachari*, comes to test the earnestness of *Parvati*'s penance and fidelity (*Banerjee, 1968, p. 30*). But regarding the figure, Pal suggests that the figure might be the image of *Virabhadra* one of the beautiful member of Shiva family (*Pal, 1974, p. 48*).

And the other is *Parvati* on a penance mood within the cave. *Parvati* has already lost her hands and facial parts, so we couldn't observe the gestures of her hands and facial appearance as well. Shiva is standing on the back side of *Parvati* with the flowers on his hands. There is lack of garments on the upper part

while the lower part of the body is seemed to be covered by a decorative drapery. Beautifully adorn hair dress, earrings on the ears, garland with locket on the neck are the major dresses and ornaments of the figure of Lord Shiva.

The third panel (pl. no.3) too recovered from *Naghaltol*, is now displayed in the stone art section of National Museum which represents the story of *Shiva Parvati* in amour which seems very beautiful and realistic in nature. Record of the museum tells that it was collected and registered in 2030/05/03. The size measuring of the sculpture is 50 cm and 43 cm in length and breadth respectively. According to *Banerjee* the third panel shows even in its damaged condition, a couple in ecstatic intimacies and dancing in joy. This is no doubt a picture of divine couple in their ecstasy as they have found out about the portending birth of Kumar, whose forthcoming advent is indicated by the delineation of his mount, the peacock, at the right of the couple (*Banerjee, 1968, p. 31*).

Obviously, there are two human figures that are Shiva and *Parvati*. In this panel two handed *Parvati* is sitting on a kneeling posture and holds flipper on his right and a *Korra* (a weapon of wooden handle made by the rope) on the left hand. There are no garments on the upper part while the lower part of the body is seemed to cover by simple drapery. We can observe the figure of Shiva near *Parvati* with beautifully adorn hair dress, earrings on the ears, garland with locket on the neck and presents *Abhayamudra* from the right hand and putting on the waist to the left.

Likewise, the forth panel (pl.no.4) was also discovered from *Naghaltol*, which is now displayed in stone art section of National Museum, represents the events of dancing moods of Lord *Shiva* and Goddess *Parvati* with its beautiful engrave. Record of the museum tells that this sculpture was collected and registered in 2030/05/01 by measuring the length 64 cm and the breadth 41 cm. In this panel there are two human figures and a peacock which is presents a beautiful dance within the cave. Shiva is sitting on the right, *Parvati* on the left and a peacock too sits on the left of *Parvati.* Two handed Shiva holds a flower with stick from his one hand and touches the land with the next. *Parvati* also has two hands, among which one is put on her knees and other is completely broken.

Similarly, the fifth or last one (pl.no.5) was also recovered from *Naghaltol*, now is displayed in stone section of the museum which represents the celebration of birthday program of infant *Kumar* with the presence of *Shiva Parvati.* As per the records of the museum it was collected and registered in 2030/05/01 with the size of 68 cm and 42 cm in length and breadth respectively (*National Museum, 2018, p. 18).* Here in this panel there are three human figures and a peacock which look busy in celebrating the birthday party of their son Kumar within the cave. In this sculpture Shiva and *Parvati* are standing in left and right sides respectively. In the middle section of the panel there is infant Kumar with his mount peacock.

IV. Major Features

Whatsoever, these narrative panels are known as the masterpieces of sculpture art of Nepal during the fifth to sixth century A.D. These are considered most remarkable narrative friezes among the other found scattered around the *Kathesimbhu* area. Unfortunately, due to the absentees of date and inscription, we couldn't provide the absolute date of its creation. At present, these are regarded as the illustrative examples of stone work of the country which reveals the high classed and well trained workmanship of artists. The scenery of all the panels are laid amid the hills, the Himalayas, indicated by characteristic grooves used conventionally as a symbol to denote rock (*Banerjee, 1968, p. 29*). The mongoloid facial structure, colossal and giant physical appearance, curly and unusual hair dress, well developed breast, expression of sexual appeal, elasticity and flexibility of body, dynamic and alive nature, selection of quality stone, expression of secular life style, happiness of life are the common characteristics of the sculptures whereas, the specific features as the tangible and intangible forms are as following:

Tangible Features

Tangible culture can be seen in material forms. It can be observed through the senses. This form of culture includes those types of physical elements which are constructed by the men for the fulfillment of their needs. For illustrations dress and ornaments, food and drink, tools and weapons, buildings and utensils, road and means of transportations, different forms of art and architectures and many other material objects can be included in tangible form of culture. As per the above mentioned provision, the physical posture, hand gestures, dresses and ornaments, weapons and tools which can be observed in these panels are included within the tangible features of the sculptures.

Intangible Features

Intangible culture cannot be seen in material forms. It can only be observed by inner feeling of human beings. The UNESCO convention for the safeguarding of the intangible cultural heritage 2003 defined intangible culture as follows: the intangible cultural heritage means the practices, representations, expressions, knowledge, skill as well as instruments, objects, artifacts and cultural spaces associated there with that communities, groups and in some cases, individuals recognize it as a part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity. UNESCO further classified the intangible cultural heritage in five different domains i.e. (a) oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; (b) performing arts; (c) social practices, rituals and festive events; (d) knowledge and practices concerning nature and the universe; (e) traditional craftsmanship *(UNESCO, 2003, pp.6-8).*

Folktales are considered as the intangible heritage, associated with oral traditions and expressions. According to *Banerjee* these sculptures were created on the basis of folktales of birth of Kumar, found in the poetry of *Kumarsambhavam* whereas, Pal is associated with these sculpture with the folktales of *Virabhadra* found in *Matsya Purana* (*Pal, 1974, pp. 47-48*). Whatsoever, narrative panels of *Kumarsambhavam* have helped to reveal the folk stories mentioned on ancient Hindu literatures. Workmanship is another heritage concerned with the domain of

traditional craftsmanship. The Mongolian facial composition, unique hair style, proportionate limbs, elasticity of body, beautiful garments and ornaments of these panels are considered to be the exotic creation of Nepali artists and high classed skill of craftsmanship. Skill and style is another part of intangible feature of the sculptures. These sculptures reveal some ceremonies especially marriage and birth through their carving which can be associated with the rites and rituals of Hindus. Aesthetic emotion is the feeling of beauty which is an important part of intangible features of the different forms of the arts which can also be found in these panels.

V. Dating issue

There is a lack of date and inscription with these illustrative panels, so it is very difficult task to identify the exact date when these were engraved. According to *Kramrisch* the sculptures which were recovered from *Kathesimbhu are* belonged to 7th century A.D. (*Kramrisch, 1964, p. 32*). *Banerjee* has suggested all the five, in spite of the differential ravages of time, belong together, forming different scenes of compact dram, and can be dated to about the fifth – sixth centuries A.D. (*Banerjee, 1968, p. 29*). Pal determines that from the Gupta period, at least in the *Gangetic* plains, the Buddhist seems to have made a little use of narrative reliefs in embellishing their shrines. On the other hand, both the *vaishnavas* and the *Saiva*s show a new zeal for propagating and popularizing their myths by visual means, probably as a direct result of the redaction of the *Puranas*. In Nepal, the kings of the seventh and eighth centuries, with the exception of *Bhimarjundeva*, reveal a distinct preference for *Saivism*, which must have been further strengthened by the *Lichchhavi* marriage that relates with the royal house of *Kanauj* and Magadha. Thus it is quite possible that these reliefs once did grace a *Saiva* temple erected by *Amshuvarma* or one of the later *Lichchhavis*. If a *Lichchhavi*, the monarch most likely to have consecrated such a temple would be the avowed *Saiva* poet king, *Jayadeva* II. Therefore, the date of these sculptures might be 7th to 8th century A.D. (*Pal, 1974, p. 151*).

In this issue, Ray says that the tradition of sculpturing these types of panels was already existed in the northern provinces of India from the early period which brought influences to the Nepalese school of art and the artists were created this works of art in *Lichchhavi* period (*Ray, 1973, p. 35*).In the view of other several scholars, these sculptures which were recovered from *Kathesimbhu* and *Naghaltol*, Kathmandu are belonged to 6th /7th century A.D. *(National Museum, 2018,p.17)*.

From the wall of the demolished *Pati* (rest house) of *Kathe-Swayambhu, Naghaltol*, three different types of stone sculptures were recovered which indicates the spontaneity attitudes of artists. On the basis of artistic appeal, feeling, features, style and skill, especially the female figures remaining similar with the female images which were constructed by the *Amarawati* School of Art during the preliminary phase of Christianity. But these are not as old and ancient as the sculptures of *Amarawati* of India. Only, these sculptures are dated as the illustrative sculptures of eight to ninth century Christian era (*Joshi, 2032, pp. 31-32*).

There is a lack of date and inscription in these sculptures. Therefore, it is very difficult to determine the absolute date of these images when these were sculptured. In archaeology, there are two types of dating methods which are absolute and relative. In this respect, due to absentees of date and inscription, we can go through the relative dating method to determine the date of these works of art. Finding physical features, workmanships, skill and style, quality of stone, lack of holy threads in the male figures, limited use of ornaments and other evidences suggest that these reliefs might have been sculptured during the 5th - 6th century Christian era.

VI. Conclusion

As a whole the sculptures placed in succession here represent, *Parvati* in a tough penance to show her undaunted love for her beloved Lord Shiva, (*Shiva* in the disguise of a young celibate monk), the divine wedding, *Shiva Parvati* in an amorous mood, divine romance and celebrating the birth of their son Kumar/ *Kartikeya*). The facial composition of these sculptures display some Mongolian features and possess charming expression. With the execution of unique hair style, the harmonious balance of body proportion, beautiful garments and ornaments, these panels are considered to be the exotic creation of Nepali artists. Tangible features can be seen in material forms whereas; intangible cannot be seen in material forms. It can only be observed by inner feeling of human beings. Physical posture, hand gestures, dresses and ornaments, weapons and tools which are found in these sculpture art can be included in tangible feature whereas, folktales, craftsmanship, skill and style, rites and rituals, aesthetic emotion which are shown in these panels can be included within intangible features.

Plat No. 1

Plat No 2

Plat No. 3

Plat No 4.

Plat No 5.

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CFD Analysis of A Thermal Barrier Coated Turbine Blade

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Abstract- The major objective of the present work is to study the thermal profile for a considered turbine Blade without Thermal Barrier Coating. Then, the thermal profile of the same blade with Thermal Barrier Coating is studied. A ceramic TBC coating like Yttria-stabilized Zirconia or SiC matrix composite is used as the coating for the turbine blade profile. Through extensive CFD analysis using NUMECA, the CFD tool used to generate and simulate the flow over the turbine blade, the objective is carried out. Flow behaviors over the two turbine blades and the data obtained post simulation are compared and the the effectiveness of the Thermal Barrier Coating is observed.

Index Terms- CFD, SiC matrix Composite, Thermal Barrier Coatings (TBC), Turbine Blade, Yttria-stabilized Zirconia

I. INTRODUCTION

The Turbine Blade is a work extraction device that balances the Aerodynamic, Structural and Thermal demands for the best performance.
The operating temperatures of gas turbine engines have been increasing from the past few decades for improving engine power and efficiency. Interest in bettering the efficiency of gas turbine engines for aviation applications has furthered investigation into higher combustion temperatures [8]. Nickel based super alloys operate around the temperature of 1300°C with internal cooling, and 950°C – 1175°C without internal cooling. Nickel is corrosion resistant, which is an invaluable property for the functioning elements in a jet engine. It's melting point is around 1,728K (1,455°C). It's ability to form alloys is another property of paramount importance, especially with Aluminum, which forms a compound known as gamma-prime that retains its strength at high temperatures [9]. Nickel alloys, almost up to 85 per cent of the melting point, retain their strength unlike Steel or Titanium, where a rapid decrease in the strength is seen, as 40-50 percent of the melting point is encountered. Hence, Nickel based super alloys serve at high temperatures quite well, which is a boon to aviation.

However, the barrier to temperature increase are material problems such as creep resistance, thermal fatigue, high-temperature Sulphur corrosion, and erosion. Therefore, it has become a constant necessity to advance the temperature withstanding capabilities of materials used in the aerospace sector. To tackle this, many types of coatings are suggested, and, implemented to protect various structural engineering surfaces, from problems like corrosion, erosion, and wear and to provide lubrication and thermal insulation.

Of all these, Thermal Barrier Coatings (TBCs) are used in the most demanding high temperature environment of industrial gas-turbines. They are highly advanced systems, commonly used to protect nickel-based super alloys from both melting and thermal cycling in aviation turbines [8]. TBCs are applied to metal surfaces, especially in aviation engine and gas turbine parts that operate at extremely high temperatures.

Combined with cool air flow, TBCs increase the allowable gas temperature above that of the super alloy melting point. It performs well in managing exhaust heat [8]. With today's jet engine operating temperatures, thermal barrier coating failure results in melting of the blade. But even without reaching such catastrophic failure, blades suffer from accelerated oxidation and, depending on the environment, hot corrosion. Coatings can considerably enhance the oxidation/hot corrosion resistance of these components [10].

Ceramic thermal barrier coatings (TBCs) offer the potential to significantly improve efficiencies of aero engines as well as stationary gas turbines for power generation. On internally cooled turbine parts temperature gradients of the order of 100 to 150 °C can be achieved.
Today, state-of-the-art TBCs, typically consisting of an Yttria-Stabilised Zirconia top coat and a metallic bond coat deposited onto a super alloy substrate, are mainly used to extend lifetime. Further efficiency improvements require TBCs being an integral part of the component, which in turn, requires reliable and predictable TBC performance [11]. Hence, an effective simulation of such environments could be highly beneficial towards developing better protective materials.

II. RESEARCH AND LITERATURE SURVEY

Interest in increasing the efficiency of gas turbine engines for aviation applications has prompted research into higher combustion temperatures.

Thermal barrier coatings (TBCs) made of low–thermal conductivity ceramics are now being used to provide thermal insulation to metallic components from the hot gas stream in gas-turbine engines used for aircraft propulsion, power generation, and marine propulsion. The use of TBCs (100 to 500 µm in thickness), along with internal cooling of the underlying superalloy component, provide major reductions in the surface temperature (100° to 300°C) of the superalloy [13].

This has enabled modern gas-turbine engines to operate at gas temperatures well above the melting temperature of the superalloy (~1300°C) and a Turbine Entry Temperature (TET) of 1700°C and more, thereby improving engine efficiency and performance by reducing the cooling load up to 36% while maintaining the same creep life of the blade or increasing considerably the creep life of the blade while maintaining the same cooling load and efficiency, allowing the blade to operate at lower temperatures for the same TET.

Alternatively, at somewhat lower operating temperatures, TBCs help reduce metal temperature, making engine components more durable. TBCs are also being used, to some extent, in diesel engines, where higher operating temperatures translate into increased fuel economy and cleaner exhaust.

The following anatomy of a TBC as shown below (taken from [3]), will give a clear idea of the complexity involved in such a highly advanced system.

Structure of a Thermal Barrier Coating
The four layers in the current TBC system (Fig 1) are made of different materials with specific properties and functions. These layers are:
(i) the substrate,
(ii) the bond-coat,
(iii) the thermally grown oxide (TGO), and
(iv) the ceramic top-coat.

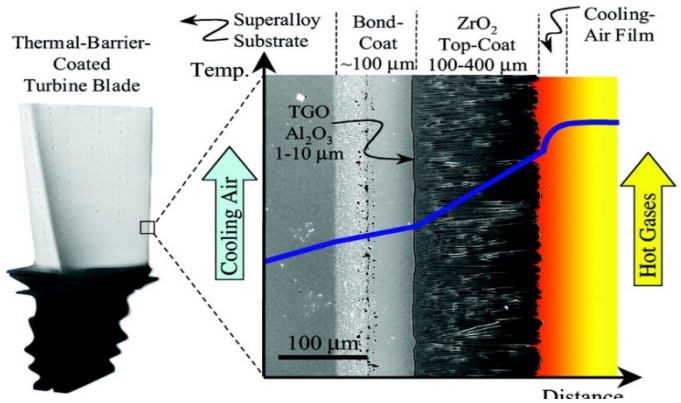

Fig 1: *Thermal Barrier Coated Turbine Blade*

(i) The substrate
The nickel- or cobalt-based structural superalloy is the substrate material, which is air-cooled from the inside or through internal hollow channels, thus establishing a temperature gradient across the component wall. The superalloy component is investment-cast in single-crystal or polycrystalline forms, and it contains as many as 5 to 12 additional elements that are added for the enhancement of specific properties such as high-temperature strength, ductility, oxidation resistance, hot-corrosion resistance, and castability.

(ii) The bond-coat layer

The bond-coat is an oxidation-resistant metallic layer, 75 to 150 μm in thickness, and it essentially dictates the spallation failure of the TBC. The bond-coat is typically made of a NiCrAlY or NiCoCrAlY alloy and is deposited by using the plasma-spray or the electron-beam physical-vapor deposition methods. Other types of bond-coats are made of aluminides of Ni and Pt and are deposited by electroplating in conjunction with diffusion-aluminizing or chemical-vapor deposition. In a minority of cases, the bond-coat consists of more than one layer, having a different chemical/phase composition.

(iii) The Thermally Grown Oxide (TGO) layer

At peak operating conditions the bond-coat temperature in gas-turbine engines typically exceeds 700°C, resulting in bond-coat oxidation and the inevitable formation of a third layer—the thermally grown oxide (TGO; 1 to 10 μm in thickness)—between the bond-coat and the ceramic top-coat. The interconnected porosity that always exists in the top-coat allows easy ingress of oxygen from the engine environment to the bond-coat. Moreover, even if the top-coat were fully dense, the extremely high ionic diffusivity of oxygen in the ZrO2-based ceramic top-coat renders it "oxygen transparent".

(iv) The ceramic top-coat layer

This layer provides the thermal insulation and is typically made of Y2O3-stabilized ZrO2 (YSZ). YSZ possesses a suite of desirable properties that make it the material of choice for the top-coat. It has one of the lowest thermal conductivities at elevated temperature of all ceramics [∼2.3 $W \cdot m^{-1} \cdot K^{-1}$ at 1000°C for a fully dense material because of its high concentration of point defects (oxygen vacancies and substitutional solute atoms), which scatter heat-conducting phonons (lattice waves). YSZ also has a high thermal-expansion coefficient (∼11×10^{-6} $°C^{-1}$), which helps alleviate stresses arising from the thermal-expansion mismatch between the ceramic top-coat and the underlying metal (∼14×10^{-6} $°C^{-1}$).

To further alleviate these stresses, microstructural features such as cracks and porosity are deliberately engineered into the top-coat, making it highly compliant (elastic modulus ∼50 GPa) and "strain tolerant."

YSZ has a relatively low density (∼6.4 $Mg \cdot m^{-3}$), which is important for parasitic-weight considerations in rotating engine components.It also has a hardness of ∼14 GPa, which makes it resistant to erosion and foreign-body impact. YSZ is resistant to ambient and hot corrosion. Finally, YSZ has a high melting point (∼2700°C), making it suitable for high-temperature applications.

[1] HIH Saravanamutto in his book "Gas turbine theory" explains that the Turbine efficiency is strongly correlated with combustion temperature. Higher temperature combustion improves the thermodynamic efficiency of the machine, giving a more favorable ratio of work generated in relation to waste heat.

[2] Marek Chalimoniuk in his paper "Types of Damages to Turbines of Aircraft Turbine Engines; Diagnosing Capabilities", describes the various types of damages the aircraft gas turbine blades are prone to, and suggests the use of protective coatings over engine components for the purpose of thermal, creep and corrosion protection.

[3] Bilge Saruhan in his research paper "Advanced Coatings for rotating Aero Engine Components" explains that Thermal barrier coatings are commonly used to protect nickel-based super alloys from both melting and thermal cycling in aviation turbines. Combined with cool air flow, TBCs increase the allowable gas temperature above that of the super alloy melting point. A thermal barrier coating (TBC) is a highly advanced system applied to surfaces, like metals, especially in aviation engine and gas turbine parts that operate at extremely high temperatures. It performs well in managing exhaust heat. With today's jet engine operating temperatures, thermal barrier coating failure results in melting of the blade. But even without reaching such catastrophic failure, blades suffer from accelerated oxidation and, depending on the environment, hot corrosion. Coatings can considerably enhance the oxidation/hot corrosion resistance of these components.

[4] Chen Jiang goes on to state the the role of thermal barrier coatings (TBC) is, as their name suggests, to provide thermal insulation of the blade and a coating of about 1-200 μm can reduce the temperature by up to 200°C.

[5] Prof. Nageswara Rao Muktinutalapati in his thesis "Material for Gas Turbine – An Overview" published in November 2011 specifies the different processes by which TBCs can be manufactured.

III. SIMULATION IN NUMECA

COMPUTATIONAL FLUID DYNAMICS

For optimum results, a tool exclusive for turbo machinery "NUMECA" has been developed. This tool helps promote flow analysis over any turbomachinery component and the real time design of Gas Turbine Blade is taken as the model.

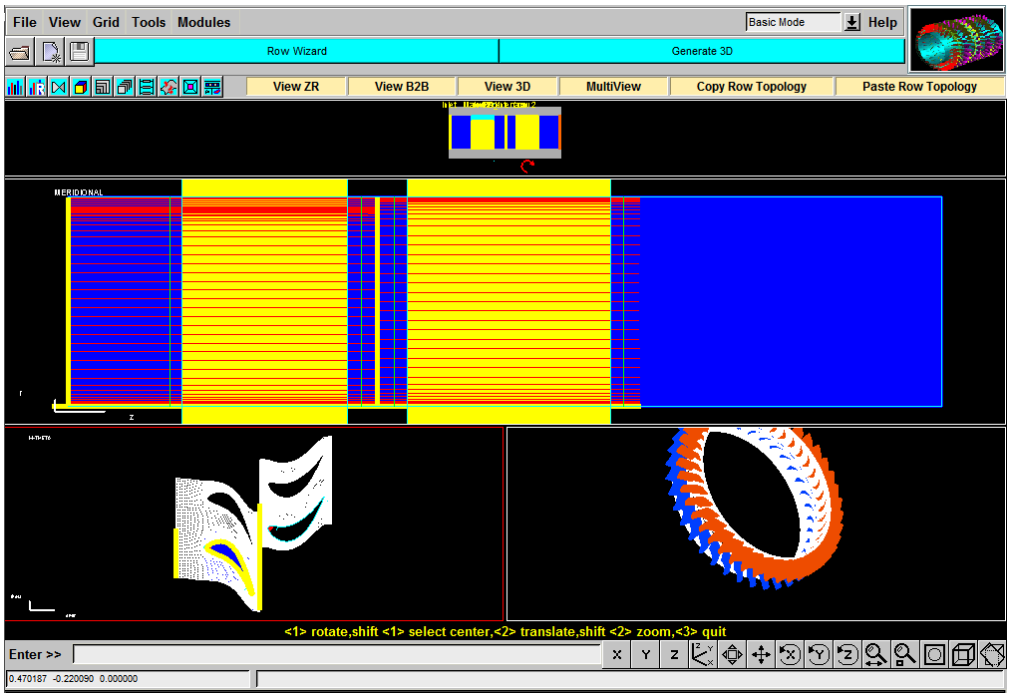

Fig 2: *Meshed multi – views of the generated Turbine Blade*

The mathematical model used here is Navier – Stokes Equation and the Turbulence model is Spalart – Allmaras Equation, as the analysis involves Wall – Bounded Flow.
Boundary Conditions provided for Temperature Distribution are Heat Flux & Convection (Conjugate Heat Transfer) . For this analysis, Thermal Conductivity was the required mechanical properties for the Thermal Barrier Coatings. The Flow Analysis is performed using NUMECA which was used to demonstrate & understand the flow over turbine blade through velocity & pressure.

The Boundary condition applied are inlet velocity, Exit pressure, outlet pressure, Temperature, Inlet turbulence intensity.
After extensive literature survey, the average values of Thermal Conductivities of the Bond Coat and the Ceramic Top Coat is taken as 1 W/mK and 2.2 W/mK and their corresponding thickness over the Turbine Blade's surface is approximately 150 and 250 microns respectively.

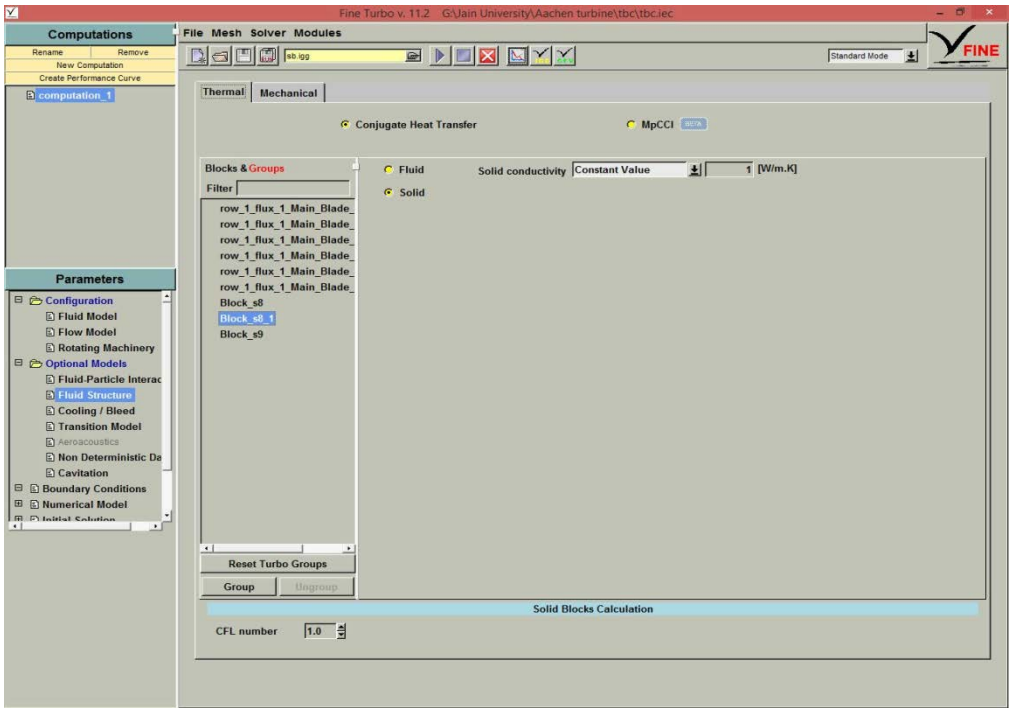

Fig 3: *Setting the Thermal Conductivity of Bond Coat*

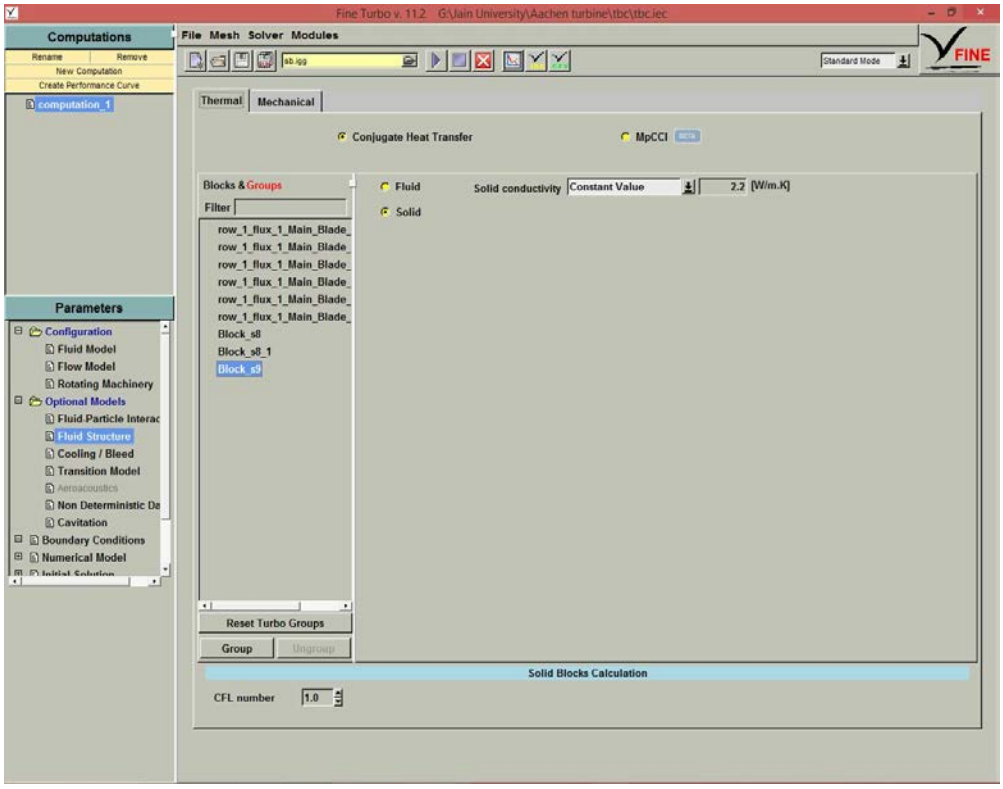

Fig 4: *Setting Thermal Conductivity of the Ceramic Top Coat*

For an Inlet Temperature of 2000K, The analysis was carried out for steady state heat transfer conditions. The difference between uncoated & coated turbine blade in temperature distribution is observed from results. The Temperature Distribution over the Turbine Blades' surfaces are shown in the Results below.

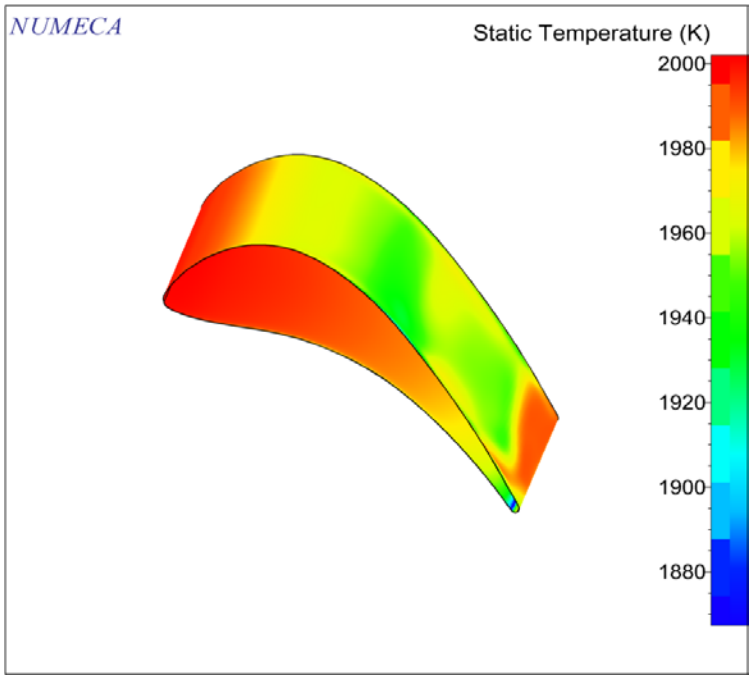

Fig 5: *Temperature Distribution over the Turbine Blade without TBC*

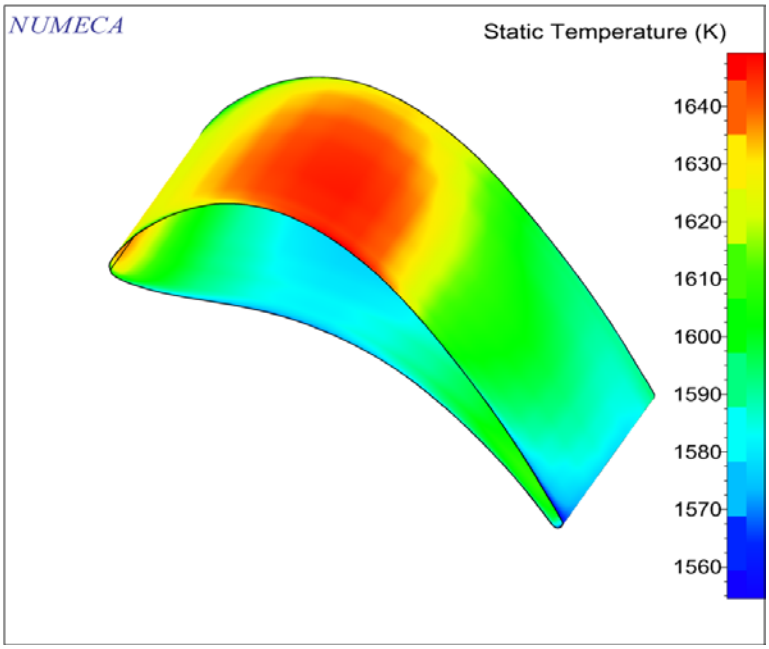

Fig 6: *Temperature Distribution over the Turbine Blade with TBC*

It is observed that the maximum temperatures (2000K) are prevailing at the leading edge of the blade due to the stagnation effects. The surface temperature of the blade doesn't vary much in the radial direction. However, there is a temperature fall from the leading edge to the trailing edge of the blade as expected. From the above result, the Blade with coated exhibits Better dissipation of heat compared to uncoated Blade. The coated Blade generates less heat compared to the other Blade so it's recommended for Higher Thermal operating Conditions.

The Plots for the Temperature Variation is shown as the Distribution of Temperature on the Suction Side and the Pressure Side as shown below :

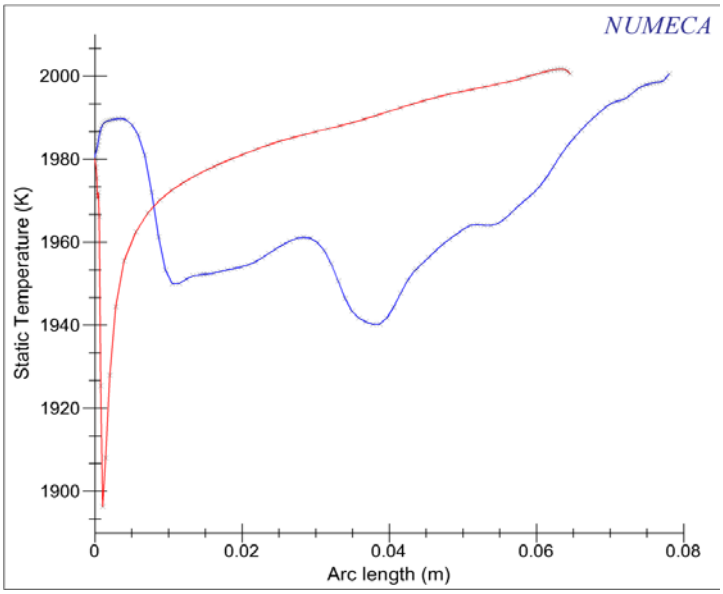

Fig 7: *Temperature variation over Suction surface (blue) and Pressure surface (red) of the blade without TBC*

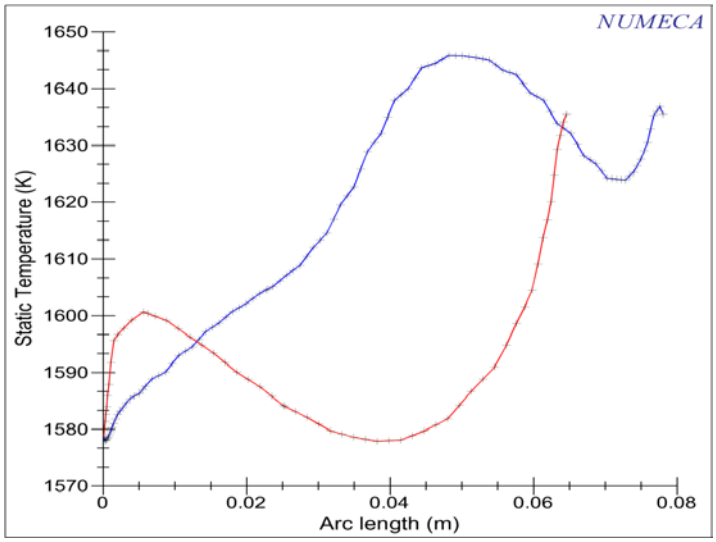

Fig 8: *Temperature variation over Suction surface (blue) and Pressure surface (red) of the blade with TBC*

It is observed in Fig 7, that for the Blade without TBC coating, the temperature at the inlet is 2000K and it decreases along the surface as air flows from the hub to the shroud to the outlet, i.e, there is a gradual decrease in Temperature of the blade along the flow as expected. Temperature on the suction side is higher than the Pressure side.

From Fig 7, it is seen that the temperature range over the turbine blade surface without TBC is 1867.49K – 2001.89K. The Average Temperature on the blade without TBC is 1974.39K.

From Figure 8, It is seen that the temperature range over the Blade's surface is 1554.61K – 1649.22K and the average temperature of the Blade with TBC is 1604.55K.

Max. Temperatures (hot spots) are observed on the leading edge and trailing edge of the blade. Figures 7 and 8 show blade surface temperature comparison between two calculated cases (Without TBC and TBC with lower thermal conductivity). The biggest temperature drop can be observed in the middle section of the airfoil surface. This fact confirms the impact of thermal barrier coatings on blade temperature level in steady state conditions.

IV. CONCLUSION

The simulations and analysis for the turbine blades have been successfully carried out.

This analysis was aimed at comparing the thermal profiles of a turbine blade in the high temperature zone with and without having TBC layers coated on it. The TBC characteristic adapted in this simulation is comparable to a simple YSZ TBC Coat.

After obtaining the results of both the analyses and upon comparison of the Static Temperature contours and the temperature variation plots of the blade without thermal barrier coating with that of the blade with thermal barrier coating, a reduction in average static temperature of the base metal of the turbine blade of 369.84K or 96.69°C was seen.

The results obtained (contours & plots) have shown that the blade with a TBC layer had lesser temperatures on the blade surface as when compared to the blade without TBC. Hence, the basic YSZ Thermal Barrier Coating has proved to be effective.

ACKNOWLEDGMENT

While presenting our work titled "**CFD ANALYSIS OF A THERMAL BARRIER COATED TURBINE BLADE**", we would like to express our sincere gratitude to Mr. MZ SIDDIQUE, Director, GTRE, Bangalore, an esteemed and prestigious Establishment of the Defence Research and Development Organization, for his kind permission to carry out this project work by utilizing the technical facilities of the GTRE. We are grateful to Jain University, for providing us with excellent facilities in the college during our course. We owe a debt of gratitude to **Ms.VIMALA NARAYANAN**, Scientist 'G', CFD Division, GTRE, Bangalore, for effectively guiding and supervising us through this project endeavour by imparting her prudent knowledge and personalized guidance coupled with sincere efforts. We are also thankful to the Head of Dept. & Prof. **Dr. MANOJ VEETIL**, IIAEM, Jain University, Bangalore, for his guidance and encouragement throughout the project duration for successful completion of the project. Finally, we would like to thank Prof. **Dr. P.A. ASWATHA NARAYANA** for motivating us to extend our work for publication, which inspired us to come this far.

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Geographical Study on General Land Use of Sagaing Township, Sagaing Region, Myanmar

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Abstract **-**The main aim of this paper is to analyze the general land use of Sagaing Township, it is found to be influenced not only by natural factor such as topography, soil, climate and natural vegetation but also by social factor. Due to the increase of population in Sagaing urban region it is necessary to set up systematic residential lands. In order to get the urban features and characteristics it is necessary to start transforming the agricultural land to the industrial land in urban area. Within the inner central part of Sagaing Township the village tracts do not have sufficient water for drinking water. That is why the underground water of these village tracts should be systematically dug or drilled in order to get sufficient amount of drinking water. Transportational land use and institutional land use are expanded within Sagaing Township. The expansion of these two land use caused the decrease of the agricultural lands. The pattern of land use of Sagaing Township at any particular time is determined by the physical, economic and institutional framework taken together. Based on the present land use pattern in order to have the development in Sagaing Township more systematic land use planning can be drown. In 2010-2011 land use of Sagaing Township is classified according to land use.

Index Terms- Land use, Rural area, Urban area.

I. INTRODUCTION

Land use is the surface utilization of all developed and vacant land on a specific point, at a given time and space. The study of land use is of immense value for planning the regional development. The systematic utilization of land can be able to promote socio-economic development. Land is the most fundamental natural resources for human beings and without land; even the human kind could not come into existence. The intensive use of land depends upon population concentration, economic prosperity thorough better agricultural production, human establishments, industrial locations, communication and transport lines, while extensive use of land is related to sparse population, dispersed settlements, the absence of communication lines and the crude forms of transport. Thus the study of land utilization is of immense value in tracing out the past use of land and its future trend.

The eastern portion of Sagaing Township is composed of Sagaing Range. The Mu River valley in the western part and the Ayeyarwady River valley in the southern part are the low flat plains. Thus land use in Sagaing Township is conditioned by the physical factors which limits the use capabilities of land. Together with the growth of population, the land use pattern of Sagaing Township is changed with time. The changes of land use in Sagaing Township were more prominent after 1988 for the operation of regional development in almost all fields. Based on the physical and nonphysical factors, the land use patterns in Sagaing Township is attempted on the geographical point of view.

Aim and Objectives

The main aim of this research is to find out the more effective land use pattern for the regional development in Sagaing Township. The objectives are,

-to find out the problems that prevent the most effective land use in Sagaing Township

-to provide information and suggestions concerning with the effective land use in Sagaing Township.

II. MATERIALS AND METHODS

Study Area

The study area "Sagaing Township" is located on the West bank of the Ayeyarwady River in Dry Zone of Central Myanmar. It lies between the latitudes 21° 50' North and 22° 15' North and the longitude 95° 40' East and 96° 2' East. It has about 485.16 square mile (310502 acres) of area and is composed of Sagaing Town Proper and 81 village tracts with 206 villages (Fig1).

The present paper is based on primary and secondary data. The primary data for this research paper were available from field survey. The secondary data were provided from government office, such as Land Record Department. Qualitative and Quantitative methods are used in this paper. The study period lasted from January 2011 to January 2012.

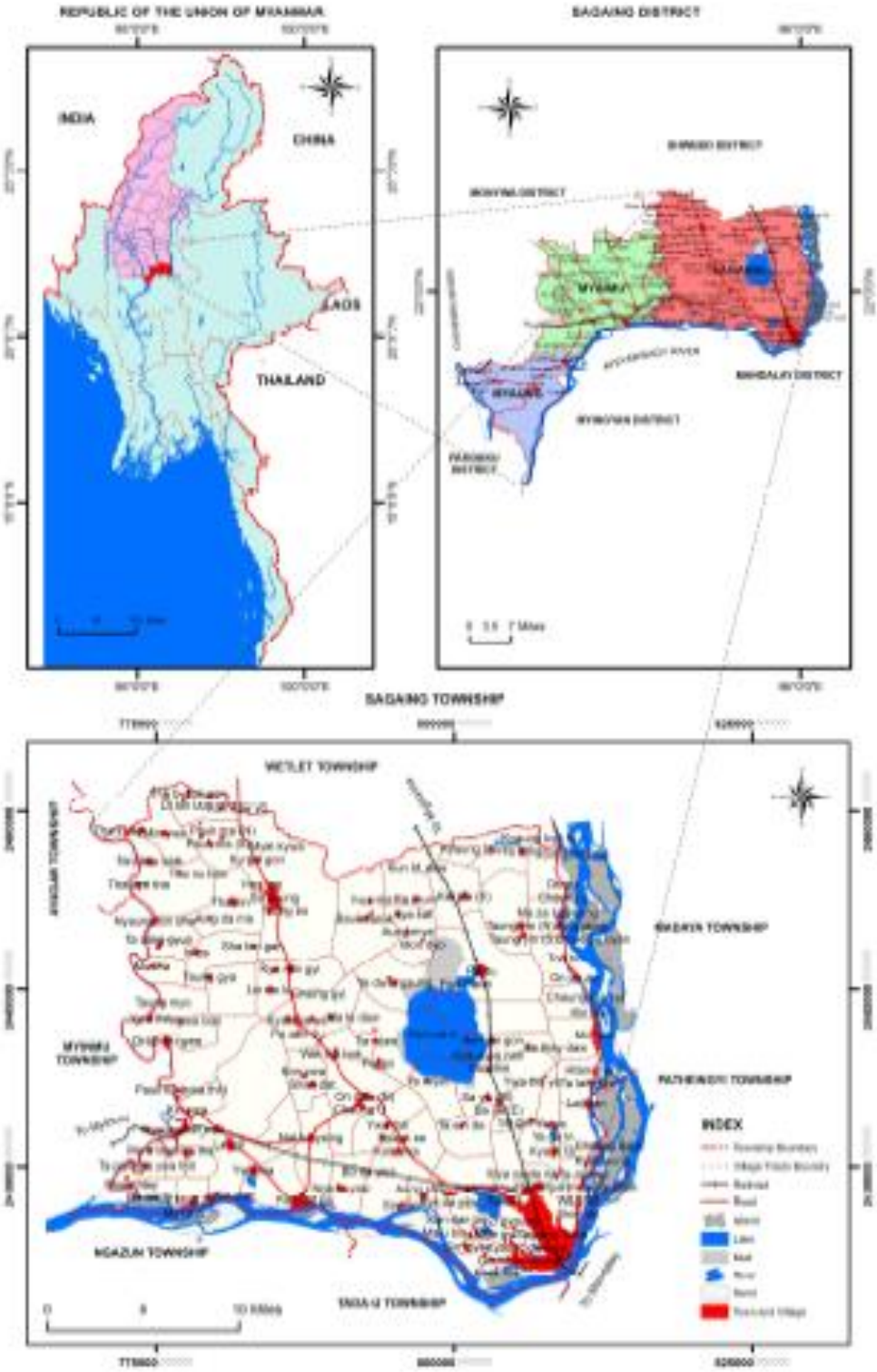

Figure1. Location of Sagaing Township

Source: UTM map No. 2195-09, 2195-13, 2196-01, 2295-12, 2296-16, 2296-04.

. III. ANALYSIS OF GENERAL LANDUSE OF SAGAING TOWNSHIP

Land use classification had received great attention of geographers in different parts of the world. It is common parlance in any study to classify the land use in different categories. The land use classification depends upon the climatic and terrain conditions to the

region and the needs of the society. In Sagaing Township the types of land use vary from rural area to urban area. The land use pattern of Sagaing Township in 2011-2012 is presented in (Table1, Fig 2).

1. Pattern of Land use in Urban Area.

In the urban area of Sagaing Township, the type of land use are classified in to seven types according to use. These are

(a) Agricultural land
(b) Residential land
(c) Industrial land
(d) Transformational land
(e) Institutional land
(f) Water Bodies and
(g) Other lands

(a) Agricultural land

The area of Sagaing Town proper is extended into the surrounding rural areas especially Tinteik village tract located on the west of the town. Therefore, the agricultural lands are found in the western and north western parts of the town. In 2011, there are totally 907 acres of agricultural land which forms about 19.3 percent of the town area. These agricultural lands are composed of 416 acres of "*Le*" land (paddy land), 105 acres of "*Ya*" land (dry crop land), 162 acres of "*Kaing*" land (riparian land) and 224 acres of garden land.

(b) Residential Land

At present, Sagaing Town Proper has an area of Residential land about 1,763 acres which accounted for 37.4 percent of the town area.

(c) Industrial Land

In 1997 an Industrial Zone was established in Padamyar and Nilar Ward of Sagaing Town Proper. However, many cottage industries are still remained in other wards. Thus in 2011 there are totally 563 acres of industrial area which accounted for 12.00 percent of the total of Sagaing.

(d) Transformational Land

Transportation system of Sagaing Town is composed of road, rail road and water transportation. According to 2011 data, there is about 456 acres of transformational lands including 212 acres of rail roads and 244 acres of roads which forms about 9.7 percent of the total of Sagaing.

(e) Institutional Land

The institutional lands are those lands which are used for governmental offices, schools, hospitals, various public organization and religious buildings. In 2011, there are 622 acres of institutional land which forms about 13.2 percent of the town area.

(f) Water Bodies

As Sagaing Town proper is located on the right bank of Ayeyarwady River, there are totally 72 acres of water bodies which form about 1.5 percent of the town area in 2011.

(g) Other Lands

Other lands include recreational lands and unused or unclassed lands. In 2011, the area of other land is about 327 acres which accounted for 6.9 percent of the town area.

2. Pattern of Land use in Rural Area.

In the rural area of Sagaing Township, the types of land use are classified into eight types according to use. These are

(a) Agricultural land
(b) Grazing land
(c) Residential land
(d) Industrial land
(e) Transportational land
(f) Institutional land
(g) Water bodies and
(h) Other lands.

(a) Agricultural Land

As the agriculture is the main economic activity, the agricultural land use is the most dominant type of land use in rural area of Sagaing Township. In the agricultural land use in rural area of Sagaing Township, as there are diversified variations in the conditions of physical factors and conditions of social factors, there are differences in agricultural land types. The types of agricultural level within Sagaing Township can be classified in to three land types as "*Le*" land (paddy land), "*Ya"* land (Dry crop land) and "*Kaing-*

Kyun" land (Riparian Land). In 2011 data, in rural area of Sagaing Township, there are 215,769 acres of agricultural lands forming about 70.6 percent of rural area.

(b) Grazing Land

As the areas with poor soils and steep slopes are not suitable for agricultural land use they are used for grazing land in Sagaing Township. In rural area of Sagaing Township a total area of grazing land is about 13,024 acres which accounted for 4.26 percent of the rural area.

(c) Residential Land

In 2011-2012 Sagaing Township has the residential land with 6,830 acres which constitutes about 2.23 percent of the rural area.

(d) Industrial Land

The industrial works are performed in residential compounds especially in the villages located along the major roads. In 2011, there are 2,217 acres of industrial land in rural area which accounted for about 0.73 percent of rural area of Sagaing Township.

(e) Transportational Land

Transportational land includes 696 acres of rail road and 5,055 acres of roads. In 2011-2012 transportational land is 5,751 acres which accounted for 1.88 percent of rural area of Township. The major rail roads and roads connect Mandalay with Monywa and Shwebo. It is found that most of the roads the rural area are earthen roads.

(f) Institutional Land

In 2011-2012 institutional land use of rural area was 5,962 acres which forms about 1.95 percent of the rural area of township.

(g) Water Bodies

The water bodies composed of rivers, streams, underground water, lakes and canal in Sagaing Township. In 2011, there are 32,690 acres of such lands which accounted for about 10.69 percent of rural land area.

(h) Other Lands

In 2011, there are 23,549 acres of other lands which constitutes about 7.7 percent of the rural land area.

Table 1. Pattern of Land use in Sagaing Township (2011-2012) .

Source: Land Records Department, Sagaing Township, 2011

Sr. No.	Categories	Urban		Rural		The Whole Township	
		Area in acres	Percentage	Area in acres	Percentage	Area in acres	Percentage
1.	Agricultural land	907	19.3	215,769	70.6	216,676	69.78
2.	Grazing land	-	-	13,024	4.26	13,024	4.19
3.	Residential land	1,763	37.4	6,830	2.23	8,593	2.77
4.	Industrial land	563	12.00	2,217	0.73	2,780	0.9
5.	Transportational land	456	9.7	5,751	1.88	6,207	2.0
6.	Institutional land	622	13.2	5,962	1.95	6,584	2.12
7.	Water Bodies	72	1.5	32,690	10.69	32,762	10.55
8.	Other land	327	6.9	23,549	7.7	23,876	7.69
	Total	4,710	100%	305,792	100%	310,502	100%

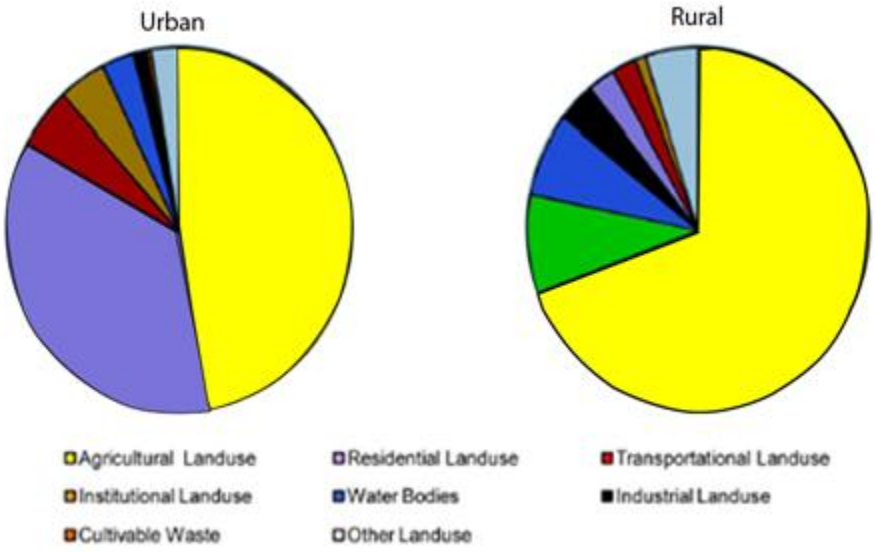

Fig 2. Pattern of Land use in Sagaing Township (2011-2012)

IV. DISCUSSION

General land use in Sagaing Township at any particular time is determined by the physical, economic and institutional framework taken together. The present pattern of land use can be considered increase sort of static harmony and adjustment with other main characteristic of the economy of township. The socio-economic conditions in the urban areas are good with job opportunities, the rural people especially the cultivators and labors shifted to the urban region. This is why in Sagaing urban region in order to establish and set up systematic residential lands to appear for the increased population, it is necessary to draw up systematic urban planning projects. In making the proposal for setting up residential lands for the growing population, the planners should include the requirement of lands for the housing of growing population. Moreover, the need of the residents for clean, healthy, environment with good sanitation should be considered also.

V. CONCLUSION

In the urban wards within Sagaing Township, as there is an increase in population, the land uses are being carried on according to the characteristics of urban qualities. At present, roads in Sagaing Twonship have been connected and upgraded, especially village to village roads more assessable. After these roads are completed the transportation land use of Sagaing Township will became much changed and better in future.

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Performance of Mungbean+Leafy Vegetables Intercropping in a Floating Garden

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ABSTRACT

An experiment was conducted to find out the suitable crop combination for increasing total productivity and net return through legume+vegetables intercropping system in a floating garden. Seven treatments viz., mungbean (monocrop), pechay (monocrop), upland kangkong (monocrop), lettuce (monocrop), mungbean + lettuce, mungbean + upland kangkong and mungbean + pechay were used in the study. Results showed that different intercropping combination did not influence the agronomic and yield components of mungbean which include the days to flowering, plant height, pod length and weight (g) of 100 seeds. No significant differences were also observed in the plant height of vegetables and the weight of pechay in mono and intercropping scheme. The intercropping system varied significantly in the weight (g) of 100 seeds and yield (kg/ha) of mungbean, weight plant^{-1} of lettuce and kangkong and herbage yield of all leafy vegetables. The yield of mungbean was comparatively lower when intercropped with vegetables. However, total productivity was higher due to additional yield of leafy vegetables. Among the intercrop combinations, mungbean+kangkong intercropping was the most feasible and profitable because it obtained the highest gross income, net income, and return on investment.

Key words- floating garden, intercropping, mungbean, vegetables

INTRODUCTION

Mungbean (*Vigna radiata* L.) is popularly known in the Philippines as mungo. It is an annual grain legume and is mainly used as human food. It is widely spread in Asia and an important component of many major cropping systems (Lambrides, *et al.*, 2006). It is one of the most important pulse crops for protein supplement in subtropical zones of the world. It is a good source of minerals such as calcium and sodium. Dried mungbean seeds are high in vitamins A & B while the sprouted mungbeans are rich in vitamins B & C (www.bpre.gov.ph/phindustry/mungbean.htm accessed 2009). It also contains 51% carbohydrate, 24–26% protein and 4% mineral (Afzal *et al*., 2008). Fresh or dry mungbean seed can be used as a whole or may be processed to bread, noodles, porridge, soups, snacks or even ice-cream (Mogotsi, 2006). Besides providing protein in the diet, mungbean has the remarkable quality of helping the symbiotic root rhizobia to fix atmospheric nitrogen and improves soil fertility (Anjum *et al*., 2006). It can also be used as intercrop or a cover crop due to its short growing period (Bhatty, 2000 and Ashour, 1991).

In developing countries intensive and efficient use of available lands and in land waters for more food production is needed. Fishpond sediments are important resource enriched with plant nutrients and organic matter which have a vital role in maintaining or

improving soil quality. They are the key quality factors that determine the degree of nutrient retention in soil. Pond sediments are rich in N, P, and K, and other macro and micronutrients that will provide the nutrient requirement of a crop. The crops utilize nutrients in sediment, thereby reducing possibilities for environmental pollution. Thus, it can be used for a successful integration between aquaculture and agriculture (Rahman, and Ranmukhaarachchi, 2003).

Intercropping is an intensive cropping system that is intended to increase production per unit area and time (Adhikary *et al*., 2005). It is more productive system and a less risky technology (Kamanga *et al*., 2010). It helps in the effective utilization of land, soil moisture, nutrients and solar radiation. This is brought about by choosing appropriate crops of varying morpho-physiological nature and planning their planting geometry to reduce mutual competition for resources (Gurigbal, 2010). Flexibility, maximization of profit, minimization of risk, soil conservation and soil fertility improvement are some of the principal reasons for smallholder farmers to intercrop their farms/crops (Matusso *et al*., 2012). Furthermore, it offers the possibility of yield advantage relative to sole cropping through yield stability (Bhatti *et al*., 2005). Eventhough vegetables are non-nitrogen fixers, they can also be suitable as intercrops because of their high profitability and higher yields. Utilizing fish pond resources through the introduction of floating gardens may increase production per unit area and provide additional income to farmers on a sustainable basis. However, only few studies have been reported on legume-vegetables intercropping in a floating garden hence, this study was conducted.

METHODOLOGY

Experimental Design and Treatments

This study was conducted in a fishpond located at Poblacion, Valencia, Bukidnon, Philippines from December to March 2016.The experiment was laid out in a Randomized Complete Block Design (RCBD), with seven treatments replicated three times. Each treatment was assigned randomly in each plot. The following were the treatments:T_1 – Mungbean (monocrop); T_2 – Pechay (monocrop);T_3 – Upland kangkong (monocrop); T_4 – Lettuce (Control); T_5 – Mungbean + Lettuce; T_6 – Mungbean + Upland Kangkong; T_7 – Mungbean + Pechay.

Cultural and Management Practices

1. Floating Garden Establishment

The floating garden (Fig. 1) that was used in the study measures 1m x 0.7 m with 20cm depth. It was filled up with soil media at 1:1 ratio of garden soil and vermicast. The boxes were supported by bamboo poles with plastic bottles to prevent from sinking.

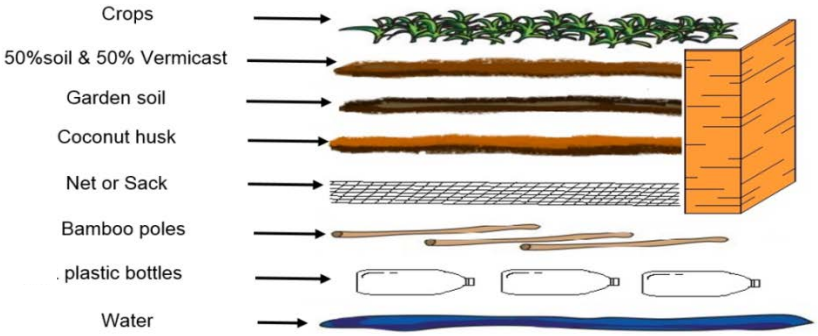


Figure 1. Floating garden set-up

2. Planting of Mungbean Seeds

Healthy seeds that are free from impurities, insect damage and diseases were selected. The mungbean seeds were planted at a distance of 10 cm x 50 cm. The seeds were sown at 1 inch deep and covered with fine soil.

3. Preparation of Vegetable Seedlings.

Sowing of Seeds - Seeds were sown thinly in shallow furrows of the soil and water with utmost care to prevent exposure and displacement.

Thinning-This was done seven days after emergence to remove unwanted seedlings and to maintain equal plant population per plot.

Weed Management-Weed competition was minimized through hand weeding. Hand weeding was done two weeks after seed germination and every two weeks thereafter.

Pest Management- Insect pests and diseases were controlled using the Integrated Pest Management (IPM) strategies to minimize pest damage.

Harvesting and Post-Harvest Operations

A. Mungbean

Priming - Priming was done at three days interval when the mungbean pods turned brown or black until all pods were harvested.

Shelling - Pods were shelled manually and were placed in a properly labeled paper bags.

Drying - Grains were sundried until the moisture content reached approximately 14%.

Cleaning - Grains were cleaned after drying to remove inert matters.

B. Vegetables

The vegetables (lettuce, upland kangkong and pechay) were harvested at 30 days after sowing. This was done early in the morning to minimize mechanical injury. The harvested vegetables were properly cleaned from any soil debris and the unmarketable leaves were also removed.

Data Gathered

A. Agronomic and Yield Characteristics of Mungbean

1. Number of days to flower – This was determined by counting the number of days from planting until 50% of plants have flowered.
2. Number of days to maturity – This was obtained by counting the number of days from planting until 80% of the pods turned brown or black.
3. Plant height (cm) – This was done by measuring the five randomly selected plants in each treatment plot during vegetative and maturity stage. This was measured from the base of the plant up to its apex using a meter stick.
4. Pod length (cm) – This was obtained by measuring the length of 5 randomly selected pods using a ruler.
5. Pods plant^{-1} – These was obtained by counting the number of pods of 5 randomly selected plants.
6. Weight of 100 seeds (g) – This was determined by weighing 100 randomly selected seeds per plot using a digital balance.
7. Grain yield – This was done by weighing all the seeds obtained from effective harvest area (0.70 m²) in each plot. Yield per hectare was computed using the formula:

$$\text{Grain yield (kg/ha)} = \text{plot yield} \times \frac{10{,}000\ \text{m2}}{\text{EHA}} + \frac{100 - \text{MC}}{86}$$

B. Characteristics of Vegetables

1. Plant height (cm) – This was measured from the base to the tip of the 5 kangkong plants and measured using a ruler and the average was determined.
2. Weight (g) per plant – The average weight was determined from 5 plant samples.
3. Herbage Yield – This was done by weighing all the leaf obtained in effective harvest area ($0.70m^{2)}$ in each plot. Yield per hectare were computed using the formula:

$$\text{Herbage yield (kg/ha)} = \text{plot yield} \times \frac{10{,}000\ m^2}{0.70\ m^2}$$

Statistical Analysis

The data gathered were analysed statistically using the analysis of variance in Randomized Complete Block Design (RCBD) and treatment means were compared using the Duncan's Multiple Range Test (DMRT).

Return on Investment

The economic analysis was determined by computing the return on investment (ROI). The ROI per hectare of mungbean and vegetable production was estimated based on the prevailing selling price. This was computed using the formula:

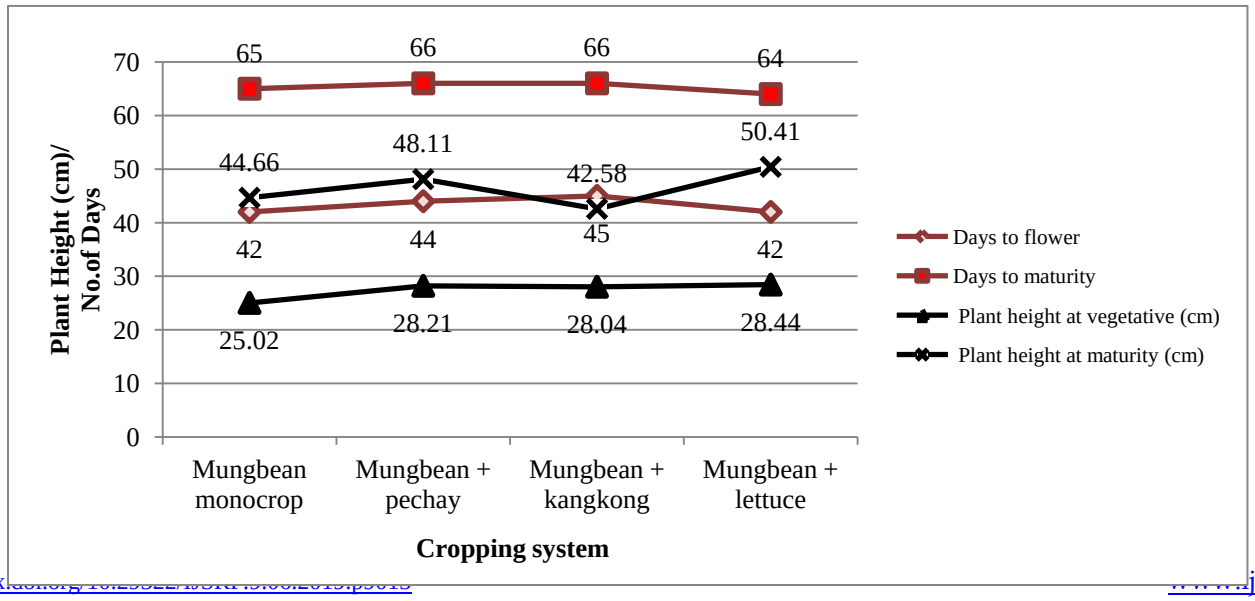
$$\text{Return on Investment} = \frac{\text{Net Income}}{\text{Cost of Production}}$$

RESULTS AND DISCUSSION

Agronomic Characteristics of Mungbean

Plant Height, Days to flower and maturity

There was no significant difference on the plant height of mungbean at vegetative and maturity stage (Fig. 2). The plant height ranged from 25.02 cm – 28.44 cm at vegetative and 42.58 cm-50.41 cm at maturity stage. Generally, mungbean intercropped with vegetables were taller than the sole crop. The intercropping system also had no influence on the days to flower and days to harvest of mungbean (Fig. 1). All mungbean plants flowered and matured simultaneously regardless of the cropping system employed.



Figue 2. Plant Height (cm), number days to flower and days to maturity of mungbean intercropped with vegetables in a floating garden.

Yield and Yield Components of Mungbean

Pod Length and Weight of 100 Seeds

The pod length and weight of 100 seeds showed no significant differences among treatments as presented in Table 1. The pod length ranged from 7.43 cm to 7.87 cm while the weight of 100 seeds ranged from 5.73 g to 6.90 g. Mungbean intercropped with upland kangkong obtained the lowest mean value in both parameters.

Pods Plant^{-1}

The number of pods plant^{-1} is an important parameter of mungbean because it is directly correlated with the bean yield. The higher the number of pods per plant, the higher is the yield. The different intercropping treatments caused significant variation in the number of pods plant-^{1} of mungbean. Pods plant^{-1} was higher in case of sole mungbean as compared to those intercropped with vegetables (Table 1). However, it was observed that among the intercropping system, mungbean+pechay had the most number of pods and lowest in mungbean+kangkong. Possible reason for higher number of pods plant^{-1} in sole mungbean plots might be attributed to the absence of inter-specific competition and better utilization of nitrogen from the organic fertilizer and fixed by root nodule. Similar result was reported by Khan *et al*. (2012) who observed that number of pods plant^{-1} of mungbean were higher in monoculture as compared to their corresponding intercrop.

Grain Yield (kg/ha)

Intercropped mungbean had lower yield as compared to sole mungbean cultivation as shown in Table 1. Grain yield was highest in sole mungbean with 509.33 kg. Among the intercrop combinations, mungbean + lettuce obtained the highest yield (338.10 kg) and lowest in mungbean + kangkong intercropping (129 kg). The increase in the yield of mungbean in sole cropping is attributed to the favorable growing conditions which improved its nutrient and water uptake when in a floating garden. It might be due to increased nitrogen fixation and full utilization of nutrients during the growing period of sole mungbean while in the case of intercropping, these resources were shared by vegetables which are strong competitors of mungbean (Thavaprakaash *et al*., 2005). The result conforms to the study of Saleem (2010) who reported that mungbean grain weight and yield were convincingly higher when it was sown alone as compared to intercropped mungbean. Khan, *et al.* (2012) also reported that sole cultivation of mungbean was the most effective intercropping system in terms of yield and yield components. The pond sediments may also add up to the nutrient requirement of mungbean and vegetables that may improve their yield characteristics. It is rich in nitrogen, exchangeable potassium, phosphorus and organic matter, hence it has a high potential as nitrogen and potassium fertilizer and as a soil conditioner (Boyd *et. al*., 2002; Muendo *et. al*., 2014).

Table 1. Yield characteristics of mungbean intercropped with vegetables in a floating garden

TREATMENTS	POD LENGTH (cm)	PODS PLANT^{-1}	WEIGHT (g) of 100 SEEDS	GRAIN YIELD (kg/ha)
Mungbean (monocrop)	7.64	10.20^{a}	6.90	509.33^{a}
Mungbean + (pechay)	7.59	8.20^{b}	6.67	163.33^{c}
Mungbean + (kangkong)	7.43	5.13^{c}	5.73	129.00^{c}

Mungbean + (lettuce)	7.87	5.23[c]	5.83	338.10[b]
F-test	ns	**	ns	**
cv (%)	7.89	1.88	10.42	7.48

Means in a column followed by the same letter are not significantly different at 5% DMRT

Characteristics and Yield of Vegetables

Plant Height

The different cropping systems did not influence the plant height of vegetables planted as monocrop and as intercrop (Table 2). However, plants were taller in sole cropping of pechay and lettuce. In intercropping combination, plants were shorter due to shading effect of mungbean on leafy vegetables which resulted in lesser light interception.

Weight Plant^{-1}

Statistical analysis revealed no significant difference on the weight (g) of pechay as presented in Table 2. Sole pechay had comparable weight to intercropped pechay. Lettuce planted as monocrop obtained heavier weight with a mean value of 26.03 grams which varied significantly when intercropped with mungbean with a mean of 23.13 grams. Lettuce planted as monocrop had full utilization on the nutrients present in the soil therefore resulting in the increase in weight. The decrease in weight of intercropped can be attributed to the interspecific competition of the mungbean and vegetables in terms of light, space, nutrient, and other necessary elements needed for plant growth and development. Meanwhile a significant difference was observed in the weight of upland kangkong. Intercropped kangkong had heavier weight with 51.53 g as compared to sole crop with 33.13 g. This indicates that both crops are compatible and complentary in an intercropping scheme. Plants species with different root and uptake patterns like in the case of mungbean and kangkong can efficiently utilize the available nutrients and even increase the nitrogen uptake (Matusso *et al*., 2012 and Undie *et al*., 2012) In addition, intercrops are very productive when the component crop varies greatly in growth duration so that their maximum condition for growth resources occurs at different periods (Ijoyah, 2012).

Table 2. Characteristics of leafy vegetables intercropped with mungbean in a floating garden

TREATMENTS	PLANT HEIGHT OF VEGETABLES (cm)	WEIGHT PLANT^{-1} (g)	HERBAGE YIELD (kg/ha)
Pechay (monocrop)	27.23	71.80	3973.33
Pechay (intercrop)	25.20	62.45	1819
F-test	ns	ns	**
CV (%)	7.04	27.02	12.7
Kangkong (control)	49.6	33.13	4673.33
Kangkong (intercrop)	50.17	51.53	2652.37
F-test	ns	*	*
CV (%)	2.13	2.13	7.05
Lettuce (control)	26.03	26.03	997.78
Lettuce (intercrop)	23.13	23.13	664.95

F-test	ns	*	**
cv (%)	22.69	8.52	3.55

ns- means not significantly different at 5% DMRT

Herbage Yield

Statistical analysis revealed highly significant differences on the herbage yield of all vegetables (Table 2). Higher yield was attained in sole cropping as compared when intercropped with mungbean. The yield reduction in intercropped vegetables is attributed to the competition between crops in terms of growth factors. Light competition might be the primary limiting factor as the other major growth factors such as water and nutrients were at adequate levels throughout the cropping system. According to Thayamini & Brintha (2010), high intercrop productivity is attained if early maturing component like vegetable is grown with little interference from the late growing crop. Thus, the choice of accurate cultivars and agronomic manipulations to certify the most effective use of limiting resources is the key part for high crop yield.

Return on Investment

An analysis on cost and return of intercropping mungbean with different leafy vegetables is presented in Table 3. Higher gross income was obtained from all intercrop combinations than sole crop mungbean. Among the intercropping combinations, mungbean + upland kangkong intercropping system obtained the highest gross income (115, 415), net income (54, 478) and ROI (0.89) and lowest in mungbean+pechay intercropping. The results of increased productivity and monetary returns were consistent with the earlier reports of yield advantage of crop mixture as compared to monoculture (Islam et al., 2014; Ahmed *et al.*, 2013).

Table 3. Cost and return analysis of mungbean + leafy vegetable intercropping in a floating garden

TREATMENTS	Yield (kg/ha)		GROSS INCOME	TOTAL COST OF PRODUCTION	NET INCOME	ROI
	GRAIN	HERBAGE				
Mungbean	509.33		40, 746	59, 510	18, 764	0.31
Pechay		3973	139,067	57, 550	81, 517	1.42
Kangkong		1819	186, 933	57, 790	129, 143	2.23
Lettuce		997	119, 733	57, 615	62, 118	1.08
Mungbean + Pechay	163	1819	76, 671	60, 937	15, 734	0.26
Mungbean + Kangkong	129	2652	115, 415	60, 937	54, 478	0.89
Mungbean + Lettuce	338	665	107	60, 937	45, 905	0.75

Prevailing prices of mungbean and vegetables at Valencia City, Bukidnon, Philippines

Mungbean = Php. 80.00 kg
Pechay = Php. 45.00 kg
Upland kangkong = Php. 40.00 kg
Lettuce = Php. 145.00 kg

CONCLUSION

Among the treatments, mungbean + upland kangkong intercropping system was the most productive and profitable than other cropping combinations as it had the highest gross income, net income and ROI. Though productivity of mungbean was reduced with intercropping, the loss in yield was compensated by the herbage yield of vegetables.

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An Empirical Study on Corporate Governance Structure and Performance of Sri Lankan Listed Financial Services Companies

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Abstract-

With the rapid growth of financial service sector and past experience of distress of financial service companies in Sri Lanka, this study motivates to investigate the relationship between the corporate governance structure and performance of 59 listed financial service companies in Colombo Stock Exchange during the period of 2014-2017. Tobin's Q and Return on Assets are used as financial performance measures. Our findings show that managerial ownership is significantly associated with the market performance measure but not with accounting performance measure. This negative relationship of managerial ownership with market based performance which suggests a managerial entrenchment effect where the management further their own self-interests rather than firms' goals in the financial service industry. The results are consistent with the agency theory where managers are unlikely to maximize returns to shareholders. In addition, the study found that there is an insignificant relationship between other governance measures and the performance. The result is robust with respect to controls for gearing and company size.

Key Words- *Corporate Governance, ASPI, Corporate Performance, Managerial Entrenchment, Board Characteristics*

I. Introduction

The corporate governance structure and firm performance has been a topic of considerable debates in the academic and business communities. An effective governance system is important as it promotes the efficient use of resources both within the firm and the economy, also assisting firms and economies in attracting lower-cost investment capital via the improved confidence of investors and creditors, both domestically and internationally. Also, it helps in increasing the responsiveness of firms to societal needs and expectations and in improving the long-term performance of firms. In other words, corporate performance is presumably reflected in the way the firm is managed as well as the efficacy of the firm's governance structure (Haniffa and Hudaib, 2006)

The theoretical motivation for undertaking the study on the effect of corporate governance and firm performance is to enhance the efficacy of governance structures undertaken by developed countries via the establishment of Corporate Governance Guidelines (e.g. the Cadbury, Hampel and Higgs Reports in the UK, the Bosch Report in Australia and the Business Roundtable in the US) following major corporate collapses in various developed stock markets in the last two decades (Khas, 2002). The Institute of Chartered Accountant of Sri Lanka has been at the forefront of issuing Corporate Governance Codes in Sri Lanka. The first titled "Code of Best Practice on matters related to financial aspects of Corporate Governance" was issued in 1997.

The International Monetary Fund (IMF) revealed that out of the 46 licensed financial companies in Sri Lanka, 15 are presently facing liquidity issues, with six at a high level of distress with Non-Performing Loans ranging from 50 to 90 percent (Razak, 2016). Further, IMF highlighted that the mismanagement and irregular practices, the rapid growth of the non-bank financial sector in Sri Lanka has often led to excessive risk taking which has led to the weakening of the financial position of these companies. There is a main concern regard to the compulsory listing requirement for registered finance companies introduced by the previous administration. However, The 12 finance companies not listed on the Colombo Stock Exchange but operating at present in the finance industry (Razak, 2016). Therefore, main motivation of the current study is to explore whether the various best governance practices influence performance of Sri Lankan listed banking and finance corporations listed in Colombo Stock Exchange (CSE). As a result, core issue in the corporate governance system is the nature of the relationship between the practice of best code of ethics in corporate level and economic performance of a financial service firm. It was concluded that macro economy and share market performance were the two most

appropriate concepts for this study. Accordingly, the main objective of the study is to investigate the relationship of corporate governance system and firm performance of public financial service companies listed in CSE.

1.1.1 Colombo Stock Exchange

The CSE has two main price indices called All Share Price Index (ASPI) and Standard and Poor Index (S&P). Index values are calculated an on-going basis during the trading session, with the closing values published at the end of each session. The CSE has 295 companies representing 20 business sectors as at 30th September 2017, with a Market Capitalization of Rs. 2,919 Billion in 2017(2018a). Public Companies incorporated under the Companies Act No.7 of 2007 or any other statutory corporation, incorporated or established under the laws of Sri Lanka or established under the laws of any other state (subject to Exchange Control approval) are eligible to seek a listing on the CSE to raise Debt or Equity from public. In order to secure a listing of the company's securities, they will be required to comply with the relevant provisions of the above act, the Securities and Exchange Commission Act No.36 of 1987 (as amended) and the Listing Rules of the Exchange (2018b)

1.1.2 Sector Indices

CSE holds 20 sector indices. These sector indices are calculated based on an on-going basis and closing values are published at the end of trading daily. These price indices reflect the price movements of companies in the 20 respective service sectors. The sector price indices will therefore be an indication as to the trends of the market. The Table 1.1 represents the market capitalized percentage of index covered by ASPI in 2018(2018a).

Table 1.1 Sector Index as a Market Capitalized Percentage of ASPI

SECTOR	% of ASPI	Cumulative %
BANKS, FINANCE & INSURANCE	22%	22%
DIVERSIFIED HOLDINGS	21%	43%
BEVERAGE, FOOD & TOBACCO	20%	63%
HOTELS & TRAVELS	9%	72%
TELECOMMUNICATION	6%	78%
MANUFACTURING	5%	83%
OIL PALMS	4%	87%
HEALTH CARE	2%	89%
CONSTRUCTION & ENGINEERING	2%	91%
LAND & PROPERTY	2%	92%
INVESTMENT TRUSTS	1%	94%
POWER & ENERGY	1%	95%
TRADING	1%	96%
PLANTATIONS	1%	97%
MOTORS	1%	98%
CHEMICALS & PHARMACEUTICALS	1%	99%
FOOTWEAR & TEXTILES	0%	99%
SERVICES	0%	100%
STORES & SUPPLIES	0%	100%
INFORMATION TECHNOLOGY	0%	100%
ASPI	100%	

Source: www.CSE.lk, 2018

As shown in Table 1.1, 22% of the market capitalization covered by Banking, Finance and Insurance sector in ASPI. This weighting system allows the price movements of above mentioned industries to have a greater impact on the index.

THEORETICAL BACKGROUND, PRIOR RESEARCH AND HYPOTHESES

It is generally accepted that strong corporate governance structures are essential to mitigate the 'agency' problem that arises due to the separation of ownership and control in firms. Empirical evidence indicates that the size of the board does matter (Monks and Minow, 1995) as it affects the extent of monitoring, controlling and decision making in a company. Jensen and Meckling (2009) explain the agency relationship which is a contract under one party (the principal) engages another party (the agent) to perform some service on their behalf. Managers as agents acting in their own self-interest are unlikely to maximize returns to shareholders. Therefore, an appropriate governance structures should be implemented to safeguard the interests of the investors.

Small boards are supposed to support in alleviating the effort problem and in becoming more effective (Daily et al., 2003); and (Ghosh, 2006), but when they grow too big, boards become more symbolic rather than being a part of the management process (Hermalin and Weisbach, 2000). However, bigger boards may be constructive for some companies as they provide diversity that would help companies to secure critical resources and reduce environmental uncertainties (Pombo and Gutiérrez, 2011); (Haniffa and Hudaib, 2006). Martin and Jay (1992) recommend that board membership to be between eight and nine, and any additional benefits from increased monitoring gained by additional membership will outweigh the costs associated with slow decision making, the effort problem and easier control by the CEO (John and Senbet, 1998). Based on the literate review, the study developed below hypothesis.

H1: Higher the board size diminishes the corporate performance.

Empirical evidence on the count of Non – Executive Directors (NEDs) which impact on corporate performance is mixed. Millstein and MacAvoy (1998) found US corporations with a higher proportion of active independent boards perform much better than those with passive, non-independent boards. In contrast, Singh et al. (2018)found a significant negative relationship between board outsiders and firm performance based on Tobin's Q. Rhoades et al. (2000), using meta-analysis, found a weak link in performance when there is dominance of either insiders or outsiders on the board as opposed to a balanced board. Leung et al. (2014) and Zattoni et al. (2017) found a non-significant relations between corporate performance and the proportion of outside directors. Based on the empirical studies, the hypothesis developed as;

H2: There is a non-significant relationship between the proportion of NEDs on the board and corporate performance.

Empirical analyses of the impact of role duality on various corporate performance measures have yielded conflicting results. Boyd (1995) found evidence of better performance for US firms with role duality. However, Rhoades et al. (2000) found firms with a separation of the two roles consistently have higher accounting returns compared to those that have the roles combined. Based on the Australian study of Christensen et al. (2010), there are conflicting significant results between the accounting and market measures for having a dual CEO/chairperson. In contrast, Peel and O'Donnell (1995) and Dahya et al. (1996) found no significant difference in the performance of companies with or without role duality. The UK studies by Weir et al. (2002) also came to the similar conclusion of difference in the firm performance due to role duality.. Brickley et al. (1997) found no systematic link between duality status and organizational performance or market value. Hence the next hypothesis is;

H3: There is a non- significant relationship between role duality and corporate performance.

According to Managerial entrenchment theory, the incentive to maximize firm value declines as market discipline becomes less effective against a larger shareholding manager as management increases its ownership. Weir et al. (2002), (Short and Keasey, 1999) confirm that UK management become more entrenched in ownership than their US counterparts. Second, the results from extending the analysis to consider different measures of firm performance and a more generalized form of the relationship confirm the general finding of the US literature of a non-linear relationship between firm performance and managerial ownership. Cui and Mak (2002) examines relationship between managerial ownership and performance for R&D firms that are listed on the NYSE, AMEX and NASDAQ. This study found a W shaped relationship between managerial ownership and performance where Tobin's Q initially declines with managerial ownership, then increases, then declines again and, finally, increases again. Also, this relationship explain with industry effects in determining relationship between managerial ownership and performance of the firm. Levana Dhia and Martinus Hanung (2016) proves that managerial ownership negatively affects company performance with a company effect using Polynomial regression analysis method.

H4: There is a significant negative relationship between managerial ownership and corporate performance

II. Research Methods

As at 31 December, 2017, a total of 59 financial service companies were listed on the All Share Price Index (ASPI) of the CSE. Since the study looks at the period between 2014 and 2017, the full data set, especially those data related to corporate governance variables, are available for all financial service companies and collected from the Colombo Stock Exchange website.

The independent variables consist of six corporate governance variables, namely board size (BSIZE), board composition (BODCOM), board leadership or role duality (DUAL), multiple directorships (MDIR), top five shareholders (TOP5), managerial shareholdings (MOWN), and four control variables, gearing (GEAR), company size (LNSA), capital expenditure (LNCAPEX), and industry type based on the classification of banking, insurance, finance and other financial service providers. The dependent variable is corporate performance and two measurements, namely Tobin's Q (Q-Ratio) and return on assets (ROA), are considered in this study as proxies for market return and accounting return respectively and Table 3.1 explains operationalization of research variables.

Table 3.1. Operationalization of Research Variables

Variables	**Acronym**	**Operationalization**
Dependent Variables		
Tobin'sQ	Q- Ratio	Ratio of the market value of common shares plus total debt divided by the book value of total assets of the company.
Return on assets (%)	ROA	Earnings after tax divided by total assets of the company.
Independent Variables		
Board size	BSIZE	Total number of directors on the board of the company.
Board composition (%)	BODCOM	The proportion of non-executive directors (NEDs) to total number of directors on the board of the company.
Role duality	DUAL	Dichotomous with 1 if the chairman is also the chief executive officer (CEO) of the company and 0 otherwise.
Top 5 shareholders	TOP5	The proportion of shares owned by the five largest shareholders to total shares outstanding in the company.
Managerial Shareholdings	MOWN	The proportion of shares owned by the executive of the company as a group to total shares outstanding.
Control Variables		
Gearing (%)	GEAR	The percentage of total equity to total assets of the company.
Sales (proxy for size)	LNSA	Natural log of sales of the company
Capital expenditure (%)	CAPEX	Proportion of capital expenditure to total assets

3.1 Model Development

The study will be used the following two models to analyse the relationship between the various corporate governance variables and corporate performance:

Model 1:

$$Q\ Ratio_t = \propto_0 + \beta_1 BSIZE + \beta_2 BODCOM + \beta_3 DUAL + \beta_4 TOP5 + \beta_5 MOWN + \sum_{i=1}^{n} \beta_{i\ OTHERS} + \varepsilon$$

Model 2:

$$Q\ ROOA_t = \propto_0 + \beta_1\ BSIZE + \beta_2 BODCOM + \beta_3 DUAL + \beta_4 TOP5 + \beta_5 MOWN + \sum_{i=1}^{n} \beta_{i\ OTHERS} + \varepsilon$$

where:

α - Intercept.

Q-Ratio - Tobin's Q-Ratio; proxy for market measure of performance.

ROA - Return on assets; proxy for accounting measure of performance.

BSIZE - Board size.

BODCOM - Board composition.

DUAL - Role duality; chairman of the board is also the chief executive officer.

TOP5 - Shareholdings held by top 5 major shareholders.

MOWN - Shareholdings held by directors.

Others - Control variables: gearing (GEAR), size based on natural logarithm of sales (LNSA), capital expenditure (CAPEX), and dummy variables for each of the six industry classifications.

ε - Error term.

III. Findings and Discussions

The study considered the descriptive statistics regarding the financial service companies' dependent, independent and control variables before calculating the regressions. Table 4.1 presents the descriptive statistics for the raw data for the board characteristics in most recent period from 2014-2017 and the performance.

Table 4.1. Descriptive Statistics of Financial Performance

	Type of Financial Service Company			
	Banking	Insurance	Finance and Leasing	Investment Services
	Average	Average	Average	Average
Q-Ratio	0.917466176756234	0.900821077153888	0.968706229142736	0.025248291870760
ROA	0.89%	2.71%	8.04%	-1.64%

The measures of ROA indicate that all of the financial service companies tested performed well except Investment Services reporting a negative ROA. The highest Tobin's Q perform in Finance and Leasing companies. The mean for Tobin's Q indicating that the market value is greater than the book value of the assets. The mean ROA was 8.04 for Finance and Leasing Companies and 2.71% for Insurance Companies, indicating that the profitability of companies compared to its assets lower somewhat in Banking and Investment Service Companies.

Table 4.2. Descriptive Statistics of Corporate Governance Indicators

	Type of Financial Service Company			
	Banking	Insurance	Finance and Leasing	Investment Services
	Average	Average	Average	Average
BSIZE	10	8	9	7
BODCOM	88.91%	70.31%	85.92%	63.91%
TOP5	27.9%	23.2%	29.1%	43.8%
MOWN	0.3609%	10.9765%	0.7080%	9.1735%

Highest average board size is reported in banking and least average board size is reported in investment service companies. There is also a large managerial ownership reported in insurance companies and least managerial ownership reported from the banking sector. Highest ownership concentration is explained by the percentage of shareholdings hold by top five investors which investment service companies reported highest ownership concentration.

The estimation of multiple regression models requires the absence of multicollinearity between the performance and board structure of the finance companies tested. A serious multicollinearity problem is predicted by Arceneaux and Huber (2007) when starting at 0.7. The Pearson correlation in Table 4.3 established that there are no strong relationships between the independent variables, in conformance with Arceneaux and Huber (2007) as all correlation coefficients were lower than 0.7. No bi-variate multicollinearity existed for any of the models tested.

Table 4.3. Correlation Analysis

	BSIZE	BODCOM	DUAL	TOP5	MOWN	GDIV	Q-Ratio	ROA	GEAR
BODCOM	0.294								
	0.001								
DUAL	-0.111	-0.141							
	0.237	0.13							
TOP5	-0.158	-0.124	0.037						
	0.09	0.185	0.694						
MOWN	-0.241	-0.297	0.121	-0.097					
	0.009	0.001	0.196	0.302					
GDIV	0.095	-0.129	0.097	0.362	-0.102				
	0.312	0.168	0.3	0	0.277				
Q-Ratio	-0.018	-0.003	0.037	-0.007	-0.184	0.093			
	0.849	0.973	0.695	0.945	0.048	0.323			
ROA	0.009	0.144	-0.054	-0.06	0.025	0.048	-0.18		
	0.927	0.122	0.567	0.524	0.789	0.608	0.053		
GEAR	0.303	0.131	-0.313	0.003	-0.296	0.188	0.321	0.048	
	0.001	0.16	0.001	0.977	0.001	0.044	0	0.612	
LNSA	0.378	0.252	-0.126	-0.221	-0.066	0.113	-0.107	0.298	0.409
	0	0.006	0.178	0.017	0.479	0.226	0.255	0.001	0
LNCAPEX	0.222	0.203	-0.04	-0.344	-0.055	-0.019	0.113	-0.029	0.318
	0.017	0.029	0.672	0.000	0.559	0.836	0.225	0.759	0.001

The results of correlation matrix show that there is negative relationship between Tobin Q ratio and managerial ownership ($r=-0.184$, $P<0.05$). Also, it confirms that managerial ownership shows a negative association between gearing ratio at 5% significant level. The results of the OLS regression in Table 4.4 determine whether current and future company performance (measured as Tobin's Q and

ROA) can be explained by independent and control variables for the sample selected. The main purpose in Table 4.4 is the association and the significance of the independent and control variables further tested. The regressions performed are significant at the 95% confidence level in both Tobin's Q and ROA. For Tobin's Q 30% and ROA 25% of the variation is explained by the independent and control variables.

Table 4.4. Regression Results

Dependent Variable		B	Std. Error	t	Sig.	95% Confidence Interval		Partial Eta Squared
						Lower Bound	Upper Bound	
Q-Ratio (Model 1)	Intercept	0.892	0.316	2.822	0.006	0.266	1.519	0.067
	BODCOM	0.000	0.002	-0.164	0.870	-0.005	0.004	0.000
	BSIZE	-0.014	0.023	-0.617	0.539	-0.059	0.031	0.003
	TOP5	-3.430E-06	1.422E-05	-0.241	0.810	-3.162E-05	2.476E-05	0.001
	MOWN	-0.007	0.003	-2.039*	0.044*	-0.014	0.000	0.036
	LNCAPEX	0.013	0.012	1.143	0.256	-0.010	0.036	0.012
	DUAL	0.009	0.064	0.143	0.887	-0.118	0.136	0.000
	Gearing	0.005	0.001	3.709	0.000	0.002	0.008	0.108
	LNSales	-.026	0.016	-1.560	0.122	-0.058	0.007	0.021
ROA (Model 2)	Intercept	0.871	3.869	0.225	0.822	-6.796	8.539	0.000
	BODCOM	0.048	0.030	1.624	0.107	-0.011	0.107	0.023
	BSIZE	-0.056	0.276	-0.201	0.841	-0.603	0.492	0.000
	TOP5	-9.966E-05	0.000	-0.573	0.568	0.000	0.000	0.003
	MOWN	0.024	0.043	0.571	0.569	-0.060	0.109	0.003
	LNCAPEX	-0.102	0.143	-0.716	0.475	-0.385	0.180	0.005
	DUAL	0.073	0.783	0.094	0.925	-1.479	1.626	0.000
	Gearing	-.009	.018	-.526	.600	-.045	.026	.002
	LNSales	.580	.207	2.799	.006	.169	.990	.064

*Significance at the 0.05 level

Test results indicate a Durbin-Watson statistic of 2.19 for Model 1 and 1.9 for Model 2 which demonstrations the models fit well. The outcome reveals that Managerial ownership has a significant negative impact on Tobin's Q. With the exception of this variables, other governance attributes indicate insignificance association at 5% significance level. Although Model 1 accounts relatively lower variance, the model is significant at 1% significance level (F=20.85). Model 2 is not significant at 5% significant level (P>0.05). Additionally, the Durbin-Watson statistic which measures the autocorrelation in the residuals of the models are 2.19 in model, which indicates no serial correlation in errors of the model and ensures the model fit. Assessing the acceptance or rejection of the hypothesis will be dependent on the t-statistic being greater than the critical value of 1.96 at 95% confidence level. Further, it is interesting to explain the relationship of managerial ownership and Q Ratio graphically as shown in Figure 4.1. In order to analyze it further in a post hoc manner, the study divided managerial ownership to two stratifications as more than 20% of the proportion of shares owned by the management of the company as 1 and otherwise 0 (Fahlenbrach and Stulz, 2009).

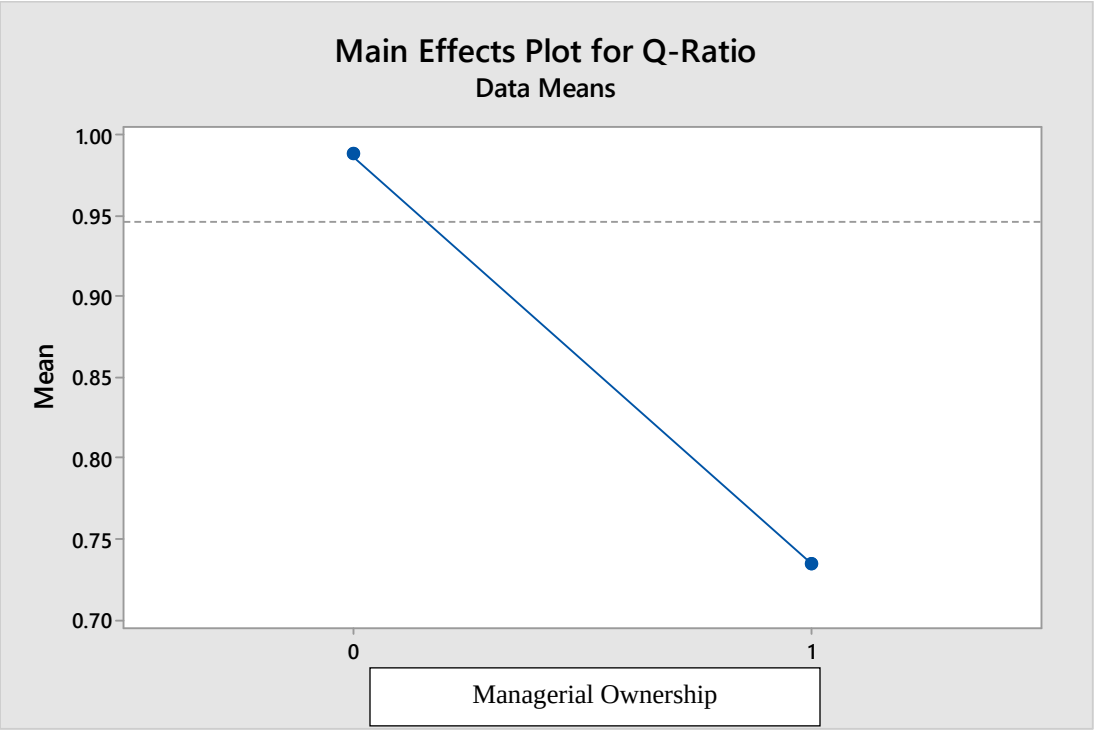

Figure 4.1. Main Effect Plot for Q-Ratio in Model 1

To test the robustness of the results, additional analysis was performed by re-testing the regression by excluding the control variables of Lnsales, Lncapex and gearing. The results obtained are consistent with the original regression performed. The multicollinearity problem underlying the regression model was tested by calculating a correlation matrix and a variance inflation factor (VIF) for each variable. The finding satisfy with all of the VIFs tested are below 2 and the only model 1 satisfy the assumptions of normality of residuals and homoscedasticity.

CONCLUSION

Contradicting the research finding of (Li X, et al, 2018), a positive relation between firm value and managerial ownership which is often viewed as evidence that higher managerial ownership increases shareholder wealth because it aligns the interests of management better with the interests of shareholders. However, our finding supports managerial entrenchment by showing a negative impact of managerial ownership on financial performance in financial service companies in Sri Lanka. This means that investors believe that managers gain so much power that they are able to use the firm resources to achieve their own interests, especially in financial service companies. This finding support (Faleye, 2007) that classified boards entrench management and reduce the effectiveness of directors, thereby hurting firm value. The finding suggests to further research the managerial entrenchment behaviour in financial service firms and governance effect on non-financial firms in listed finance companies.

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IGNOU in Enhancing Higher Education for Women in Sikkim

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Abstract

Indira Gandhi National Open University (IGNOU) established by an Act of Parliament in 1985 is one of the largest university in the world operating with the core objective of promoting opportunities for higher education and achieving its vision 'reaching the unreached'. Analysing the role of IGNOU in the advancement and development of higher education through its outstretched academic and professional programmes, the University confers to provide education to the people, more particularly the women and the marginalised sections of the society.

The Annual report of IGNOU (2015-16) highlights that the strength of female students is higher than 50%. On the basis of gender, the present enrolment profile of students shows that out of 4.56 lakh enrolled students in 2015-16, 2.07 lakh were female learners.

The present study thus, enables us to understand the role of IGNOU in augmenting higher education in general and particularly women in Sikkim. The available data on the enrolment of learners in IGNOU in the state of Sikkim over past five years reveal that enrolment of women in higher education has increased from 55% in January, 2012 to 64% in January, 2017. Evaluation studies also elicit that female learners in Sikkim have highest pass percentage as compared to male learners. Sikkim, where educational development started only in early nineteenth century has less opportunity for higher education aspirants. IGNOU has been one of the leading centers for providing higher education a platform, especially for women in Sikkim. The paper tries to understand higher education system in Sikkim and the contributions made by IGNOU in promoting higher education for women in the state.

Key words: IGNOU, Role, Sikkim, Higher, Education, Women.

Introduction

The development of higher education in Sikkim has been a major concern since its merger in 1975. Records show that by 1975 only few institutions like Namgyal Institute of Tibetology (1957), Sikkim Institute of Higher Nyingma Studies (1963), and Sir Thudob Namgyal College (1972) existed (Dewan, 2012). Within the period of twenty years of statehood the state could establish only few higher educational institutions. However, with the contribution of private investors many colleges and universities sprout in Sikkim for providing higher education. The growth of higher educational institutes became more visible after 1990's. It shows that the development of higher education in Sikkim laid its foundation quite late as compared to other Indian States.

Despite the fact that colleges, technical training institutions, and universities are showing an upward trend in providing higher education in Sikkim, yet these could hardly accommodate all those who have desire for tertiary level education.

Barring these higher educational institutes, higher education learners in the state also has access to Open Distance Universities like IGNOU. Since there is a great demand for more access to higher education, the IGNOU regional center in the state, through its ODL mode has been serving the learners, especially belonging to low income families and learners aspiring to enhance their educational degrees. IGNOU with its different academic and certificate courses have been able to provide platform to acquire the

basics of higher education to the needy aspirants. Among the group, the maximum aspiring learners are women. In Sikkim, IGNOU has been playing an important part by enabling learners, particularly women for pursuing higher education in various courses offered by the university.

IGNOU, the largest Open University ensures access to higher education with the following primary objectives like -:

- to advance and disseminate learning and knowledge by a diversity of means, including the use of communication technology,
- to provide opportunities for higher education to a large segment of the population,
- to promote the educational well-being of the community generally, and
- to encourage the Open University and distance education systems in the educational system of the country. (IGNOU, Annual Report, 2015-16).

In 2015-16, the University recorded the growth of 29.82 lakh enrolment. Of the total fresh enrolment in 2015-16, women constituted 45.5%, STs with 8.8%, SCs with 10.0% and OBC was 20.8%. IGNOU disseminates its major academic programmes through 21 Schools of Studies, 67 Regional Centres and 3,089 Learner Support Centres (LSCs) across the world (IGNOU, Annual Report, 2015-16).

As per records women are the most benefiting section of the larger group. Indira Gandhi National Open University has acted as the education (higher education) provider to women. On the basis of gender, the enrolment profile of students in 2015-16 shows that out of 4.56 lakh enrolled students 2.07 lakh students represented females. Increased female student enrolment is seen in the courses like- School of Education, Gender and Development Studies, Humanities, Health Sciences, Continuing Education, Vocational Education and Training, Social Work and Translation Studies and Training. The highest enrolment of female students is recorded in School of Gender and Development Studies with 79.3% followed by 67.4% in the School of Humanities. Hence, IGNOU as an academic center has been able to meet the expectation of providing education, especially to learners, particularly women, the marginalised section of the society.

The available statistics in Sikkim show that enrolment of female learners in ODL system is quite high. Various courses offered by IGNOU have attracted large numbers of female learners to pursue higher education through distance mode. In Sikkim, the enrolment of women learners in IGNOU is consistently increasing. The study on the past five years of enrolment profile shows that the women enrolment has increased from 55% in January, 2012 to 64% in January, 2017. There has also been tremendous increase in pass percentage of female learners as compared to male learners. IGNOU has been one of the leading centres in providing higher education, especially for women in a state like Sikkim where educational development began in early 19thcentury. Considering the above factors, IGNOU, in Sikkim is playing a role of 'Life-long Learning Center' as assured by UNESCO.

In this view, the present paper is an attempt to study the role of IGNOU in enhancing higher education to women in Sikkim. For this purpose of study, the paper relies on the data collected from the IGNOU, Regional Center, Gangtok, Sikkim, 2017. The data used includes the list of enrolment of learners in each course from 2012 to 2017 and the convocation list of learners for the year, 2014, 2015 and 2016.

The fowling section tries to focus on the enrolment of women for various programmes and degree received under IGNOU in past five years (2012-2017).

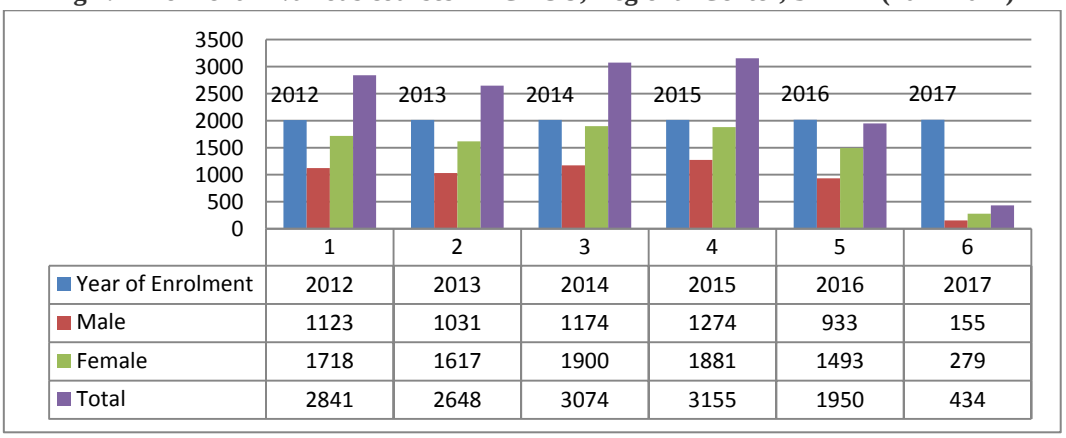
Along with the other higher educational institutions in the state, the enrolment of women in various courses offered by IGNOU has seen a tremendous increase in past five years. Consistency in increase in enrolment of women each year is a noticeable factor. The following table shows the enrolment of learners in various courses in past five years.

Table 1.Enrolment of learners in IGNOU, Regional Center, Gangtok, Sikkim (2012-2017)

Sl. No.	Year of Enrolment		Male	Female	Total
1	January	2012	308	378	686
2	July	2012	815	1340	2155
3	January	2013	322	457	779
4	July	2013	709	1160	1869
5	January	2014	532	778	1310
6	July	2014	642	1122	1764
7	January	2015	516	723	1239
8	July	2015	758	1158	1916
9	January	2016	180	296	476
10	July	2016	753	1197	1950
11	January	2017	155	279	434

Source: IGNOU, Regional Centre, Gangtok, Sikkim

Fig 1. Enrolment in various courses in IGNOU, Regional Center, Sikkim (2012-2017)



Source: IGNOU, Regional Centre, Gangtok, Sikkim

In gender wise comparison of course completion in 2014, 2015 and 2016, the result analysis shows that highest number of women has completed their higher education courses. As per the IGNOU records the course completed by female learners are greater than the male learners in all three consequent years. The evaluation results also show that the female learners have higher pass percentage than the male learners.

The year wise (2014-2016) and course wise completion data (in figures) for Bachelor Degree Programmes (BDP) and Master Degree and Certificate Courses are presented as follows;

Bachelor Degree Programmes (BDP) and Certificate courses;

EEC-Elective Economics

EPA-Elective Public Administration

EEG- Elective English

EHD- Elective Hindi

EHI- Elective History

EPS- Elective Political Science

ESO- Elective Sociology

BCOM- Bachelor of Commerce

Master Degree and Certificate Courses:

MAH- Master of Arts (History)

MEC- Master of Arts (Economics)

MEG- Master of Arts (English)

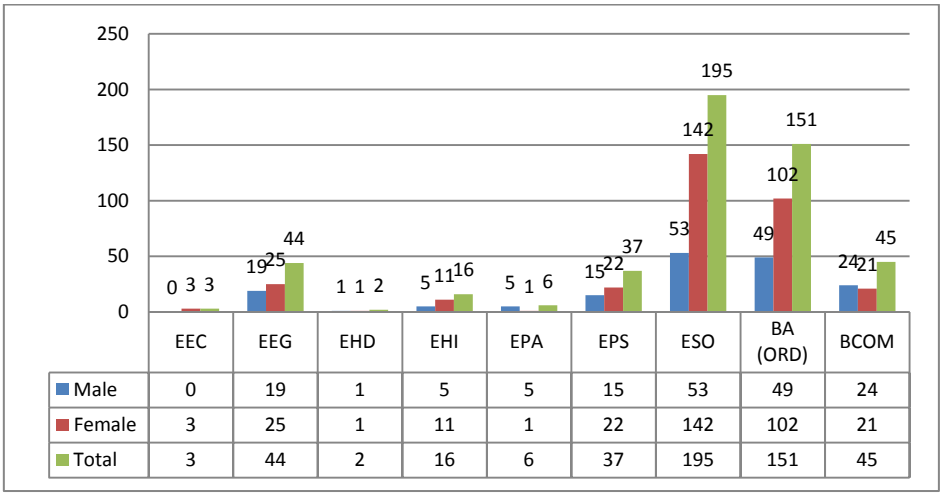
MPS- Master of Arts (Political Science)

MSO- Master of Arts (Sociology)

MSW- Master in Social Work

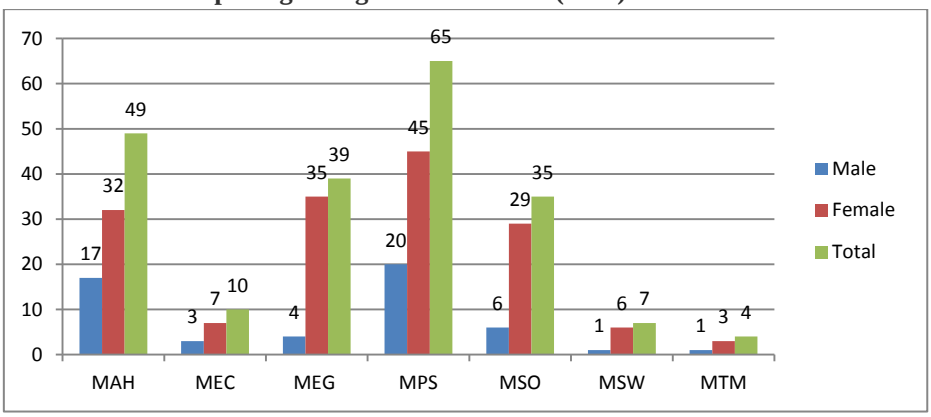
MTM- Master in Tourism and Travel Management

Fig 2. Number of learners completing BDP Course (2014)



Source: IGNOU, Regional Center, Gangtok, Sikkim, 2017

Fig 3. Number of learners completing Post graduate courses (2014)

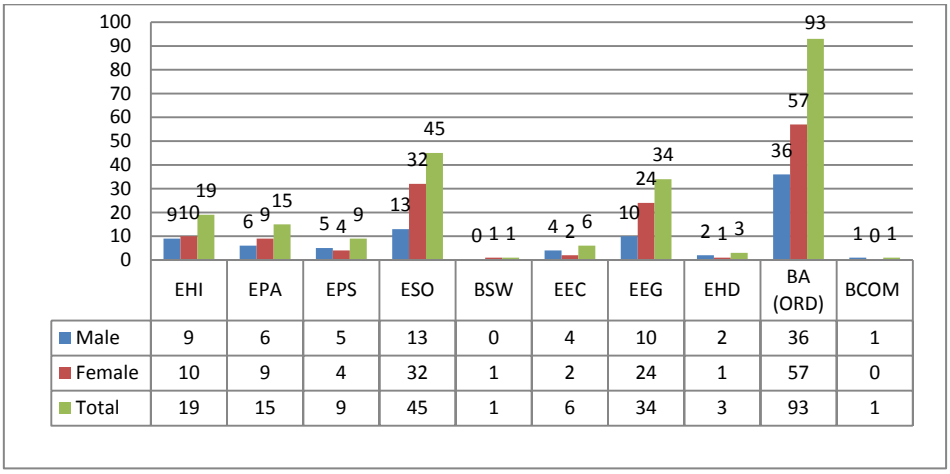


Source: IGNOU, Regional Center, Gangtok, 2017

As depicted in figure 2 and 3, the total number of learners who completed their course (Post Graduate) in 2014 is 209. Out of which 157 are female learners and 52 male learners. The highest number of learners completing their course is in MPS, followed by MAH, MEG, MSO and MEC.

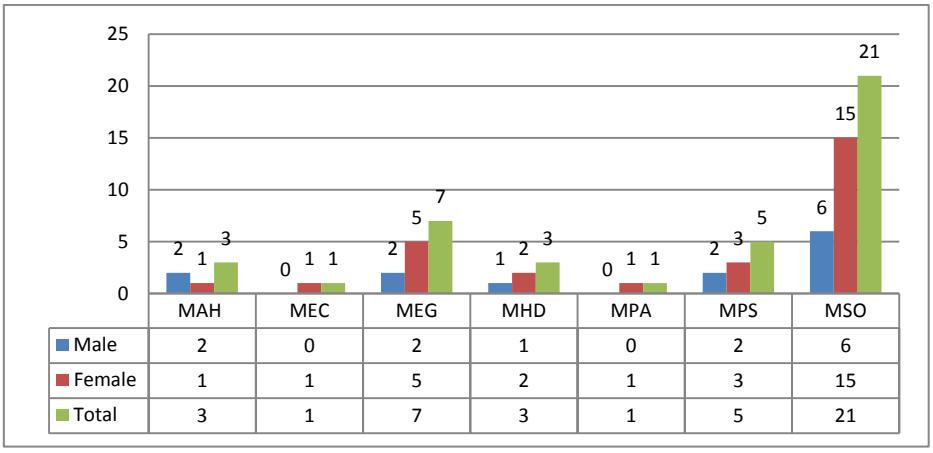
The total number of learners completing BA Courses in 2014 is 499, where 328 are female learners and 171 are male learners.

Fig.4. Number of learners completing BDP course (2015)



Source: IGNOU, Regional Centre, Gangtok, Sikkim

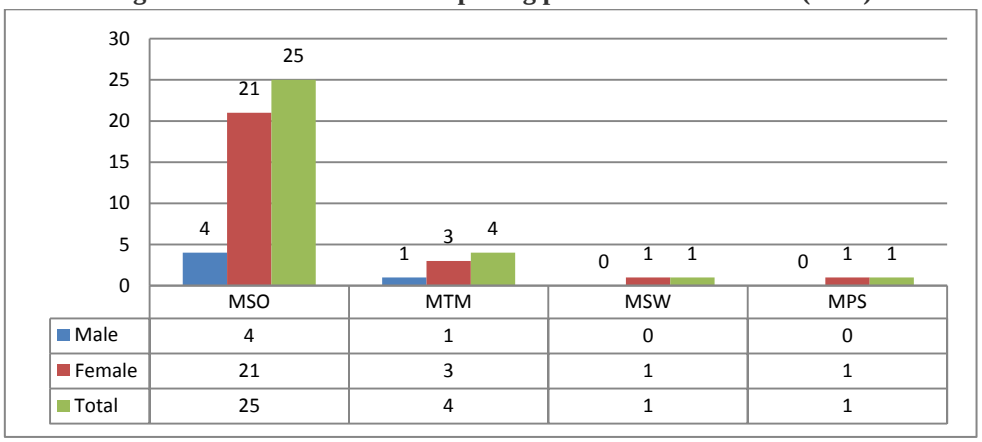
Fig.5. Number of learners completing Post Graduate course (2015)



Source: IGNOU, Regional Centre, Gangtok, Sikkim

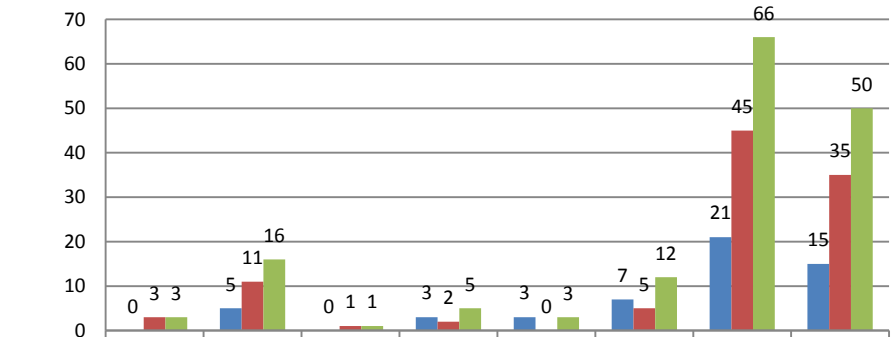
The learners who have completed their BDP courses in 2015 are 226, where 140 are female learners and 86 are male learners. In Post graduate courses also the female learners are on the higher side.

Fig.6. Number of learners completing post Graduate Course (2016)



Source: IGNOU, Regional Centre, Gangtok, Sikkim

Fig.7. Number of learners completing BDP Course (2016)



	EEC	EEG	EHD	EHI	EPA	EPS	ESO	BA(ORD)
Male	0	5	0	3	3	7	21	15
Female	3	11	1	2	0	5	45	35
Total	3	16	1	5	3	12	66	50

Source: IGNOU, Regional Centre, Gangtok, Sikkim

Similarly, analysis of 2016 result of Post graduate courses and BDP Courses elicits that of the total 187 learners, 128female learners and 59 male learners have completed their courses. It is seen from the study of enrolment and result analysis of learners in five years (2012-2017) that women have been benefiting the most from the ODL system of IGNOU in the state.

IGNOU, since its very inception in December, 2000 in Sikkim has become the center of higher education in the state. With the opening of IGNOU, the aspiring learners for higher education sought entry to the new system of Distance education which enabled the learners to live their dreams of learning and acquiring higher qualifications.Considering the enrolment profile and result data of IGNOU, Regional Centre, Sikkim has been able to meet the principle of 'reaching the unreached'. Above all IGNOU has contributed significantly to the development of higher education in Sikkim.

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Potential Geoheritage & Geotourism Sites in India

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Potential Geoheritage & Geotourism Sites in India

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Abstract- India is endowed with unique geological and geomorphological processes. However, the positive trend of development has negatively impacted the geological wealth of our country. The aim of this paper is to convey to the reader in brief about the idea of Potential Geoheritage sites in our country present in almost every state. This comes in sync with tourism of such sites which is still hardly visible. The awareness that needs to be spread amongst the people as well as the government to recognize these sites in a better manner in itself is the 'marketing' of these sites. Today, India compares itself with the world on development front but at the same time it also needs to compare itself on the promotion of Geoheritage sites and the correct showcasing of these sites which many countries in the world have gotten right, so these sites which already have the potential to be converted to 'Geoparks', can actually be converted to such parks and mark themselves on the UNESCO Geohritage Sites Map too. Why collectively we need to understand the impact that we have on such geological sites or any other important sites for that matter, be it heritage, archaeological, natural, man-made, etc., is really important. Hence, while reading this paper one must also imagine how ill-treated such places in our country can get and how we as citizens of this nation can contribute to the restoration of these sites.

Index Terms- Geoheritage, Geoparks, Geotourism, Geodiversity, National Geological Monuments (NGMs)

I. Introduction

Geology, a word that can be broken into two main parts, Geo- means Earth and Logy- means the study of it. In application the subject deals in understanding as to why/when/where/how, living beings have evolved over time and how the planet has changed its structure over time. Thus, geology deals with all the life changes that have shaped our today over billions of years of this planet.

Geology is often categorised into Physical geology and Historical Geology. Physical Geology is the branch of science that studies the physical features of Earth, such as volcanoes, mountains, earthquakes, rocks and oceans. Historical Geology is the branch of science that studies the historical events such as formation of the Earth, major changes throughout time, and also how all these changes are going to impact the future of the planet. One thing that geology has given us very fondly today is Geodiversity. Geodiversity imperatively comprises of the geological and the physical essentials and elements of nature, which include everything from minerals, soils, rocks, landforms to even fossils. It also comprises of the various geological and geomorphological processes of Earth.

Geomorphology is another branch of science that studies the nature and the origin of the landforms, in particular the formative processes of erosion and weathering that occur in the atmosphere and the hydrosphere. Geoparks are singular, unified geographical area (also referred to as sites), where landscapes of international significance are managed.

These sites are managed with a holistic viewpoint. Protection, education and sustainable development are the important parameters that these sites are constantly evaluated upon and worked on. Little help is required from the local communities to maintain these sites through a bottom-up approach.

The concept of Geoparks was first introduced by UNESCO in 2001 and it has rallied since. In 2015, a new label of UNESCO Global Geopark was ratified by its 195 member nations. At present there are 140 Global Geoparks spread across 38 countries, but India still hasn't managed to get any of its sites on the list.

As part of the bottom-up approach followed by UNESCO for development of Geoparks, the local communities are given the opportunity to develop a cohesive partnership to promote the features of a particular site. A long term support system in form of public as well as private support from the local communities is established and these communities meet regularly to showcase and protect the heritage of a Geological site.

II. Geoheritage and Geotourism

According to Springer, Geoheritage can be defined as, "a generic but descriptive term applied to sites or areas of geological features with significant scientific, educational, cultural or aesthetic value. Scientifically and educationally speaking these Geoheritage sites have significant features resembling to textbooks such as landscapes, rocks, mineral types, etc., and culturally speaking these sites have played a role in history and culture creation. These sites are also packed with aesthetic appeal to promote local and regional tourism". Geoheritage sites become critical in advancing the knowledge about natural phenomenon like hazards, soil processes, climatic changes, groundwater supply fluctuations, mineral and energy supply levels, environmental changes, evolution of life, and other such aspects that are concerned with the history and nature of Earth. Hence, these sites have high potential for outside classroom visits, economic support to communities, recreational use and enhancing the knowledge available in the public domain.

National geographic defines Geotourism as, "tourism that sustains or enhances the distinctive geographical character of a place- its environment, heritage, aesthetics, culture and the well-being of its residents".

The Indian Subcontinent is endowed with cultural heritage, a rich historical milieu and prominent physical attributes, which this project intends to cover.

The Geological Survey of India (GSI), founded in the year 1851 is a Government of India Ministry of Mines organization and was formed for collecting information in the field of Earth science and other fields of survey. In India, GSI has taken the responsibility of protection and promotion of the physical attributes of India and has declared 26 such sites in different parts of India as "National Geological Monuments (NGMs)". This is where the purpose of this research took birth; to study the different NGMs The Geological Survey of India (GSI), founded in the year 1851 is a Government of India Ministry of Mines organization and was formed for collecting information in the field of Earth science and other fields of survey. In India, GSI has taken the responsibility of protection and promotion of the physical attributes of India and has declared 26 such sites in different parts of India as "National Geological Monuments (NGMs)". This is where the purpose of this research took birth; to study the different NGMs and potential sites in India, relatable features of all these sites and draw areas of comparison with the UNESCO Global Geoparks which are currently recognized internationally. Exploring the answers to the questions such as, why hasn't UNESCO still stepped in India, and why is it that people aren't really aware of these NGMs that India so fondly possesses was the key thought driver behind this paper.

III. Potential Geoheritage Sites in India (Briefly)

1.1 Belum Caves, Kurnool District, Andhra Pradesh

Belum caves in the Kurnool district of Andhra Pradesh are the longest and the largest set of cave systems that are open to public visit in the Indian Subcontinent. These caves are particularly known for their speleothems. Speleothems are cave formations and as pointed earlier are secondary mineral deposits that form stalagmites and stalactites. This natural cave system was formed over tens of thousands of years due to a constant flow of underground water. These caves have galleries, caverns with fresh water, siphons and very long passages. The cave system has an overall length of 3300 meters and are called Belum Guhalu in the local language which is Telugu. The deepest point in the cave system is known as Pataalaganga, which is 46 meters in depth when compared to the entrance point level.

The caves received scientific attention since the year 1884 and very studied in detail even in the 1980s. In 1988 the state government of Andhra Pradesh declared the geological site as protected. And in 2002, Andhra Pradesh Tourism Development Corporation (APTDC) developed these sites fully for tourism purposes. Out of the grand total of 3.5 KM of cave length, 1.5 KM is open for tourist entry and the rest isn't at the moment.

1.2 Floating Rock, Meghalaya

Must see nature's wonder, in the outskirts of the village of Mawlynnong, lies a balancing rock. The balancing rock is in a spot surrounded by small fences and in the fences lies a small rock on top of which a very large boulder is perfectly balanced. These rocks have sustained through time and ages somehow. No amount of weathering, storm or cyclones have been able to come an inch closer to unbalancing them. The place is very quiet usually and surrounded by bamboo trees.

The locals believe this was a spot where thousands of years ago lots of human sacrifices were made. And later this was a spot for the ancient shrine of the Kharsi tribal people.

1.3 Gandikota, Andhra Pradesh

Gandikota is a village in Kadapa district of Andhra Pradesh. In telugu, the word 'gandi' means gorge and hence the place has received its name. the village lies on the right bank of the river Pennar.

The Cuddapah Basin of Peninsular India contains places like Chittoor, Anantapur, Kurnool, Cuddapah, Nalgoda, Krishna, Mahaboobnagar and Guntur districts along belonging to the Proterozoic period.

1.4 Gongoni, Grand Canyon of West Bengal

In the most unusual part of India lies a resemblance of the Grand Canyon of Arizona in the United States. West Bengal boasts the presence of a beautiful gorge which is a miniature version of the Grand Canyon of US. Located in the town of Garbeta on the banks of river Silabati is a handiwork of nature. This gorge of red soil has resulted too from the weathering forces of nature such as wind and water. Why the most unusual part of the country for the situation of a Canyon is because Bengal hosts plains and development of such a gorge in plains is very unusual and rare. The canyon remained party accessible for a long time until few years back the government of West Bengal decided to add stairs to the canyon so that everyone could easily walk down into the canyon.

To add to this, a folklore also surrounds this place, that during the exile of Pandavas the Pandava prince Bheema from the epic of Mahabharata slayed the demon Bakasura who lived in this Canyon.

1.5 Kolodyne Castle, Mizoram

In the western region of Saiha, lying in the Southern part of Mizoram is a marvellous and mesmerising rock formation that resemble a castle. This geological marvel is known for its craftsmanship, and the craftsman is none other than nature itself. Lying there for years in the pristine river of Kolodyne (also known as Koladyne) is this magnificent potential geological site. The Kolodyne Castle also known as the 'Castle of Beino' is a sprawling alley of white, grey, silvery rocks that range 8 to 10 meters in height. The locals of the village believe that it is a cursed castle and there are a lot of folklores about the castle, some say that the river queen of spirits lives in this place and acts as an ombudsman (a person charged with the responsibility of representing the interests for the public).

The area is not very well accessible during the monsoons but summers are the best time to visit this geological marvel, when the waters of the river and low and the rock formations can be clearly seen.

1.6 Mahabaleshwar Hill Range, Mahabaleshwar, Maharashtra

Located in the Satara district of Maharashtra in India is a beautiful hill station which lies in the Sahyadri mountain range. This hill station is Mahabaleshwar with a view of the evergreen forests which one during the British raj served as the summer capital of Bombay Province. It is at an elevation of 1400 meters and is 285 kilometers from Mumbai. It is the source of Krishna river which flows through Maharashtra, Andhra Pradesh, Telangana and Karnataka.

The entire hill range of Mahabaleshwar is geographically important because they belong to the volcanic region of Deccan Traps in India. The deccan traps are amongst the largest volcanic features on Earth. The word 'trap' refers to step like hill formations.

It is known through scientific dating of the Deccan region that they began formation 66 million years ago when the Cretaceous period had ended. These were formed due to a bulk of lava eruptions or volcanic eruptions. This bulk of lava is called as flood basalt and is responsible for 5,00,000 square kilometers of the Deccan Traps.

1.7 Marble Rocks, Jabalpur, Madhya Pradesh

This geological marvel is an upcoming potential geosite under the consideration by the Geological Survey of India (GSI). Located in the sixth largest river of the Indian Subcontinent, Narmada (previously Nurbudda), this site lies in the city of Jabalpur in Madhya Pradesh. The narmada river has carved gorges along its path and these gorges are of soft marble. These gorges run for nearly 8 KMs in the river and is a popular tourist destination. The site is also famous for its resource sharing with the world. Many local marble mines mine in the area and transport the marbles across the globe. These marble are rich in magnesium and are as hard as soap stone. This area of the narmada river apart from the white marbles is also particularly rich in brown and blue coloured marbles.

This site over the past few years has explored the tourism opportunities and business opportunities equally, the gorge has a cable car to take the tourists across the beautiful river and boats are also provided in huge numbers for hiring purposes. Add to this the crafts that can be bought from the local shops of Jabalpur and the area around the river as well, where-in the crafts are made particularly from the locally available materials.

1.8 Leh Manali, Himachal Pradesh

The leh manali highway is one of the most spectacular views that our country has to offer to any traveller. Any person visiting this place from around the country will be left spellbound by the spectacular views of the small hills, weathered structures and curvaceous roads amongst everything else. Leh is the ground zero for the mountain deserts of ladakh. Monasteries, pure blue lakes, and scattered villages, scenic valleys and marvellous structures all lie in this plane. These structures start from manali itself. Manali, a slice of heaven in the midst of urbanization that is spreading quickly. A place which is filled with a mix of culture as well as growing towns. The perfect stop to get a person startled and started with what lies ahead for them as they travel from Manali to Leh-Ladakh and Spiti Valley.

The conical structure of the rocks that can be seen in the image below is a resultant of the rocks constant quarrel with the winds. The needles rise towards the sky and make a beautiful stop for any passing by person. It is also become a stop-over spot for all the buses around which travel upwards from Manali to Ladakh. In the winter season, what adds more vibrancy to this site is the added colour of white snow on these pointed structures. It is beautiful. They might look like sand but they are part of the greater Himalayas that have weathered over the greatest period of time.

1.9 Natural Gateway Near Lachung La, Himachal Pradesh

Lachung la (also known as Lachulung la) is the second pass on the Leh manali highway. At its peak of 4891 meters it is a place filled with mountains that have so many shades of brown in them that one might have to bring multiple palates of the colour brown to paint the vivid beauty of the mountains and small hills. The natural gateway (shown below) is a must watch for any traveller in Lachung la. This natural tunnel, is right opposite to a trekking route from Leh to Manali.

1.10 Natural Coral Bridge at Neil Island, Andaman & Nicobar Islands

The Andaman-Nicobar accretionary ridges (islands) have a varied geography and geomorphology which has resulted from a complex interaction with climate, tectonic plates, surface uplifts, weathering processes and eustatic sea level. Similar to the Bay of Bengal and the Indian Ocean the Andaman & Nicobar Islands too have a subtropical climate with hot to humid sea breeze conditions.

The beautiful natural bridge is a lovely site to visit in the Neil Islands and the local Bengalis of the island have also named it Howrah Bridge. The best time to visit and see this rock bridge is on the days of low tides. Otherwise the approach to the bridge is not possible. On low tide days, people have to walk on rocks to reach this place and they can easily spot crabs and octopuses on their way to the bridge. Any local guide can be hired to better explain the features of this natural formation.

1.11 Oravakallu Rock Garden, Andhra Pradesh

Located in the Kurnool district of Andhra Pradesh is a beautiful mix of geology and sculpture garden. In the village of Oravakallu (also Oravakal) lies the Oravakallu Rock garden which is a formation of igneous rocks, pools of water and an ancient cave amidst a 1000-acre sculpture garden.

The Andhra Pradesh Tourism Development Corporation (APTDC) has developed this site too over the past few years. The rocks in the garden contain quartz and silica. Quartz and silica happen to be very important raw material for the glass industry.

Few ecological concerns that are faced currently by the garden are:

1. Companies filing petition to mine the quartz and silica
2. This site is also famous for film production, but once the shootings are done, POP (Plaster of Paris) is left behind by the production and this spoils the garden .

A good thing done by the APTDC is the provision of rooms and cottages inside the garden itself for staying purposes. It is located 20 kilometers from the Kurnool district on the National Highway- 18 (NH-18).

1.12 Varkala Cliff, Thiruvananthapuram, Kerala

Varkala is a beautiful place in 'God's own Country' Kerala. It is the only place in the Southern part of Kerala where 'cliffs' are found. These cliffs are adjacent to the Arabian Sea. The entire cliff runs down with sedimentary formations in it. These Cenozoic sedimentary cliffs are commonly known as 'Varkala Formations'.

Varkala also happens to be home to a temple that is more than 2000 years old. This is the famous tourism spot of Janardana Swami Temple.

The varkala cliff is made up of beds of sands and beds of shale. Along with a thin seam of lignite which make this a good spot for natural vegetation and hence natural springs and scattered vegetation is common to the area.

The Varkala Cliff is adjacent to the sea and has a beach which offers a lot of tourism in this part of Kerala specifically. Sports like paragliding are quite common in the area, followed by other water sports.

The most urgent threat faced by this site is the heavy tourism activity. This activity though very helpful for economic purposes for the state and the city, makes it difficult for the authorities to manage the area. Because of which poor disposal of garbage, ill-treatment of waste and other problems cause by people is very common.

Another problem is that the site was only recently posed as a National Geological Monument and hence awareness amongst the people for this site for geological purposes is less, which too needs to be worked on.

1.13 Yana Rocks, Yana Village, Karnataka

Yana village is a located in the forests of Kumta in North Canara district of Karnataka. It is known primarily for its karst rock formations. Karst rocks are formed by the dissolution of soluble rocks such as dolomite, gypsum and limestone. The yana rocks are a set of two massive rocks outcrops that are known as Bhairaveshwara Shikhara and Mohini Shikhara. Shikhara word comes from Hindi and means hill. These two rocks are a composition of the karst limestone in a crystallized state. The Bhairaveshwara Shikhara is 120 meters in height and the Mohini Shikhara is 90 meters in height.

The place is a famous tourist spot not only because of the crystallized karst rocks but also because at the bottom of the Bhairaveshwara Shikhara lies a cave temple where a self-manifested Shiva linga is present. To add to the sanctity of the place, water from the cave roof drips over the Shiva linga drop by drop all the time, making it an apt pilgrimage spot that it is today.

The two rock monoliths are surrounded by streams, forests and are a part of the Sahyadri range of hills in the Western Ghats of South India. Inside the Bhairaveshwara Shikhara cave also lies abronze statue of Goddess Durga.

And to add to all this is a natural waterfall located at a mere distance of 8 KMs from the Yana Rocks and the waterfall is called Vibhuti Falls which too attracts tourists to this spot.

The natural creation of the Shiva linga has been attributed by geologists as a geological phenomenon formed by the Stalagmites and Stalactites in a limestone formation. Stalagmites are various types of rock formations composed of lava, mud, minerals, sand, peat, pitch, etc., that rise from the floor of a cave due to the accumulation of such materials on the cave floors. On the other hand, Stalactites too can be composed of lava, mud, minerals, sand, pitch, peat, etc., but instead they hang from the ceilings of caves or hot springs

1.14 Ramgarh Impact Crater Site, Baran District, Kota, Rajasthan

Since the inception of the GSI (Geological Survey of India) in 1851, the scientists were always intrigued by this potential geological site in the Baran district of Kota in Rajasthan. This meteorite impact crater site has a diameter of 3.2 KMs and has an elevation of about 200 meters from the ground terrain level. It was first discovered way back in the year 1869 by the GSI and the site was recognized an impact crater site in the year 1960 by the Geological Society of London as well.

The process of further worldwide recognition for this site was led by Dr. Pushpendra Singh Ranawat recently. This recognition from the Canadian agency will mark this site as the 191st crater site in the world. The process has been fast tracked by INTACH (Indian National Trust for Art, Culture & History) and soon with the help of this site's significance the village of Baran will be marked on the global map.

1.15 Zawar Mines, Udaipur, Rajasthan

The famous Zawar mines located in the Udaipur district of Rajasthan is a zinc and lead extraction site with even greater significance in both geology and history. This potential National Geological Monument has its contribution in history, science, economics, archaeology as well as geology. Zawar is a settlement in located about 40 KM from the city of Udaipur. This township was created by Hindustan Zinc Limited company about a while back.

This site has an ancient underground set of mines and to add to it the remains of an ancient smelting industry and hence it is regarded as a potential site for not only geological recognition but also the first site in India to have a Geopark built around it.

Zinc is a metal that can be difficult to extract from the core, the process being known as 'Smelting'. This metal has a low boiling point of 907°C and can be extracted only through a mastered smelting process. And it was India out of all the countries in the world which was the first one to master this technique of Zinc Smelting and all this happened in the Zawar Mines of Udaipur district. The technology was so difficult to achieve that even in India at the time the mine was unique for Zinc smelting and faced no eminent threat from anyone trying to copy the method of this metal's extraction.

Even the Archaeological study by the British Museum, London, M.S. University of Baroda and Hindustan Zinc Ltd, have proved that Zawar metallic zinc was the first ever production in the world by distillation.

IV. Recommendations

A. Proper signage should be the starting point to developing these sites. Most of these sites whether potential or listed don't have proper and well maintained signage boards in front of them. These boards are often blocked by trees, shrubs, or get dirty. Thus even if a site has a board it should be maintained.

B. Illegal activities such as mining in these sites should be prohibited. A lot of places in our country have lost their mineral wealth to miners and mining activities. Thus stringent rules need to be laid down and adhered to so that these sites can be preserved.

C. Regular cleaning of premises and regulation needs to be conducted. Even though natural calamities can't be handed, the aftermaths can be. So, a dedicated team of people should report if geological sites are exposed to natural degradation or calamity.

D. Sites are also closer to roads in many cases, ex: Eparchaen Unconformity, thus an expansion of roads in the future can damage these sites and hence larger buffer zones between such sites and road or railways construction needs to be provided.

E. Proper fencing should be done around the area to protect geological monuments.

F. More than often the maintenance of the roads leading up to these sites becomes a big issue. This drags down the consumer from visiting these places too. Proper roads leading up to the monuments should be constructed and should be maintained in frequent intervals.

G. Water bodies around geological sites often are subjected to sewage, garbage and industrial waste dumping. This needs to be resolved and checked, to better maintain these sites.

H. Conservation measures require Site Management Plans, Visitor Management Plans, Garbage Management Plans, Lake Management Plans, building Interpretation centres and providing information in form of signage boards in local as well as universal languages.

I. Proper flyers and brochures should be made available at these places.

J. Social Media channels should be optimized for information delivery to the public regarding these sites.

K. Government should work in tandem with Private enterprises or Businessmen to develop these sites in a better manner.

L. Awareness amongst general public must be increased so that they don't ill-treat or disrespect these sites by throwing waste or drawing graffiti, etc.

M. Local communities of people and villagers often litter these sites by defecating in their vicinity, this needs to be stopped by educating them about these places.

N. Apart from mining for minerals these sites are subjected to construction, overcrowding and other anthropogenic activities. These activities should be minimized.

O. Forest department can be checked with to include the areas to sites under their jurisdiction, this can help a lot.

V. Conclusion(s)

In conclusion, Geoheritage and Geotourism have significant impact on us as well as our economies. I can't help but compare geological monuments in India to be compared to other sites in parts of the world. Countries like China, Japan, Republic of Korea, France, Austria, Germany, Italy, Greece, Poland and others have worked a lot on bringing out the best of these sites and maintaining them in forms of Geoparks and we should do the same. It is not as if our country doesn't have these wonders, it has more wonders to be transformed in to Geoparks than any other country but a simple act of will is missing from the system. This needs to be reinforced so that these places don't go to waste. Monuments like these cannot just lead to sustainable development of communities around them but also offer business development opportunities and it needs to be kept in mind while uplifting these sites. Maintenance can come in form of proper authorities monitoring these sites or by the simplest way of not littering these sites. In all we as a community need to hold this responsibility and act together.

Services can be established in these sites in the future once they receive their fair share of attention. ATMs can be set up in these areas, if banks asses the need to do so. Shops can be established so that consumers can buy brochures, gifts and takeaway goodies from these places. Motels can be constructed so that lodging doesn't become a problem. All this can be attributed to "Goods related Services" concept of "Services Marketing Mix". In other nations this potential is well realised and still it isn't when it comes to India.

Even though development of service and tourism related activities can be a little slow for the time being, an initiation is a must. Otherwise it won't be long before people actually don't care about these geological sites of importance and once that happens it would be a total failure to brand these sites for tourism purposes at all. The finest example can be taken from Botanical Gardens of Bengaluru. How the place has been converted in to a garden, with annual flower shows, a picnic spot for people, jogging track for fitness enthusiasts, this can be done with most of the sites as well. Even though many sites would still remain exclusive to interested people, who want to actually visit them, lots of other sites still have potential to be turned in to places of recreation or Geoparks.

Museum facilities can be opened to popularize these sites and geology at large as well. Lots of Geoparks around the world do offer this facility and we need to jump on it as well.

The point of this paper being that it is a proof that a market exists for these places. No doubt a further study of an even larger audience would yield in similar results. But it won't be of any use is we don't allocate funds, strategies, human resources and technology to the development of our geological heritage. It is time for us to learn from other nations, what they are doing right, what they are doing wrong, how they have built these places and places of interest, these questions need to be asked and answered so that we don't miss out on our opportunity, which for the time being we do have.

Stakeholders for these sites need to be identified, administrators need to be sensitized, tourism departments need to gather up to date information, measures of protection need to be deployed, public's negligence to these places needs to be tuned to public's interest for these sites.

Agreed that we have a long way to go to achieve everything. But it can happen one day at a time.

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The Substitution of *Eucheuma cottonii* Seaweed Flour to the Acceptability and Color Characteristics of Biscuit

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Abstract- Biscuits are snacks that are known to be saved because they have a good and varied taste. Processing *Eucheuma cottonii* seaweed into flour as a raw material for making biscuits can be done to increase the use value and economic value of seaweed. The purpose of this study was to study the panelist acceptance and color characteristics of biscuits by substituting seaweed flour *Eucheuma cottonii*. The concentrations used were 0% (PM1), 5% (PM2), 10% (PM3) and 15% (PM4). The research method used a completely randomized design of 4 treatments and 5 replications. Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test. The results showed that what was meant by Eucheuma cottonii seaweed flour had an effect on the color of the biscuits. The 5% concentration of *Eucheuma cottonii* seaweed flour has a higher score with a score 3.47, lightness 72,74, redness 7,80 and yellowness 28,79.

Keywords: biscuit, *Eucheuma cottoni* seaweed, organoleptic, substitution

I. Introduction

Biscuits are a favorite food made by baking dough that comes from wheat flour, fat, eggs, sugar with or without the addition of other permissible additives.[1] Seaweed is an algae that is small, easily recognizable, has economic value and has been cultivated and utilized. *Eucheuma cottonii* seaweed is a seaweed which belongs to the red algae group (*Rhodophyceae*) and is most commonly found in the market.[2] The technology of *Eucheuma cottonii* seaweed cultivation that is easily applied to the community makes *Eucheuma cottonii* seaweed rapidly develop. Utilization of seaweed can be maximized by developing processed seaweed products to increase the use value and economic value of seaweed. One effort to develop seaweed is to process it into flour as a biscuit-making ingredient.

Product appearance is an important parameter on a product. The appearance of a product will affect consumer acceptance of the product. Appearance of a product in general can be determined by color. Colors can give the impression of liking before consumers consume these foods.[3] Interesting colors on a product will cause a sense of liking before consumers consume these foods. Although the food produced is delicious, but if the resulting color deviates and is not attractive, it will cause someone to lose their appetite when they consume it. The color produced on the product must be able to represent the flavor added and can please consumers.

II. Material and Method

Material

The main ingredients are used *Eucheuma cottonii* seaweed flour, flour, butter, egg yolk, sugar, milk powder, baking powder, cornstarch. The tools used are digital scales, mixers, ovens, pans, molds, bowls and spoons. The tool used to test the color of biscuits is Chromameter CR-400.

Method

The method used in this research is the experimental method. The treatment used in this study was the variation of the concentration of seaweed flour *Eucheuma cottonii*. The experimental design used in this study was a completely randomized design with 4 treatments and 5 replications. The substitution concentration *of Eucheuma cottonii* seaweed used was 0% (PM1), 5% (PM2), 10% (PM3) and 15% (PM4). Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test.

Processing of *Eucheuma cottonii* flour

The process of making *Eucheuma cottonii* seaweed flour is by washing and soaking seaweed for 3 days so that the smell and color of seaweed is lost. Furthermore, cutting seaweed becomes smaller and drying under the sun. Then dried seaweed is milled and sieved to get good seaweed flour.

Processing of biscuit

The process of making biscuits is by mixing butter and egg yolk using a mixer for 5 minutes. Next add sugar, baking powder, cornstarch, milk powder and stir again using the mixer for 3 minutes. Then add the flour, seaweed flour and knead until the mixture is evenly mixed. The finished dough is formed according to taste on a butter-smeared pan. Then bake the dough using an oven with a temperature of 150°C for 15 minutes.

III. Result

Hedonic organoleptic tests was conducted by panelists of 100 persons. The components of hedonic organoleptic are appearance, flavour, taste and texture. The organoleptic test was used to determine the acceptability and preference of panelists for biscuits by substituting *Eucheuma cottonii* seaweed flour. Organoleptic test results on biscuits with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 1.

Table 1: Test of organoleptic biscuits substituted with *Eucheuma cottonii* seaweed flour

Treatment	Appearance	Flavour	Taste	Texture	Total
PM1	3,48	3,22	3,35	3,49	3,39
PM**2**	3,36	3,36	3,61	3,56	3,47
PM**3**	3,22	2,97	3,13	3,30	3,16
PM4	3,30	3,07	3,03	3,35	3,19

The result of organoleptic parameters the highest value of appearance was obtained in the treatment PM2 and the lowest in PM3. The highest parameters of flavour, taste and texture were obtained in PM2 treatment and the lowest was in PM3 treatment. Overall the panelists' acceptance of biscuits with the substitution of *Eucheuma cottonii* seaweed flour was obtained in the PM2 treatment with a value of 3.47.

The results of the color test showed that there was a significant effect on biscuits with substitution of *Eucheuma cottonii* seaweed flour on the characteristics of Iightness (L), redness (a) and yellowness (b). This is indicated by the value of each characteristic which gives a value of $p < 0.05$. The color characteristics of biscuits with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 2.

Table 2: Characteristics of color of biscuits with substitution of seaweed flour Eucheuma cottonii

Treatment	Color		
	L*	a*	b*
PM1	72,74 ± 0,06^{d}	5,34 ± 0,03^{a}	28,79 ± 0,15^{c}
PM2	71,73 ± 0,17^{c}	6,57 ± 0,10^{ab}	28,35 ± 0,18^{b}
PM3	69,47 ± 0,07^{b}	7,55 ± 0,04^{bc}	28,69 ± 0,12^{c}
PM4	65,75 ± 0,04^{a}	7,80 ± 0,07^{d}	26,84 ± 0,04^{a}

Based on the ANOVA results, it can be analyzed that the different treatment of Eucheuma cottonii seaweed flour gives a significant effect ($p < 0.05$) on the color characteristics of lightness, redness and yellowness. Then proceed to Tukey's further test. In lightness characteristics, the PM1 treatment obtained a lightness value of (72.74 ± 0.06^{d}), PM2 treatment obtained a lightness value of (71.73 ± 0.17^{c}), PM3 treatment obtained lightness value of (69.47 ± 0.07^{b}) and PM4 treatment obtained lightness value of (65.75 ± 0.04^{a}). The graph of lightness values can be seen in Figure 1.

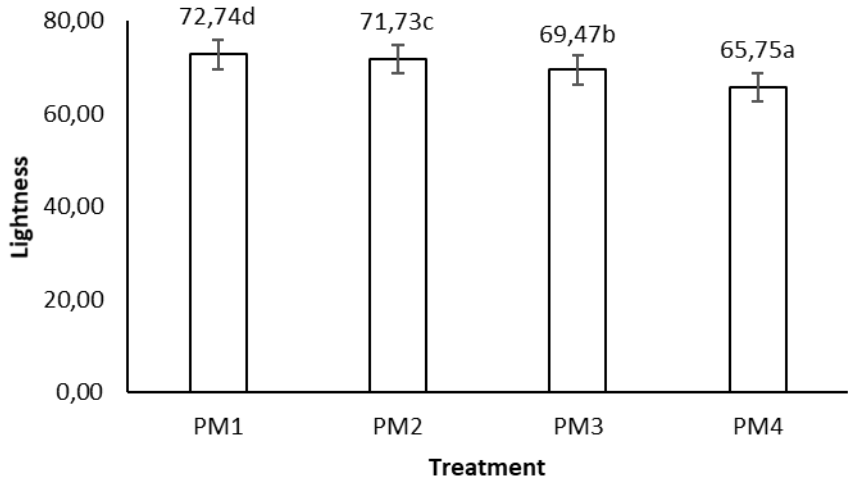

Figure 1: Graph of lightness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

In redness characteristics, the PM1 treatment obtained a redness value of (5.34 ± 0.03^{a}), PM2 treatment obtained a lightness value of (6.57 ± 0.10^{ab}), PM3 treatment obtained lightness value of (7.55 ± 0.04^{bc}) and PM4 treatment obtained lightness value of (7.80 ± 0.07^{d}). Graph of redness value can be seen in Figure 2.

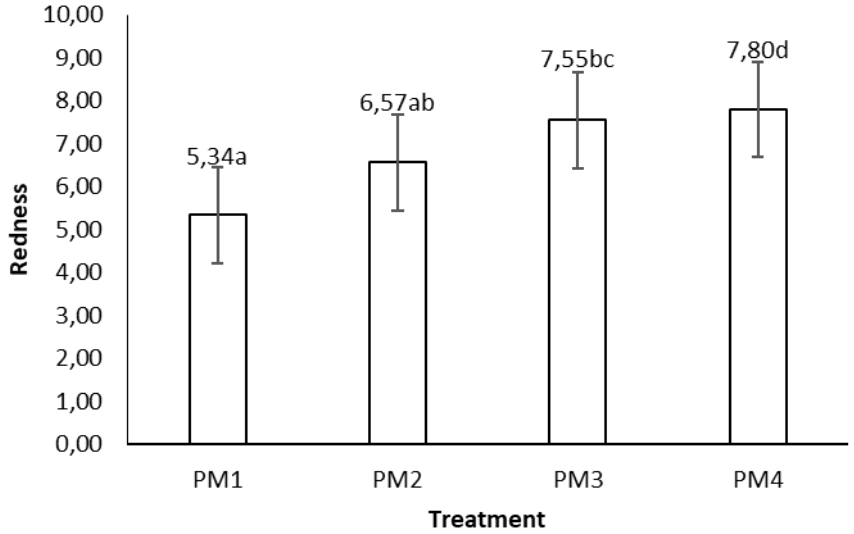

Figure 2: Graph of redness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

In yellowness characteristics, PM1 treatment obtained yellowness value of (28.79 ± 0.15^{c}), PM2 treatment obtained lightness value of (28.35 ± 0.18^{b}), PM3 treatment obtained lightness value of (28.69 ± 0.12^{c}) and PM4 treatment obtained lightness value of (26.84 ± 0.04^{a}). The graph of lightness values can be seen in Figure 3.

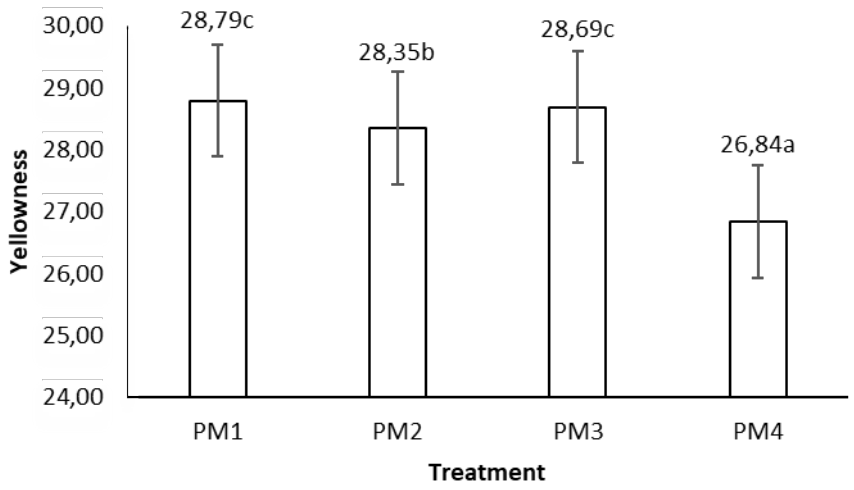

Figure 3: Graph of yellowness of biscuits with substitution of *Eucheuma cottonii* seaweed flour

IV. DISCUSSION

The value of lightness (L) shows that the higher the substitution concentration of *Eucheuma cottonii* seaweed flour the lower the L* value. The brightness level of biscuits ranged from 0-100. The highest brightness value of biscuits was found in the PM1 treatment which was 72,74 and the lowest value was found in the PM4 treatment which was 65,75. The lightness value of a product can be influenced by the roasting process affecting the color of the biscuits. The longer the roasting time, the more color produced on the biscuit will be brown due to the browning reaction (Maillard reaction). Maillard reaction is a reaction that occurs between amino groups and reducing sugars present in the raw material. The existence of this reaction will form a melanoidin compound so that the biscuit will be brown.[4] Decreasing the value of L* on the product can be influenced by protein content. High protein content in a product can make the L* value decrease. Decrease in L* value because the higher the protein it will increase the Maillard reaction which will make the product darker.[5]

The value of redness (a) shows that the biscuits with the substitution of *Eucheuma cottonii* seaweed flour give a color that tends to red. Redness value is indicated by a positive value which means red and a negative value which means green. The highest a* value was obtained in the PM4 treatment of 7,80 and the lowest value was found in the PM1 treatment of 5,34. The redness value produced on biscuits can be affected due to the roasting process due to the reaction of the *Maillard* reaction. The values a* and L* values generated on biscuits are inversely proportional. The higher the value of L *, the value of a* will be lower.[6]

The yellowness value (b) shows that the biscuits with the substitution of *Eucheuma cottonii* seaweed flour tend to be yellow. The value of b* is indicated by a positive value which means yellow and a negative value which means blue. The highest b* value was obtained in the PM1 treatment of 28,79 and the lowest value was found in the PM4 treatment of 26,84. The yellowness value will be inversely proportional to the value of redness. If the yellowness value is high, then the value of redness will be low. The yellowness value of the product can be influenced by the ingredients present in the manufacturing process such as egg yolk. Egg yolk has a carotenoid pigment that can produce yellow and after the oven process will turn golden yellow or brownish yellow. In addition, the presence of developer materials such as baking powder can make the value of b * in the product relatively high.[7]

V. CONCLUSION

Biscuits substituted with *Eucheuma cottonii* seaweed flour can have a significant effect ($p < 0.05$) on the color produced, there are lightness, redness and yellowness. Besides that the difference in the substitution concentration of *Eucheuma cottonii* seaweed flour also had an influence on the level of preference of panelists. The substitution concentration of Eucheuma cottonii seaweed flour which was favored by panelists was PM3 (5% substitution of *Euchuema cottonii* seaweed flour).

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Substitution of *Eucheuma cottonii* Seaweed Flour Against Acceptability and Hardness of Steamed Brownies

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Abstract- Brownies are one type of cake that has a characteristic blackish brown color. Brownies are made from a mixture of flour, eggs, margarine, chocolate powder and chocolate bars. The purpose of this study is to determined the level of acceptance of panelists and hardness in brownies substituted with seaweed flour *Eucheuma cottonii*. Variations in substitution of seaweed flour at the manufacture of steamed brownies had carried out with the percentage of seaweed flour at 0%, 5%, 10% and 15%. The research method used a completely randomized design of 4 treatments and 5 replication. Data were analyzed using the Kruskal-wallis test and the hardness analysis was analyzed using the One Way ANOVA test. The results showed that the substitution of *Eucheuma cottonii* seaweed flour has a significant effect on the hardness of brownies. The 10% concentration has a higher acceptability with a score of 3.54 with a hardness value of 48.48N.

Keyword: steamed brownies, organoleptic, *Hardness*, *Eucheuma cottonii* seaweed flour

I. Introduction

Brownies has a different texture than other cakes that has a denser and softer texture. There are two types of brownies, steamed brownies and baked brownies. Generally steamed brownies are not too different with baked brownies. Water content in steamed brownies are higher than baked brownies. therefore, the shelf life are shorter[1]. The principle of making steamed brownies are using water vapor from 100 ° C hot water for ± 30 minutes, while make baked brownies are using an oven at 175 ° C for ± 30 minutes[2].

The main raw material of brownies are wheat flour. Brownies do not require developing of volume that is too large so some of the flour as the main raw material can be substituted with flour non-wheat. Seaweed flour can be substituted wheat flour in making brownies. *Eucheuma cottonii* is one type of red algae that has a variety of colors, has cylindrical thallus, slippery surface, contains carrageenan agar and its widely used in the food industry[3]. Up to now efforts to increase the use of seaweed flour in bakery products are still very minimal. One of diversification effort to develop of seaweed is processing it into flour as an ingredient for making steamed brownies.

Organoleptic testing is an assessment by utilizing the human senses to observe appearance, flavor, texture and taste and to determine the level of preference of a product. Hardness is one of the texture properties that has an important component in determining product valuation. Although the food produced are tasty, but the texture of the food is hard, it will cause someone to lose their appetite when they consume it. So it is necessary to do research to find out the level of acceptability of panelists and hardness in steamed brownies which substituted into seaweed flour *Eucheuma cottonii*.

II. MATERIALS AND METHOD

Material

The materials used in this study are *Eucheuma cottonii* seaweed flour, water, flour, chocolate powder, dark chocolate, margarine, sugar, sp and baking powder. While the tools used are digital scales, mixers, pans, bowls, spoons, steamer. The tool used to test the hardness of steamed brownies is Lloyd texture analyzer instrument.

Method

The method used in this research is the experimental method. The treatments are used in this study was a simple complete randomized design with 4 treatments and 5 replications. The concentration of *Eucheuma cottonii* seaweed flour used was MB1 0%, MB2 5%, MB3 10% and MB4 15%. Results were analyzed using the Kruskal-wallis test, and the hardness analysis was analyzed using the One Way ANOVA performed by SPSS 25.0 for Windows.

Processing of *Eucheuma cottonii* flour

The process of making seaweed flour are begins with cutting dried seaweed with a size of ± 2cm. Then its grinded with flour grinder. Furthermore, sieved by 80 mesh flour filter.

Processing of Steamed Brownies

The process of making brownies begins with preparing all the ingredients, then the ingredients are weighed according to needs. Then mixing materials such as sugar, eggs and sp, using a mixer at high speed until thickened for ± 5 minutes. Wheat flour, seaweed flour and chocolate powder are sifted together. Then put it in the mixture together with baking powder and stir it using the mixer again at medium speed. Melted margarine and chocolate bars in rather cold conditions are put into the mixture that has been mixed before. Stirring is evenly distributed. Then the finished mixture is put in a pan that has been smeared with a little margarine. Steam the mixture over low heat for 30 minutes.

III. RESULT

Assessment of hedonic organoleptic tests carried out by 30 panelists. The components assessed are appearance, flavor, taste and texture. Organoleptic test used to determine panelist preference level and acceptance of brownies by seaweed flour Eucheuma cottonii substitution. The organoleptic test results on brownies with substitution of *Eucheuma cottonii* seaweed flour can be seen in Table 1.

Table 1.Organoleptic test of steamed brownies of *Eucheuma cottonii* seaweed flour

Treatment	Appearance	Flavor	Taste	Texture	Total
MB1	3,46	3,34	3,56	3,50	3,47
MB2	3,48	3,32	3,50	3,26	3,39
MB3	3,54	3,50	3,64	3,46	3,54
MB4	3,40	3,46	3,50	3,38	3,44

In assessing organoleptic appearance parameters, flavor, taste, the highest values obtained in MB3 treatment and the lowest in MB4 treatment. In texture parameters, the highest value obtained of MB1 and the lowest value obtained MB2. Overall the panelists' acceptance of brownies with the substitution of *Eucheuma cottonii* seaweed flour obtained in MB3 treatment with a value of 3.54.

Hardness values are expressed in units of N (Newton). The smaller the texture value, the softer the product and the higher the texture value, the harder the product is. The results of the study show that the more addition of seaweed flour to the brownies will cause the product become harder and the value of the hardness increased. The highest hardness value obtained in MB4 treatment (15% substitution of seaweed flour) is 56,54 N while the lowest hardness value in MB1 treatment (0% substitution of seaweed flour) is 27.86 N. Hardness test results on steamed brownies of *Eucheuma cottonii* substitution can be seen in Table 2 and hardness test results graphic can be seen in Figure 1.

Table 2. Hardness

Treatment	Unit	Result
MB1	N	27,86
MB2	N	33,92
MB3	N	48,48
MB4	N	56,54

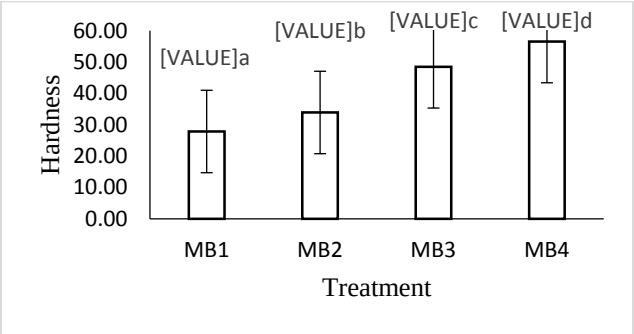

Figure 1. Graphic of *Hardness*

IV. DISCUSSION

Based on the ANOVA results it can be analyzed that the substitution treatment of *Eucheuma cottonii* seaweed flour significantly affected ($p < 0.05$) on the hardness of seaweed flour brownies. Then continued with Tukey's further test. The MB1 treatment obtained a hardness value of (27.86 N ± 1.05), the MB2 treatment obtained a hardness value of (33.92 N ± 0.94), the MB3 treatment obtained a hardness value of (48.48 N ± 2.99) and the MB4 treatment obtained a hardness value of (56.54 N ± 6.49).

The more seaweed added, the texture of the brownies will become hard. its caused by existance of carrageenan on seaweed which has a role as a stabilizer, binder, thickener and gel formation so the high of seaweed flour will form a gel and cause the texture become hard. This is presumably because the particle size of seaweed flour is quite large and the fiber content in seaweed is high[4].

The high content of cellulose and lignin in seaweed flour can be causing the products produced has a high level of hardness and less softness. brownies of Seaweed flour has a strong absorption of water. Higher values of hardness are possible because seaweed contains carrageenan which has a high ability to bind water[5]. Hydrocolloids found in seaweed can increase the hardness and compactness. This is because hydrocolloids can interact with charged macromolecules such as proteins that are capable of producing various influences including forming gels[6]. The texture of steamed brownies without using seaweed flour has a soft texture and not too hard. This is because the flour which used can be caused gluten increase So the ability of the dough expand will also increase and produce brownies that are not too hard. The amount of gluten in brownies dough which slightly causes the dough to be less able to hold the gas so the pores formed in the dough will shrink which makes the brownies become hard.

CONCLUSION

Brownies substituted with *Eucheuma cottonii* seaweed flour can have a significant effect ($p < 0.05$) on hardness. In addition, the difference in substitution concentration of *Eucheuma cottonii* seaweed flour also had an influence on the level of preference of panelists. The preferred substitution concentration of Eucheuma cottonii seaweed is MB3 treatment (10%).

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Impact of Climate Change on Water Resource in Mongolia

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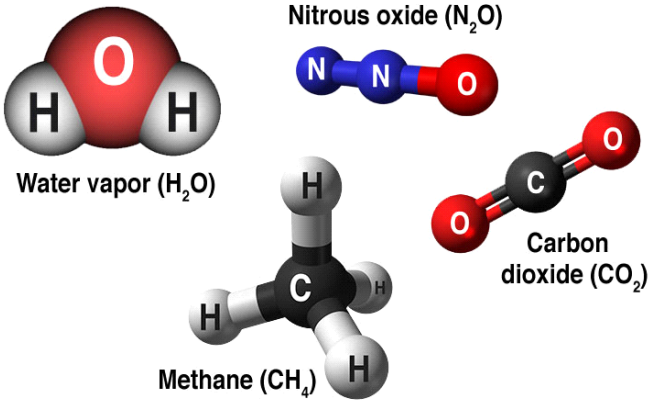
Abstract- The water resources in Mongolia are a vital and sensitive to change of the weather. The results if the climate changes show as the form of ruining of water resources, the lakes and ponds become surprisingly dry. All the surface water runs down to ground water levels, at the summer seasons there is always an extreme heat, as the result of this heat, there is always severe desertification because of the lack of rain precipitation and eventually the drought is eminent, consequences are that of soil change of its characteristics, withering of some species of plants, deterioration of the environment and subsequently the ecosystem in Mongolia. Its truth and fact that water are the vital resources of all the natural resources of which all the living thins depending on, be it surface water, hydrological, streams, the change in the hydrological system in the ecosystem is the change of most of living thing that needs water. The fluctuation of the climate is not only changing the hydrological system, but it also inflicts a serious changes of economic circular, and this change in economic or climate also change the demographic distribution of mankind. Therefore, the expected future change in Mongolia will also affect sustainable environment in the region and Mongolia in particular.

Index Terms- Water Resource, Climate Change, Temperature, Precipitation, Mongolia

I. Introduction

Climate specifically can be termed as the results of many factors that posed threats to environment, and the degradation of the environment is the result of what we call "Climate change''. It's the main challenge that deprive humanity from enjoying the ecosystem leverages. Climate change is not only changing environment per se, but it changes almost everything that connected with our life ranging from our culture, economic, politics, populations, urban planning, rural recreation, and social habitat. Climate is the carbon emission from the factories, industrials factories, solid waste disposal, and misuse of natural environment to fund economic ambiguity of man, to enrich and fill his micro economic needs, this result into destroying of what was in-situ and use the artificial way, so when these gases accumulate, the block the natural emission from ozone, and ultraviolet, and this cause depletion of greenhouse (Sukh, 2012), (Change, 2007). Greenhouse reflection is a normal and natural way which is essential for life on earth, man keeps changing this greenhouse due to his influence in the environment, emitted energy from atmosphere to earth, and warms its surface is vital to all plants , animals, and micro living organisms as well **(**KY, 2014**)**. Some gas elements in the atmosphere block the heat that needs to escape. There are gases that can stay in the atmosphere for longtime, and don't have necessary active response to alter the temperature to cause climate change. It's obvious that the main cause of climate change is the rise in temperature after the escaping heat from the earth is blocked by some gases from the atmosphere (Change, 2007). The result of changing hydrological flow cycle interaction with terrestrial carbon cycle (Ministry of Nature, 2011)

Fig 1: Gases that contribute to the greenhouse effect

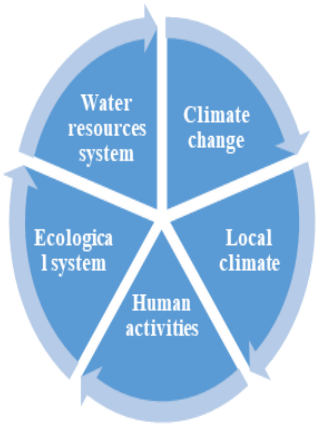


Source: https://climate.nasa.gov/causes/

- **bound between climate change and water resource**

Hydrological nature or cycle is a vital and important link to climate change. The impact of any change in climate on water cycle can be because of water quality alterations which the water resources that caused by climate factors (mostly precipitation, temperature). Climate change can change the world of which we are staying currently and it's all water system principles, and cause negative change in managing and running its hydrological flow and that of rainwater runoff in a given time at a given space and That will also affect evaporation, and that will lead to soil degradation as the result of droughts and severe lack of water. This is shown here below fig 1. (KY, 2014)**.**

Fig 2: Cycle diagram of climate change affects



Source:(KY, 2014)

- **Global Climate and Hydrological Change (standard climate change)**

The climate change, and anthropogenic have influence in pushing the time and space distribution, and intensity. The average of the rains precipitation (i.e. rain belt, temperature, humidity wind speed, and evaporation) all these largely converge in the longest period of time and leads to global, or national level of cycle. (Xia, 2017)**.**

Currently almost a third of the earth population stays at the nations which are living at a certain stress because of lack of water, and this makes the domestic, industrial and farms exceeds 22% of the total water surface. And a billion persons are now in dire need of drinking water, 260% million suffering from the health sickness because of the lack of clean water access and poor water treatment. Every year floods takes thousands lives and displace half million (Hans Joachim Schellnhuber, 2006).thus, it said that climate change can increase the intensity of floods and drought which may be more severely than that of the previous years due to increase in industrialization and economic widens done by the advanced countries (Charles J. Vo¬ro¬smarty, 2000). And the fast developed countries in Asia like China, India and South East Asia countries, U.S and Western countries already did negative impacts on the environment and created a vacuum in the climate change recovery. Sensitivity of the pacific countries to climate change is due to the present of Deltas, Low coral reefs areas so it worries people that their response to this may increase because they keeps exploiting due to their economic expansion (Japan International Cooperation Agency, 2010). addition, some human interactions like exploitation of land, change in cover, deforestation agriculture activities urban planning, use of water, mining activities ,ecological production ,rain water management all these can collectively cause change in evaporation, runoff surface water, precipitation, concentration of the hydrological cycle, and absolute influence (Xia, 2017).

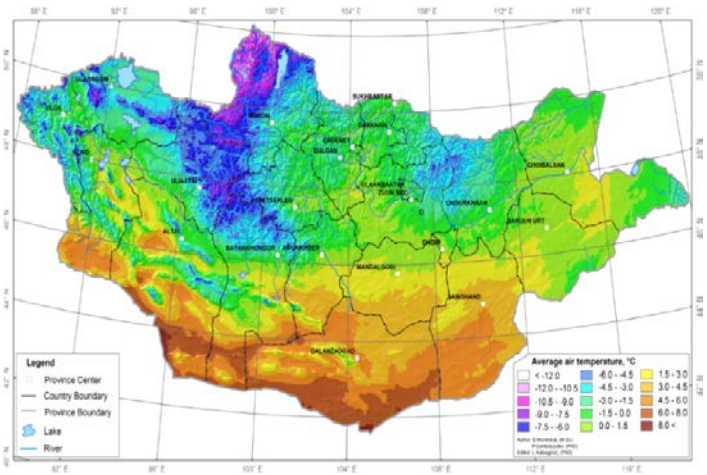
II. Study Area, Geography of Mongolia

Mongolia is a landlocked nation in the North of Asia located at exactly latitude 40^0 35'N and 52^0 09'N and Longitudes 87^0 44'E and 119^0 Mongolia has a relatively high territory altitude, the height of latitude is 1,590m above sea level almost 82% of the country territory is above 1,000, making it a mountainous area which also making inaccessible and half of the territory is higher than 1,400m.Mongolia is covering 1.5 million square km. with more than 3 million population (M. o. E. a. T. o. Mongolia, 2018)**.** The country is engulfed by high mountains that has relative height of 1500m, and this high range apparently block the window of advection of the air that blow from the North and the warm one that comes from the West .the humid flux transport from Pacific and through Indian oceans is blocked here because the uniqueness of this place (Ministry of Environment, 2015)**.** Mongolia is a semi desert and geographically steppes, Mongolia is only 3 regions North, South, and Central these regions differs in their terrains, Climate, Precipitation and minerals. West of the county is covered by many huge forests. Central Mongolia is a home, major characteristics steppes, and south is desert. (Sato).

2.1 Climatic condition

Climate in the country is categorized into four seasons, based on their temperature variety, and low rainfall. Usually, the geographical area of the region shows and help in the climate of the area, the temperature of the air reach up to -5^{0c}c in the Altai, Khangai, Khentii even at Khuvsgul mountainous terrain -6-8°C, also along the valley of big rivers, 2°C at the steppes region or desert it goes up to 6°C but in the Southern parts of Mongolia it even exceeds that number according to the report (Ministry of Environment, 2015). We acquire on daily bases an average of 233-260of Sun energy day, which is enough to nutrients our plants, grow our seeds, and sustain our land from degradation as result of lack of activated living organisms. The sand dusts blow for almost 30 to 100 days a year.

Fig 3: Spatial distribution of annual mean temperature, 1961-1990

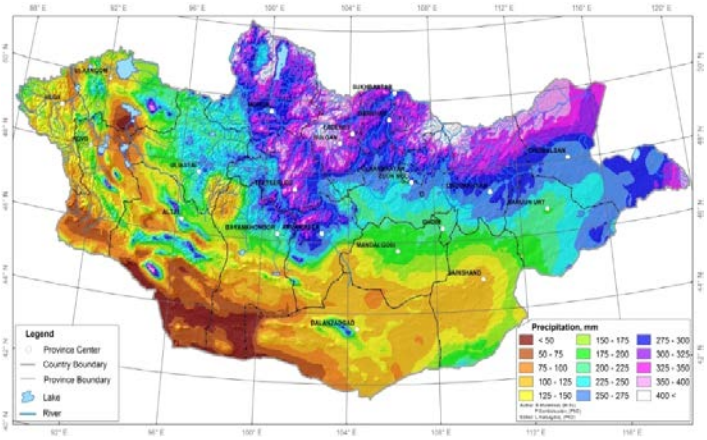


Source: (M. o. E. a. T. o. Mongolia, 2018)

Because the country (Mongolia) is located in a ride area ,that cause the precipitation to be low, the yearly precipitation is ranging from 50-400mm and 83% always deducted from its rainfalls in this hot arid when its having intense rain occurred from the convection system (Ministry of Environment, 2015). The yearly bases precipitation may and can exceed that 400mm only in the highest mountainous plateaus meanwhile its 300-

400mm in Khangai, Khuvsgul and Khentii mountainous, and that of Khalkh basin river at the eastern part of the country, 240-300mm in Mongol Altai. And forest-steppe, 130-240 mm at steppe and 40-160 mm at Gobi and of that desert area from the South inner side of Altai, the precipitation is only 55mm (M. o. E. a. T. o. Mongolia, 2018)**.** The favorite month for precipitation every year is April of which 85% of total precipitation occur up to September among which 50 to 60% only falls when its July and August. Snow and mist do happen in the winter times and are relatively low because basically the all surrounds are desert and mountains covered. Precipitation during cold season is about 30 mm in the mountain places while 12mm at the Gobi region and it is more lessen than 10 mm (Information and Research Institute of Meteorology, 2015)**.**

Fig 4: Spatial distribution of annual mean temperature, 1961-1990



Source:(M. o. E. a. T. o. Mongolia, 2018)

2.2 Current climate change and future scenarios in Mongolia

The climate change mercilessly affects the ecosystem in Mongolia, the temperature is estimated to be increasing by 2.^{0}14c at its annual means, since 1940s (Ministry of Nature, 2011). As the result of this change in the environmental change of Climate. Mongolia has been going through extremely cold and hot weather. In the cold weather, precipitations hiked to 12.6% and 119.4%. As a result of climate change, Mongolia experiences extremely cold weather in winter period and the weather declined to 11.3% to 2.5% at its warm weather, the precipitation drop**s**. In summer, most areas or regions experience 13% to 90% increasing in evapotranspiration (Sisira Withanachchi, 2014). As observed in the last 70 years, Mongolians has cattle, and love to take care of their herds, but for climate changes issues, animals started to suffer, the meteorological observers scattered over Mongolia shows that the earth temperature has increased since 1940s, it keeps increasing in the future, but less increase in temperature has been shown in Gobi desert and steppe regions (M. o. e. a. g. d. o. Mongolia, 2014).

Fig 5: Changes in annual mean temperature in Mongolia between 1940 and 2014

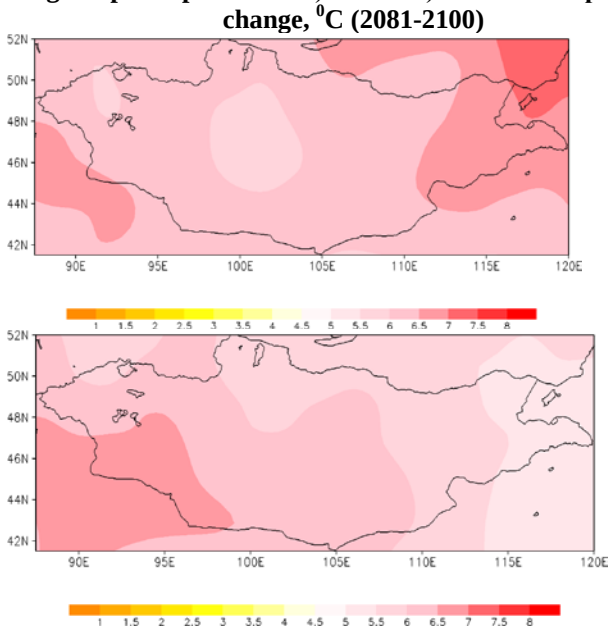
Source:(M. o. E. a. T. o. Mongolia, 2018)

Fig 6: **Changes in annual precipitation in Mongolia between 1940 and 2014**

Source:(M. o. E. a. T. o. Mongolia, 2018)

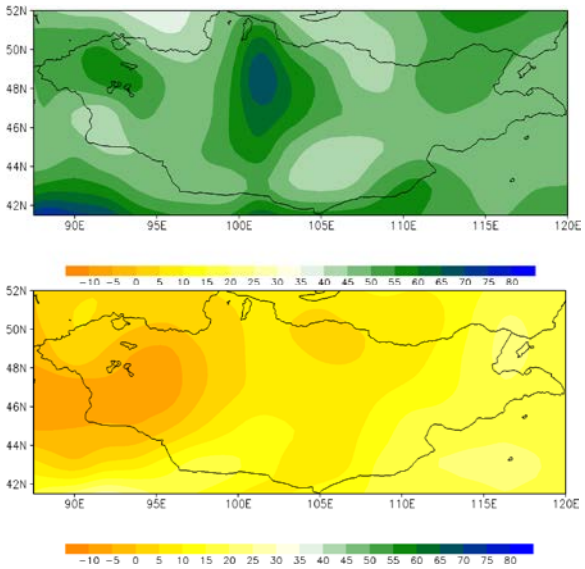
In the future climate prediction, we are aware that the air temperature will increase and it's suspected to be 3.4^{0}c than its current percentage by 2046 to 2056 time in contrast to 1985-2005. Moreover, the average annual precipitation shall increase by 13.6 percent and more expectation to increase at winter season precipitation (up to 20-38 percent) again reduction in increase is expected to commence in summer rainfall. The high temperature warming by 6.0-6.5c^{0}. (Figure 7) in western region at in summer time in near future, Winter shall be increased with 50-75% in the center part of Mongolia (Figure 8), at the sometimes summer rains can be decreased by5-10% in the West part and slightly hikes up to 10% in the rest of territories of the country (Figure 8). Spatial patterns of air temperature and seasonal precipitation fluctuate in near (2016-2035) and in the mid future of (2046-2065) are the same but only differs each other by low intensity comparing to far future change (M. o. E. a. T. o. Mongolia, 2018).

Fig 7: Spatial pattern of a) winter b) summer temperature change, ^{0}C (2081-2100)



Source: (M. o. E. a. T. o. Mongolia, 2018)

Fig 8: Spatial pattern of a) winter b) summer precipitation change, % (2081-2100)



Source:(M. o. E. a. T. o. Mongolia, 2018)

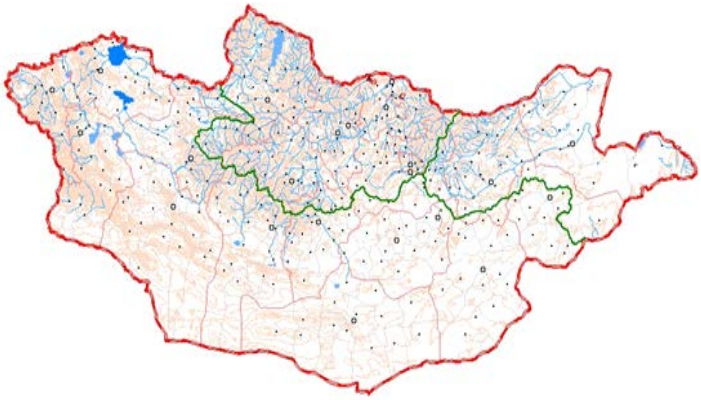
III. Surface water resource in Mongolia

The surface water composition in Mongolia is mainly compose of rain water stored in lakes, streams500km^3/year and the glaciers of 19.3km^3/year,32.5km^3/year is r river water which as 1.8% as basic flow, 4.4% are indirect run of rainfall. This amount of 32.5km^3/year has rivers flow formed in Mongolia, and the water that surface inflow water which is 4km^{3}km/year comes from nearby countries like Russia and China (B. Myagmarjav, 1999).

3.1 Rivers

The total of all rivers in Mongolia drains to three different rivers basins in Mongolia, the so call Arctic Ocean Basin, Pacific Ocean Basin and Central Asian Drainage Basin. The main suppliers of this drainage is water from the rain, and winter that provides snow, and the last is ground water and glaciers at the West of Mongolia. In the flow index classification, it is found Mongolians rivers systems are divided into three categories, wit which rivers spring and summer rains are the flooding regime, that of Spring –summer are acting as snow melting flooding and final is rivers which as only summer rains regime (Information and Research Institute of Meteorology, 2015).

Fig 9: River basins in Mongolia



Source: (Information and Research Institute of Meteorology, 2015)

3.2 Lakes

We have over 300 lakes whose surface area are more than 0.1km^2 of which only 4 lakes are having surface that are larger than 1,000km^2 ,17 lakes have larger surface area that is more than 100km^2, 27 have larger than 50km^2. The average amount of water resources in all these lake 500km^3 within which 314km^3 of this total water comes from Kuvsgul Lake. 34 % of these lakes located at the mountains, the rest in the steppe and Gobi (Ministry of Nature, 2011)**.**

3.3 Glaciers

262 glaciers in Mongolia, they occupied an area of 65.9 km that means air temperatures of -8C, and yearly precipitation of about 380 mm, these Glaciers are distributed into an area between 46C25`-50C50` N, 87` 40`-100 50` E, in an altitude of 2750-4374 m. Spatial distribution is irregular and keeps decreasing from north-west to sought-east (Ministry of Nature, 2011). The largest valley glaciers at Tavanbogd Mountains, the Potanin and Aleksandra glaciers (M. o. e. a. g. d. o. Mongolia, 2014)**.**

3.4. Groundwater resource

As it is mentioned before, that ground water recharge is estimated to be 10.8 km$^{3/}$year (M. o. e. a. g. d. o. Mongolia, 2014). But the, distribution of hydrogeological ground water aquifers varies from basins to other, the highest recharges to ground water is 40-60 mm/year and it can be found at sands deposits of alluvial. These aquifers are distributed in rivers valleys and lakeshores (Ministry of Nature, 2011).

Table 1: Potential groundwater resources per unit area (1 km^2) and whole territory of Mongolia

Classification of exploitation resource per unit area		Water for unit area	Area of distribution		Groundwater resource
		$10^3 m^3$/year	êm^2	106m^3/year	106 m^3/year
1	Area with small resources	< 3	770225	1032.9	9.6
2	Area with from small to moderate resources	3- 10	571780	3032.7	28.1
3	Area with moderate resources	10-30	139825	2182.8	20.2
4	Area with large resources	> 30	65790	4538.0	42.1
Total		1547620	10786.4		100

Source: (S.Chuluunkhuyag)

IV. Climate change impact on water resource in Mongolia

The results of climate change shown the form of change of runoff declined, regime flow change, lakes, ponds have all dried up. Cryo-sphere has reduced or compressed, drop in ground water levels and rapid increase of fast flooding. The runoff of small rivers and that morphometric alteration of small lakes that serves as evident of climate change in those steppe and Gobi area, and these bodies that contains water are the most vulnerable for climate warming and human impact (Information and Research Institute of Meteorology, 2015).

4.1 Impacts on surface water

River runoff: 56-75% of water runoff in rivers draining from Khuvsgul, the Khangai and the Khentii mountains are composed mainly from rainfall, while that of rivers originated from Mongol Altai mountain from snow and ice melting water (50-70 %) the other in the warm period a year. Because in most Mongolian river water easily lose in process through evaporation rates, infiltrations into the ground. During winter periods, rivers freezes, hence, the flow rate is either lowered or not there at all. The country has four main seasons, observed in Mongolia rivers, they are Winter low-flow times, this regime period lasts from December to April, second is that Spring runoff time due to melting down of ice which lasts from April to June, third is Summer period because of rainfall, it goes up to June to September, and finally the last one is warm season low period of water, it comes after rain and lasts to winter (Ministry of Nature, 2011).

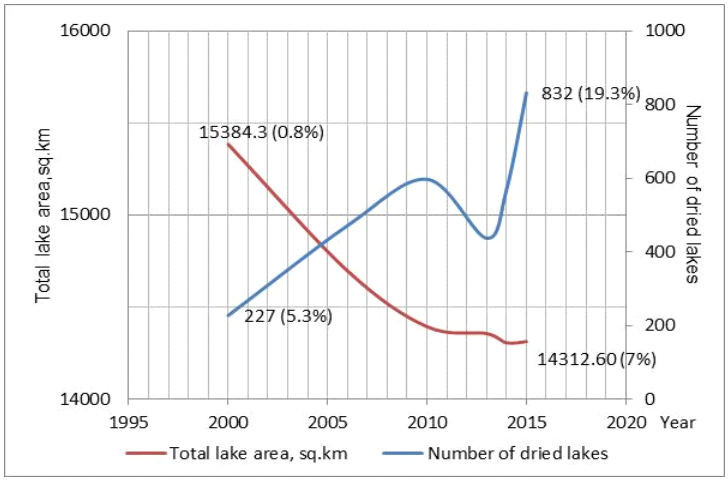
Impact of climate change on rivers reveled in decline of runoff, flow and thermal regime change and reduction of surface water bodies etc. HADLEY model simulation shows that by 2040-2070 shows some small increase of runoff in main three river basins, however such small increase will be much less than (by several times) the increase of basin evapotranspiration. Thus, river basins will continue more dry in the future. Since 1978, the total flow of the river yearly estimated to be 78.4 km^3 in 1993 (M. o. e. a. g. d. o. Mongolia, 2014). Maximum value reached, lasting low flow steadily continues from 1996 and reached the minimum of 16.7 km^3 in 2002 and 22.7 km^3 annual, average river flow was assessed in 2015, which was lower than the long-term means by 11.9 km^3 (M. o. E. a. T. o. Mongolia, 2018).

Fig 10: Annual total river flow variation in Mongolia, km^3/year

Source:(M. o. E. a. T. o. Mongolia, 2018)

Lakes: The area of all total lakes are reduced by 0.8% or 130.3km^2 and 227 lakes are dried since 2000. 5.3% lakes were dried in 2006, 7.2% or 1,121.5 km^2 lakes were dried in 2010, 7.8% or 12,09.1 km^2 lakes were dried in 2014 and by 7.8% or 1,201.9 km^2 and 832 lakes had dried in 2015 respectively, in comparing to those of 1940th .

Fig 11: Changes in total lake areas and number of dried lakes



Source: (M. o. E. a. T. o. Mongolia, 2018)

The water of the big lakes and medium ones had decreased in the last 20 years and that of lagoons and small lakes remain low from the start till now but increased once when there are floodplains (M. o. E. a. T. o. Mongolia, 2018). In a report written by researchers about climate change in Mongolia, the inventory said that, glaciers areas were once 470sq.km until 1990, 451sq.km till 2000, 389sq km in 2011. It reduced by 12.1% from 1940 till 1990, by 4% in 1990 to 2000, and 13.75% in 2000-

2011. In total, glaciers reduced by 29.9% for the last 70 years (M. o. e. a. g. d. o. Mongolia, 2014).

Glaciers: Glacier reduction and shrinking become speedy after 1990th most extensive ablation happened in the last 10 years (Myagmarjav B, 1999). At that period from 1940 to 2000, the glaciers from Bogd area, Turgen massif, Kharkhiraa massif and Tsambagarav massif, these regions are said to have lost 10.2%, 19.3%, 28.0% and 28.8% of their total area accordingly (KADOTA Tsutomu, 2007).

4.2 Impacts on groundwater resource

The impact of climate change on groundwater recharge in Mongolia is unclear. Many factors affect the recharge: alterations in precipitation, evaporation and temperature regime, soil properties and their changes. Climate change will affect groundwater resource throughout the country. It is expected that aquifer recharge is reduced, just as ground water levels are reduced, especially in the shallow aquifers. Higher temperatures and droughts will result in increased evapotranspiration. Recharge will also suffer from more extreme precipitation events, because more water will runoff before it can percolate into aquifers. Thus, even when overall precipitation increases, aquifer levels may decrease, as a result of having less precipitation events that are more extreme (Ministry of Nature, 2011).

V. Conclusion

This review paper information evidence shows us that consequences of climate change reveal in the form change of flow regime and water resources, drying up lakes and ponds in regions without permafrost, dropping of groundwater levels, summer extreme heat, intensifying desertification due to drought in Mongolia. Hydrological systems change does not only affect the biological and ecological system, but also affects the economy, life, so the future climate change effect the sustainable development of regional, national level in Mongolia. These increased vulnerabilities to climate hazards will compound current water governance problems in Mongolia. Thus, governance policy and optimized water use practices will need to adaptation to climate change.

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The Substitution of Bran Flour on the Acceptability and Color Characteristics of *Eucheuma cottonii* Seaweed Cookies

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Abstract- Cookies are one of practical foods because they can be eaten at any time and with good packaging will have a relatively long shelf life. The substitution of rice bran flour in product *Eucheuma cottonii* seaweed cookies can increase the use value and economic value of rice bran flour. This study aim is to determine the level of acceptance of panelists and color characteristics of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour. The concentration from substitution of rice bran flour used were 0% (A), 2.5% (B), 5% (C) and 7.5% (D). The research method used a completely randomized design of 4 treatments and 5 replications. Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test. The results of the study shows that the substitution of rice bran flour give significant effects on the level of acceptance and color of cookies. The substitution concentration 2.5% of rice bran flour has a higher score with a score 3.42, lightness 68.50, redness 8.36 and yellowness 29.39.

Keywords: cookies, *Eucheuma cottonii* seaweed, rice bran flour, substitution, organoleptic

I. Introduction

Cookies are one of practical foods because they can meet human nutritional needs. Cookies are one type of pastry made from basic ingredients of flour and other additives that form a formula, thus producing cookies with certain structural properties. *Eucheuma cottonii* Seaweed Cookies are one type of cookies that are added with seaweed as a raw material. Rice bran contains a lot of dietary fiber and phytosterol, which has a strong fiber content and fitosterol in reducing blood cholesterol. Rice bran has a nutrient content of 16.3% protein, 21.4% fat, 8.3% mineral, 49.4% carbohydrates and food fiber 25.3%.[1]

The first characteristic of the product that consumers will see before consume the product is appearance. Appearance of a product is an important characteristic, because apparitions support the quality or quality of the product. Appearance assessment can be influenced by color, texture and shape.[2] One of the parameter for the appearance of the product is color. The color contained in a product served as the first attraction for consumers to accept or reject the product. Rice bran has a high nutrient content, but has a brownish color. Therefore it is necessary to do research to find out the effect of substitution of rice bran flour on the color and level of acceptance of cookies.

II. Material and Method

Material

The ingredients used are rice bran flour, seaweed flour *Eucheuma cottonii*, flour, margarine, egg yolk, sugar, skim milk and baking powder. While the tools used are digital scales, mixers, ovens, pans, molds and basins. The tool used for color testing is Chromameter CR-400.

Method

The method used in the research is the experimental method. The treatment used in the study is the difference in the concentration of rice bran flour substitution. The experimental design used is a simple complete randomized design (RBD) with 5 treatments and 4 replications. The substitution concentrations of rice bran flour used are 0% (A), 2.5% (B), 5% (C) and 7.5% (D). Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test.

Processing of cookies

The process of making cookies is by mixing butter, egg yolk, sugar, baking powder and milk powdes using a mixer for 5 minutes. Then add the flour, seaweed flour, rice bran flour and knead until the mixture is evenly mixed. The finished dough is formed according to taste on a butter-smeared pan. Then bake the dough by using an oven with a temperature of 150°C for 15 minutes.

III. Result

The assessment of hedonic organoleptic tests was carried out by 100 panelists. The parameters assessed are appearance, aroma, taste and texture. The organoleptic test was used to determine the level of reception of panelists on seaweed cookies *Eucheuma cottonii* substitution of rice bran flour. The organoleptic test results on *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour can be seen in Table 1.

Table 1. Test of organoleptic *Eucheuma cottonii* seaweed cookies substitution of rice bran flour

Treatment	Appearance	Flavor	Taste	Texture	Overall
A (0%)	3,58	3,29	3,42	3,23	3,38
B (2,5%)	3,41	3,40	3,53	3,33	3,42
C (5%)	3,25	3,08	3,04	3,05	3,10
D (7,5%)	2,91	3,03	3,13	3,14	3,05

In the organoleptic test the highest value of sighting parameter was obtained treatment A (0%) and lowest treatment D (7.5%). The highest parameters of aroma and taste were obtained in treatment B (2.5%) and the lowest in treatment D (7.5%). The highest parameters of texture were obtained in treatment B (2.5%) and the lowest in treatment C (5%). Overall the panelists' acceptance of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour was obtained in treatment C (2.5%) with a value of 3.42.

The results of the color test showed that there was a significant influence on seaweed cookies *Eucheuma cottonii* substitution of rice bran flour on the characteristics of Lightness (L), redness (a) and yellowness (b). This is indicated by the value of each characteristic which gives a value of $p < 0.05$. The color characteristics of *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour can be seen in Table 2, the Lightness (L) graph can be seen in Figure 1, the redness (a) graph can be seen in Figure 2 and the yellowness graph (b) can be seen in Figure 3.

Table 2. Characteristics of color *Eucheuma cottonii* seaweed cookies substitution of rice bran flour

Treatment	Color		
	L*	a*	b*
A (0%)	68,24±0,07^{d}	7,84±0,10^{a}	28,56±0,25^{b}
B (2,5%)	68,50±0,14^{d}	8,36±0,04^{b}	29,39±0,07^{d}
C (5%)	66,76±0,16^{c}	8,80±0,06^{c}	30,00±0,06^{e}
D (7,5%)	63,86±0,12^{b}	10,36±0,03^{d}	28,94±0,06^{c}

Based on the ANOVA results, it can be analyzed that the different treatment of rice bran flour gives a significant effect ($p < 0.05$) on the color characteristics of lightness, redness and yellowness. Then proceed to Tukey's further test. In lightness characteristics, the A treatment obtained a lightness value of (68.24 ± 0.07^{d}), B treatment obtained a lightness value of (68.50 ± 0.14^{d}), C treatment obtained lightness value of (66.76 ± 0.16^{c}) and D treatment obtained lightness value of (63.86 ± 0.12^{b}). The graph of lightness values can be seen in Figure 1.

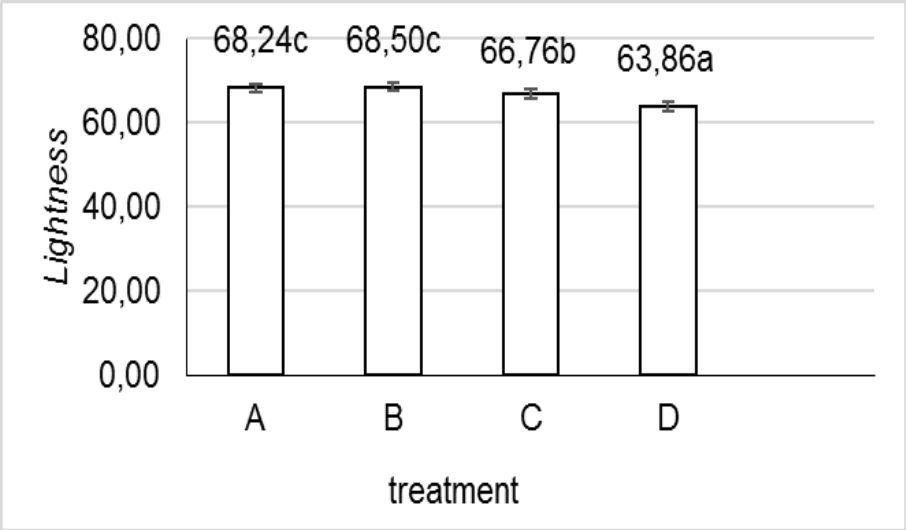

Figure 1. Graph of Lightness (L) *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour

In redness characteristics, the A treatment obtained a redness value of (7.84 ± 0.10[a]), B treatment obtained a redness value of (8.36 ± 0.04[b]), C treatment obtained redness value of (8.80 ± 0.06[c]) and D treatment obtained redness value of (10.36 ± 0.03[d]). Graph of redness value can be seen in Figure 2.

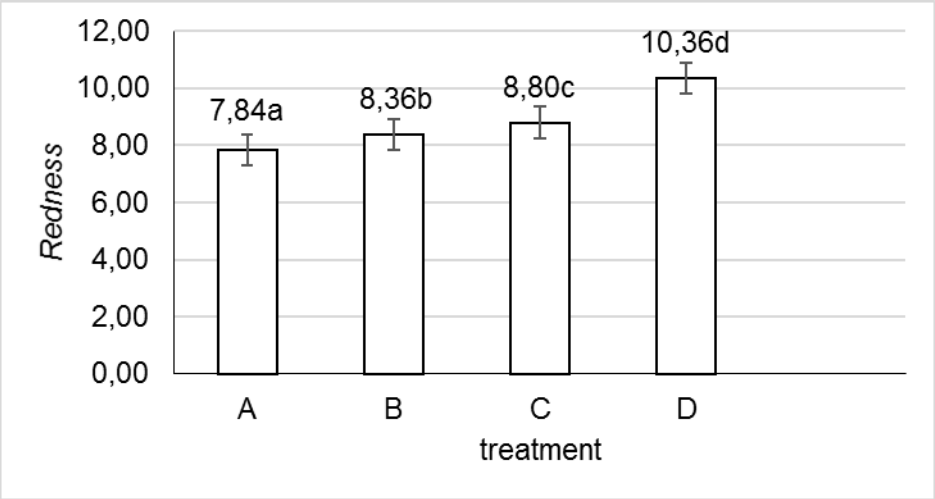

Figure 2. Graph of redness (a) *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour

In yellowness characteristics, A treatment obtained yellowness value of (28.56 ± 0.25[b]), B treatment obtained yellowness value of (29.39 ± 0.07[d]), C treatment obtained yellowness value of (30.00 ± 0.06[e]) and D treatment obtained yellowness value of (28.94 ± 0.06[c]). The graph of yellowness values can be seen in Figure 3.

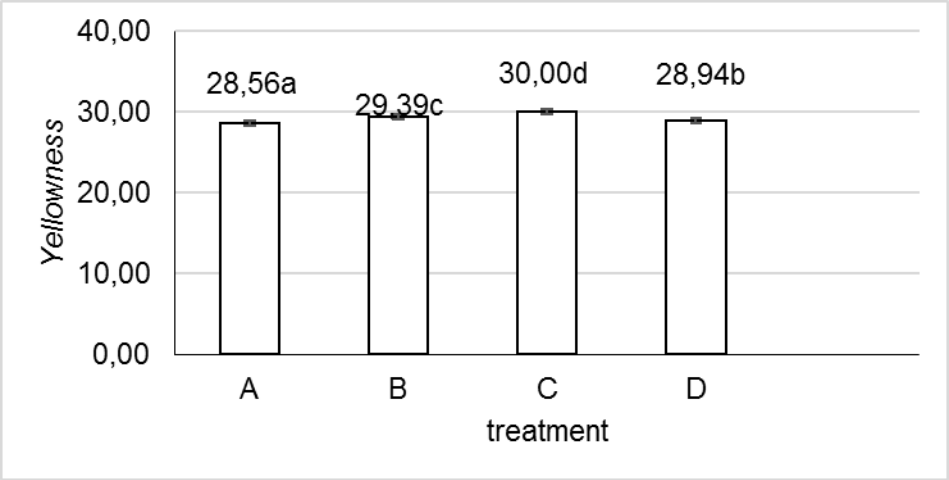

Figure 3. Yellowness graph (b*) Eucheuma cottonii* seaweed cookies with substitution of rice bran

IV. DISCUSSION

The value of Lightness (L) shows that the higher the substitution concentration of rice bran meal, the L* value will be lower. The value of L* (Lightness) starts from the number 0 (black) to 100 (white). If the L value is higher, it indicates that the color of the product is getting brighter. The highest brightness value of cookie is in treatment B (2.5%) which is equal to 68.50 and the lowest value is found in treatment D (7.5%) which is equal to 63.86. Decreasing the value of L* on the product can be influenced by protein content. High protein content in a product can make the L* value decrease. Decrease in L* value because the higher the protein it will increase the Maillard reaction which will make the product darker.[3] Explained that the addition of rice bran flour will decrease the brightness of Cookies. This is caused by the color of the rice bran flour itself is brownish yellow. So more addition of rice bran will make the color more dull brown, besides that it can also be caused by browning or maillard reaction (non-enzymatic browning reaction).[4]

The value of redness (a) shows that *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour causes the color of color tends to be red. The value of the component a* (redness) represents the red-green color level with levels (+60 red and -60 green). The highest a* value was obtained in treatment D (7.5%) in 10.36 and the lowest value was obtained in treatment A (0%) in 7.48. The color redness in cookies are thought to be influenced by raw materials, which the higher the concentration of rice bran is given so the color of the cookies are red. It can also be caused by the roasting process that affected the color of cookies, then produces red color.[5]

The yellowness value (b) shows that *Eucheuma cottonii* seaweed cookies with substitution of rice bran flour will cause the color of cookies that tend to be yellow. Components of value b* represent blue to yellow, are two chromatic components with a range of values -120 to +120. The higher the value of b* indicates that the yellow color in the cookie is getting yellow, and vice versa. The highest b* value was obtained in treatment C (5%) of 30.00 and the lowest value was obtained in treatment A (0%) of 28.56. The brighter the products are produced, the higher the value of the yellowish degree from the product, on the contrary if the brighter the products are produced, the lower the value of the redness of the product. The yellowish color of cookies are influenced by the addition of rice bran, the more addition of rice bran four will reduce the yellowish color of the product and vice versa.[2]

V. CONCLUSION

Eucheuma cottonii seaweed cookies with substitution of rice bran flour can give significant effect ($p < 0.05$) on the color produced, namely lightness (L), redness (a) and yellowness (b). In addition, the differences in concentration of rice bran flour substitution also affects the level of acceptance of panelists. The concentration of the substitute of bran flour preferred by the panelists is in treatment C (2.5% substitution of rice bran flour).

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The Color Characteristics on Shrimp Shumai *Litopenaeus Vannamei* with Carrots (*Daucus Carota*) Add

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Abstract -Shumai is a type of snack made from ground meat wrapped in a thin skin and steamed. In this research, shrimp shumai is made with the addition of carrots. The addition of carrots aims to improve the appearance of the color on shrimp shumai. The treatment in this study is adds 0%, 10%, 20% and 30% of carrots to shrimp shumai with an organoleptic test using 100 untrained panelists, continued with color test L, a, b, and chemical test for the best treatment of color and organoleptic parameters. The addition of carrots affects the parameters L, a, b, and organoleptic appearance. But it did not significantly affect organoleptic parameters of aroma, taste, and texture. Shrimp shumai which have the higher carrots concentration have a lower value of L, a higher value of a and b, and has a high value of consumer's attraction, as evidenced by organoleptic test.

Keywords: shumai, shrimp *Litopenaeus vannamei*, carrots, additional, color

I. Introduction

Completing the food needs is not always by the main food, but also by the additional food. One of the additional foods or snacks that are popular in Indonesian peoples is shumai. Fish shumai are processed food that uses a minimum of 30% of fish/ shrimp, or surimi, flour, and other ingredients which wrapped with dumpling skin and steamed (SNI, 2013). 100 grams of shrimp shumai content 13 g of protein, 28 g of dietary fiber, 3.5% of vitamin C, and 3.2% of vitamin A (Nutritionix, 2018).[1]

Carrots are one of the vegetables that are rich of beta carotene. Beta carotene is a yellow-orange pigment. Carrots are tubers of carrot plant (*Daucus carota*) in an intact, clean, and fresh. The color yellow-orange in carrots are obtained from the beta carotene pigment (SNI, 1992).[2]

Cooked shrimp actually has a reddish color, but when processed into shumai, the color produced is pale orange tends to be white, making it less attractive to consumers. Based on Purukan *et al*. (2013), a product with the addition of carrots most preferred by panelists has a high nutrient content compared with the standard. Based on the description, the aim of this research is to study the effect on shrimp shumai with carrots add.[3]

II. Material and Method

Material

All of the materials were purchased from Local Market. The materials that used in this research is shrimp vannamei (*Litopenaeus vannamei*), carrots, egg white, tapioca flour, dumpling skin, onion, garlic, pepper, salt, and ice cube.

Sample preparation

The process is beginning with weighing each ingredient, 200 grams of shrimp meat, 20 grams of onion, 7 grams of garlic, 50 grams of tapioca flour, 30 grams of egg white, 8 grams of salt, 2 grams of pepper, and 40 grams of an ice cube. All ingredients are mixed and blended with a food processor. The grated carrots with different proportions in 4 treatments (SU1 = 0%, SU2 = 10%, SU3

= 20%, SU4 = 30% of carrots) added to the dough and stirred until mixed well. The dough wrapped in dumpling skin and steamed for 30 minutes, then lifted and cooled at room temperature for 15 minutes.

Organoleptic analysis

To choose the most like shrimp shumai in every treatment, an organoleptic test was used. Organoleptic test of shrimp shumai samples was performed by 100 consumers (student at Brawijaya University). The organoleptic test was using hedonic method.

Color analysis (L, a, b)

The color (L, a, b) of shrimp shumai with carrots were measured using a CR 400 chromamometer. To measure the internal color of shumai, the samples were cut and analyzed by the device.

Statistics analysis

In this research, all experiment was done with four treatments and five replicates. Analysis of variance (ANOVA) followed by Tukey test for color analysis and Kruskal-Wallis test for organoleptic analysis at $p < 0.05$ was done on the experimental data using SPSS software.

III. Result

Organoleptic test was used to determine the acceptability of panelist for shrimp shumai with carrots added. Organoleptic test was performed by 100 consumers with hedonic method. Hedonic test is an organoleptic analysis test that is used to determine the level of preference of a product by giving an assessment or score on the characteristics of product. The result of organoleptic test on shrimp shumai with carrots adds can be seen in Figure 1.

Figure 1. Organoleptic analysis of shrimp shumai with carrots add

Treatment	Appearance	Aroma	Texture	Taste	Total
SU1 (0%)	2.83	3.02	3.15	3.10	12.1
SU2 (10%)	3.11	2.98	3.11	3.07	12.27
SU3 (20%)	3.16	3.04	3.19	3.04	12.43
SU4 (30%)	3.44	3.09	3.15	3.15	12.83

The addition of carrot treatment was significantly different ($p < 0.05$) on hedonic appearance test. The highest value is on SU4 (30%) and the lowest value is on SU1 (0%). The panelist's favorite in appearance was SU4 treatment (30% carrots add) of 3.44. According to Purukan *et al.* (2013), the color formed on the product is caused by the addition of carrots. Carotenoid is the source of orange color on carrots.[3]

The color analysis produces three notation, L* for lightness, a* for redness, and b* for yellowness. The additional carrots give significant value ($p < 0.05$) on color characteristics in shrimp shumai. The range of lightness value is 60.61 up to 63.68. The redness value has range between 6.36 to 7.61. The range of yellowness value is between 9.52 to 17.62. The graph can be seen in Figure 2.

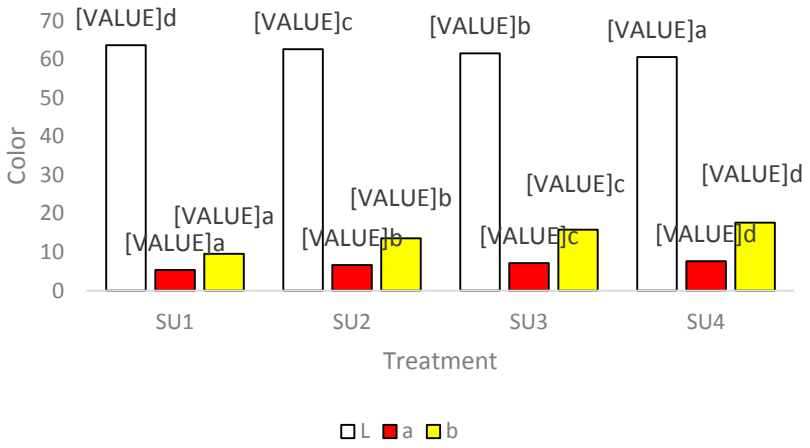

Figure 2. Graph of Lightness (L), redness (a), yellowness (b) of shrimp shumai with carrots add

IV. DISCUSSION

The parameter *a** takes positive values for reddish color and negative values for greenish, whereas *b** takes positives values for yellowish color and negative values for blue ones. *L** is an approximate measurement of luminosity, which is the property according to which each color can be considered as equivalent to a member of the greyscale, between black and white (Granato and Masson, 2010).[4]

Lightness decreases by increasing the concentration of carrots. The *L** value of shrimp shumai for each treatment has decreased, which means that more carrots add has results in dark or thick colors. Figure 2 shows that the redness and yellowness of inner color of shumai increased by increasing the amount of carrots concentration. Addition of carrots in shrimp shumai had a significant effect on these parameters of the inner color of shrimp shumai.

As the concentration of carrots increases on shrimp shumai, the result of shrimp shumai color is brighter, which is increasingly orange. Febrihantara *et al.* (2014), said that the more carrots that are added to the product will create an increasingly orange color.[5] According to Kaemba *et al.* (2017), a combination of high *a** value and low *b** value produce colors with low brightness. Whereas the combination of low *a** value and high *b** value shows bright yellow to orange.[6]

V. CONCLUSION

Carrots can be added to shrimp shumai to improve color characteristics. The addition of carrots gives a significant ($p < 0.05$) on color (L*, a*, b*) of shrimp shumai. The concentration of carrots add had an influence on the level of preference consumers.

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Risk Mitigation and Quality Assurance in Digital Forensic Investigations

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Abstract: Digital forensics involves the application of tried and tested methodologies for the Acquisition, preservation, validation, identification, analysis, documentation, interpretation, and presentation of evidences from sources in digital form, which can later be used to replicate the events found to be illegal[1]. Acquisition, Preservation, Analysis are few of the most critical processes. The risk involved in these processes, the impact of the risk and standardisation followed to minimise risk are discussed in detail in this paper.

Index Terms: Risk Mitigation, Digital forensics, Digital investigation

INTRODUCTION

Digital forensics as defined by First Digital Forensic Research Workshop (DFRWS) in the paper 'A Road Map for Digital Forensic Research' is "The use of scientifically derived and proven methods toward the preservation, collection, validation, identification, analysis, interpretation, documentation and presentation of digital evidence derived from digital sources for the purpose of facilitating or furthering the reconstruction of events found to be criminal…."[2].

Acquisition can also be termed as Preparation or Extraction of data from suspicious digital devices obtained from the site related to the act. Forensic experts can receive a dick image of the data or the real copy, they ensure the integrity of the data is maintained and converts the requests made to them to sensible questions and decides on the tools to be used to answer these questions. **Preservation** of digital evidence involves efficient protocols to be involved to ensure that the integrity of the evidence is maintained throughout and the same can be proved whenever necessary. As defined by Landwehr, integrity is "assuring that digital information is not modified (either intentionally or accidentally) without proper authorization"[3]. The digital evidences has evolved from traditional ones and in the process it has maintained all the complexities it earlier had in traditional form and also has added additional ones of its own.[4] As digital evidences are rich and volatile it is necessary to protect or seal the original image in such a way that challenges due to volatility of the digital evidences are answered. Previous work in this field has shown how this can be achieved by following a theoretical model of the umbrella principle.[5] **Analysis** phase for the forensic expert is to connect the dots in order to identify and reconstruct the occurred scenario in such a way that it can answer all the queries expected form the client. The examiners are also expected to define the procedure followed to achieve the output and from where it was documented. As a result of which examiners make sure they record the findings in a suitable manner in support of their findings.
Organisation bring in Quality Management and Information Security Management System standardisations to make sure they minimise risk related to the investigation phases and improve quality of work. Well know Quality management standardisation is ISO 9004:2018, which guides to achieve sustainable success it also follows the quality management principles mentioned in ISO 9000:2015[6]. Along with this ISO/IEC 27000 family is also followed which assures to keep an organisation's information assets safe and secure. There are multiple standardisations in this family among which ISO/IEC 27001 is well known to satisfy the need of an Information Security Management System. [7]

[1] Collective work of all DFRWS attendees, 'A Road Map for Digital Forensic Research', < dfrws.org/sites/default/files/session-files/a_road_map_for_digital_forensic_research.pdf > accessed on 28th Feb 2019
2 Collective work of all DFRWS attendees, 'A Road Map for Digital Forensic Research', < dfrws.org/sites/default/files/session-files/a_road_map_for_digital_forensic_research.pdf > accessed on 28th Feb 2019
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Digital Evidences

Data from a digital device, an internal or WAN network, wireless platforms and from different types of storage devices should be collected in a manner that it can be admissible as an evidence in a court.

Common types of **Digital Evidences** are

a. **Persistent:** This form of evidences are stored in local or remote hard drives and are saved and stored even when the digital device is in powered off state.
b. **Volatile:** They are information in volatile memory of a system for example in RAM of a device, which has potential risk to get lost when the system is powered off or can get replaced if the evidence is not collected on the correct time.
c. **Network:** These data are collected from gateway devices or network devices like a firewall or router or proxy by running debug commands and usually saved in .pcap format for further analysis. Most of the devices automatically saves system logs and network traffic to a syslog server or on some similar platforms so that it can later be used if in case required.

Risks involved and recommendations

If a digital investigation is performed badly without following the standards the evidence has a chance to stand inadmissible in front of the court of law. Hence, it is very important to perform risk analysis at an initial stage and proceed further.

The risks that are involved for the Acquisition and Preservation phase can be broadly divided into two groups:

a. Integrity risks.
b. Legal risks.

Integrity risks: It can be defined as loss of a portion of an evidence or the entire evidence in the process of collection of data from the device by the application of different technology on the evidence. The challenges that can result in integrity risk and recommendations to avoid them are mentioned below.

1. There is always a risk of altering the evidence on the disk while investigating on it by application of different tools by an investigator.
   Recommendation: A copy of the disk image should be used for investigation in order to make sure the original image is not tampered during the process. It is also necessary to maintain hash values of the image to ensure integrity of the image.
2. While doing a live data collection, we tend to run user and Kernel based tools in the end system, which results in creating at least one new process in the target machine, which may result in losing an interesting evidence in volatile form. Also, by creating a new process the OS allocates memory to the new process which may also overwrite the data in SWAP file system.
   Recommendation: It is advised to make a copy of the RAM or volatile memory first and then proceed with the live data collection on the system.[8] One can also make a note of the services and processes running on the system before and after running the forensic tool.
3. Often signs of intuition plays an important role during live data collection, there could be signs that the part of the data on the memory are created by the used acquisition tool resulting in untrusted data.
   Recommendation: It is very useful to keep a note of such instances, further in later phases it may come handy. An investigator may then decide whether to use the data to yield an output of follow a different approach.
4. The tolls or scripts used to capture the network traffic are not always successful to retrain all the packets that are captured by the Kernel. There is no question of retransmission even in case of a TCP communication as the network sniffers never participate in the communication. Well known tools used for this process are tcpdump, NetWitness and Snort, they usually read the traffic from buffered memory by libpcap.
   Recommendation: Before dumping the unread packets by the sniffers libpcap keeps a record to the percentage of the packets that are not read by the tool. Although recovering the data is not possible, it is essential for an investigator to check the percentage of the data that was not captured during the process, this gives the accuracy of the data.
5. Network monitoring tools or programs has the feature of enabling filters, in doing so they capture only interesting traffic with respect to the filter applied. If the filters are not correct we tend to capture incorrect data.
   Recommendation: An investigator should have a look at the filters applied in the first place and document the same. If the traffic is not bulky, it is recommended to capture the entire traffic and later analyse the same using log analyser tools.

Legal risks : The organisations or individuals who fail to comply with the regulatory standards risk themselves in loosing reputation and business in future. They may be liable to pay a heavy penalty or sometimes face legal actions depending on the case scenario. Examples with recommendations given below:

[8] SANS Digital Forensics and Incident Response Blog,SANS DFIR <https://digital-forensics.sans.org/blog/2009/09/12/best-practices-in-digital-evidence-collection/> accessed on 1 March 2019

1. Before intercepting an employ's email, an investigator must get the company's policy checked which allows him to do a surveillance of the employ's emails, else it may result in privacy breach.
2. Violation of any of the company's statues during investigation may be a punishable offence leading to penalty or imprisonment, it is recommended to consult a legal counsel if in case any doubt arises.
3. It can be taken as an example when HP tried to probe into CNET's journalist to find out the source of her information. They in this case used a web bug. This has to be kept in mind that the use of such technologies are not always legal and has to be confirmed by a legal counsel first.[9][10]

[9] Dean Takahashi,HP scandal sheds light on electronic tracking technologies <https://www.seattletimes.com/business/hp-scandal-sheds-light-on-electronic-tracking-technologies/> accessed on 1st March 2019
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Email threading for e-Discovery in Digital forensics

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Abstract: The process of electronic discovery is very commonly used by digital forensic experts for day today activity to investigate a civil or criminal case. There are several techniques used in electronic discovery keeping the main objective in focus. This paper talks about one of the widely used eDiscovery techniques called Email threading and elaborates the pros and cons of using it during an investigation.

Index terms: Email threading, Digital investigation, Forensic computing, eDiscovery

I. What is e-discovery

Electronic discovery is the process of identifying, collecting and producing information that is electronically stored. This is usually done as a part of an investigation or in response to request for production in a law suit. Electronically stored information many include but not limited to emails, documents, presentations, voicemails, video and audio files. The technologies involved in electronic discovery is often complex because unlike hardcopy evidences the electronically stored data may contain metadata for example time stamps , author etc which has to be maintained along with the original information in order to confirm that the original data was not tampered. Additionally, the volume of electronically produced data is very high which is hard to manage and investigate. [1]

II. Email threading and its advantages

There are several e-discovery analytic technologies and one of the widely used is email threading. It is told that it can cut down review time to more than 60% resulting in both cost and time savings.[2]
An email thread is nothing but a chain consisting of the original message the one that was forwarded and the responses that it received. The tools that help for email threading groups all of the related email messages which in turn makes it easy to review them.

The example given below shows an example of email thread, here gmail acts as a email threading tool which when used in conversation mode and the conversation is between Niladri Sarkar and Nealsrkr.

[1] Complete Discovery Source, 'The Basics: What is e-Discovery'<https://cdslegal.com/knowledge/the-basics-what-is-e-discovery/> accessed on 13th November 2018
[2] LMDglobal,'Email threading saves time in document review',<https://www.ldmglobal.com/2018/08/07/email-threading-saves-time-in-document-review/> accessed on 22 November 2018

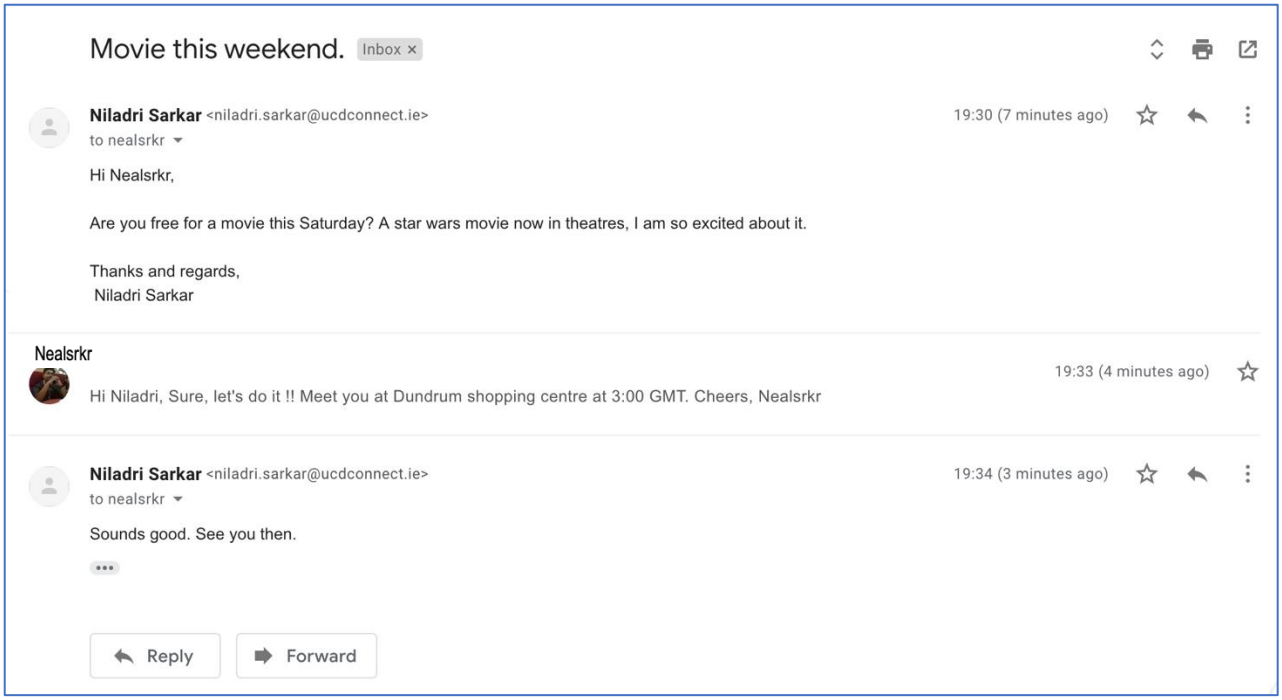
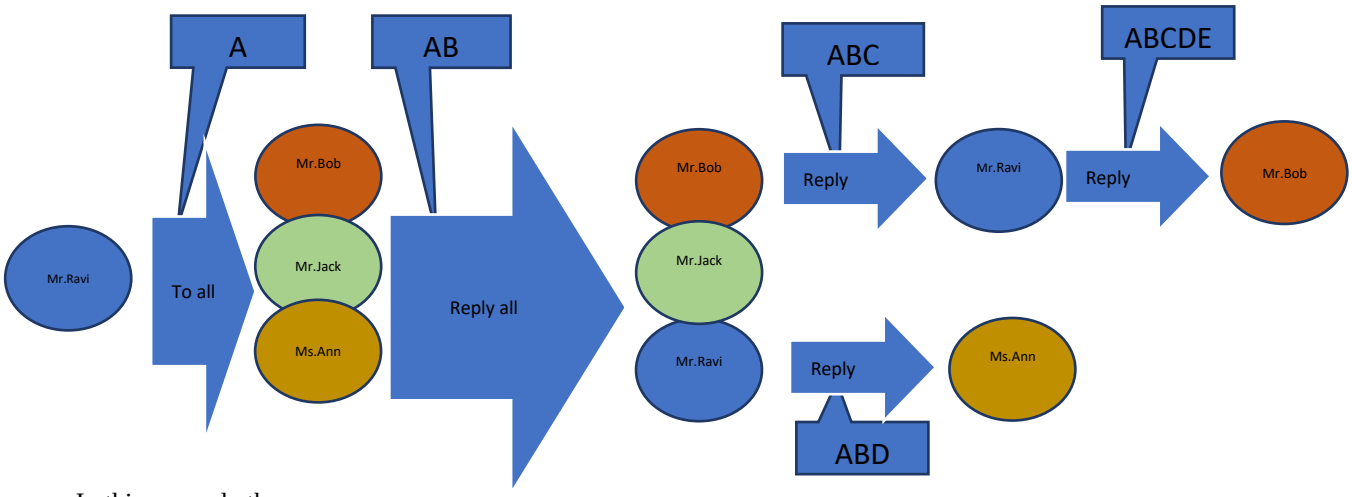


Figure 1: From email box

It is important to have email threading in electronic discovery because it helps to bring in related contents together which would not be otherwise appear together. As an example let us assume that the email invitation for movie from Niladri was forwarded to a third person by Nealsrkr. In this chase without email threading it would have appeared as an absolute new email. However, any email threading tool would group this conversation together and such conversations are usually identified as "near-duplicate" detections. This is because the email that was forwarded by nealsrkr was a copy of the original email sent by Niladri, the only difference is the sender and receiver of the email were different. Sometimes each thread is again sub divided into several other threads following the pattern of flow of messages. The last email is always tagged and reviewed first. The flowchart below is an example of it.

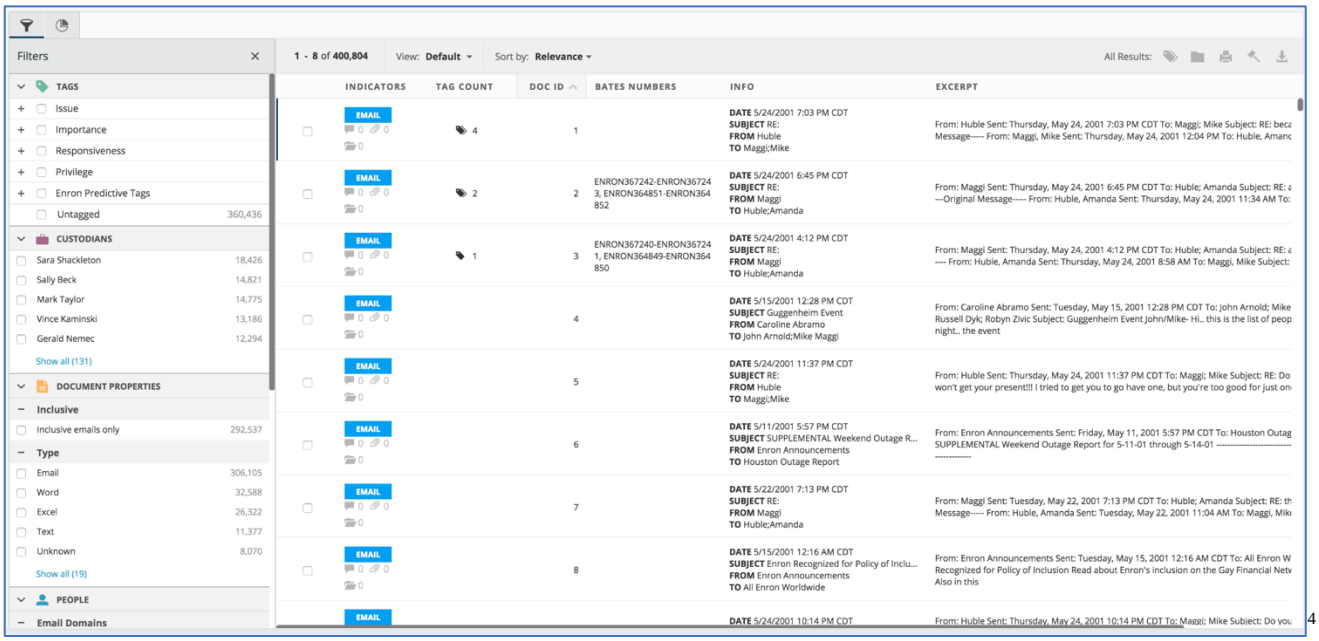


In this example there are:

Type	Count	Description
Thread	1	Initiated by Mr.Ravi
Messages	5	A, AB, ABC, ABD, ABCD
Last Email tags	2	ABD, ABCE

When a document or bulk of email review is down the feature of identifying near duplicates and connecting them to the original data turns out to be extremally useful. In a chunk of information that has been collected the bulk of emails available may not be in correct order as a result if they are not groped well in the first place will lead to insufficiency and create hindrance. This may also led to checking of similar content more than once hence making the process less efficient. Using a email threading tool and as a best practice the last email of an email chain is selected first and all the relevant conversation related to the same email are found in it. Threading an email speeds up the process as an investigator is able to see the content of end to end of all possible data available from a bulk of email along with details like timestamp, sender , receiver and attachments if any. The threading tools are

also equipped with tagging option using which identified piece of evidence can be bookmarked by the investigator and later groped together which can further be used to create an investigation report. A sample view of an email threading tool interface from Disco is shown below.[3]



4

When emails are reviewed in the form of a thread it not only helps the investigator to understand the relationship between the sender and receiver but also helps to find out if any conversation or email present in-between are missing, this may help in the investigation process by giving an indication that the interesting or relevant data might me missing or removed and different forensic technique must be initiated to identify or spot the content of the missing piece of information.

III. How email threading is performed

Email threading tools usually categorizes the bulk of provided data first, grouping them in different sections which are the unique data also known as *pivot* by Ringtail tool, the duplicate data and the pre-categorized data which is now duplicate but was original earlier, this is also called as *Duplicate previous pivot* as per Ringtail terminology. An Email thread can have more than one pivot.

Pivot or unique data	The document should meet the following criteria to be a pivot or unique data • It should be the latest content of the thread which has the entire conversation. • It contains the recipients and attachments that are not present in the next document. • The document cannot be thread analysed
duplicate data	• The contents are the exact copy of any other document of the thread at the same level • It contains information which are also available in substituent documents.
Duplicate previous unique	• A new document which becomes a pivot is added to the thread first and the existing pivot is then changes as a duplicate.

Post analysing the entire content the data is classified in the above categories and a thread is formed. Using this analytic approach helps to view a huge volume of data in an organized manner and it makes it easy for the investigator to analyse the same. If there is an email attached to an email it is not considered for email threading, it is just treated like an attachment. An investigator can reduce the volume of documents by removing duplicate ones or my removing any document which he finds to be not relevant. To make the thread analysis more efficient the tools do not take the below prefixes separated by comma under consideration during analysis.

RE, RE:, FW, FW:, FWD, FWD:, Accepted:, Action Requested:, Cancelled:, COMPLETE:, Declined:, NOTICE TO:, Out of Office Autoreply:, Recall:, REMINDER:, Task Accepted:, Task Declined:, Task Request:.

[3] Percipient, 'Email threading? What is it?'<https://percipient.co/email-threading/> accessed on 22 November 2018
[4] Disco, 'Your ediscovery upgrade'<https://www.csdisco.com>, accessed on 22 November 2018

Sometimes it is required to analyse an ongoing email thread, this might result in change in parameter values as they depend on the content of the email.

Below example will help to understand the same:

● Suppose Email 1 is a pivot in a given email thread.

● Email 2 is added on the go and submitted for thread analysis. The new email has the same normalized subject, sender and receiver and also has an extra attachment.

After the thread analysis is completed the results are as follows

● Email 2 will be made as pivot.

● Email 1 is changed to duplicate earlier pivot, as the new document contains all the data it had.[5]

IV. Drawbacks

Although email threading makes the process of eDiscovery easier there are few drawbacks which does not make it cent percent efficient. One of the major drawback is when an email is attached to another email, it is treated as an attachment and its content are not verified like it is done for other emails, this might be necessary in several cases. Also, when the subject is changed and its normalized value is no longer the same the threading tools become inefficient to categorise the same. In the same way if there are multiple email chains running with no subject with not exactly similar contents it is difficult for the threading analyser to categorise such emails. Also, several tools have their own limitation when it is about verifying the attachments, all of them are not efficient to inspect attachments of different file format. It is also a big challenge that all the documents that are suspected to be an evidence has to be downloaded and have to be made available offline to make an email threading tool work on it. This involves requirement of extra infrastructure and time also in this process sometimes there are high chances an calendar event or an email saved as draft can be missed. As mentioned by Microsoft there are chances to loose contents when data is moved to offline platform from one location to another.[6]

V. Application of Email threading in IT Forensics

The main aim of IT forensics is to investigate an incident related to digital technology. It tries to reconstruct the course of events and attempts to identify the individuals involved in an incident. The process may include analysing an email content where email threading plays an important role. Keeping in mind all communications done in an organisation is documented using email also emails are used by authorities to process approvals (this also includes financial departments) email as a document is frequently investigated. One more common incident that is often reported is data theft or passing of data. An employee or former employee may be involved in the act where data has been sent outside the organisation using email and he/she was unauthorised to do so. Considering the huge volume of emails an individual sends or receives it is quite difficult to analyse each of them manually, email threading can here can help to organise the content and present the data in an organised format, this will not only easy the task but also save a lot of time making the process very efficient. Industries are now driven by digital technologies and email is the most impotent mode of communication within an organisation or while communicating with clients, this as a cluster creates a ground for email threading to play an impotent role in IT forensics.

VI. Conclusion

We can conclude by saying that in the field of eDiscovery where identifying collecting and producing information from data which is electronically stored is the major requirement email communication or email as a document is one of the main component of the data to be investigated in most of the cases. The volume of these emails being very high it is difficult to analyse them one by one manually which results in reading the same document more than once. Email threading solves this problem by organising the data and displaying them in an easy understandable visualized format with all meta data like timestamps easy accessible. There are several vendors who provided email threading tolls to make eDiscovery easier for emails. Although each one of them has different terminologies to identify parameters they use almost the same algorithm to create email threads. With advance in technology machine learning plays a vital role to create perfect email threads where the machine trains itself over time to become more efficient. IT forensic investigates on incidents to identify a culprit, frequently is it required to trace emails and reverse engineer to understand what exactly was done which resulted in an incident, email threading is useful in these cases.

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[5] Documentation,'Email threading administration',https://www.ringtail.com/documentation/ringtail-9.2/case-admin/threading/thread-admins#MiniTOCBookMark2> accessed on 22 November 2018

[6] Microsoft,'Office 365 meets evolving eDiscovery challenges in a cloud-first world',<https://www.microsoft.com/itshowcase/Article/Content/843/Office-365-meets-evolving-eDiscovery-challenges-in-a-cloudfirst-world> accessed on 22 November 2018

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A pre – experimental study to assess the effectiveness of acupressure therapy (sp6 pressure point) in the intensity of dysmenorrhoea among nursing students at S. R. Nursing College, Gwalior M. P.

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Abstract- Dysmenorrhea is a common gynecological complaint among adolescent girls and women of reproductive age. It refers to any degree of perceived cramping pain associated with menstruation. Complementary and alternative medicine (CAM) therapies are widely used in the general population. CAM therapies may be adopted as interventions to prevent or alleviate dysmenorrhea. A pre-experimental study was conducted to assess the effectiveness of acupressure therapy (Sp6 point) on dysmenorrhoea during the first day of menstruation among nursing students at S R Nursing Colleges of Gwalior. The study used the pre-experimental approach with Two group pre-test post-test pre-experimental Research Design. Purposive sampling technique was taken up to select 60 respondents of dysmenorrhoea during their first day of menstruation in selected S R Student Nursing Hostel, Gwalior as per predetermined inclusion criteria. Data was collected with the help of Numerical Pain Intensity Scale for assessing the intensity of dysmenorrhoea and the pain intensity was recorded by the tool. Participants received acupressure therapy, in Group I at every 4 hourly for the first day of menstruation alternating between each leg at the Sanyinjiao (SP6) acupoint whereas those in the Group II received acupressure therapy at every 8 hourly for the first day of dysmenorrhoea by the researcher.

Two complete 5 – minutes cycles of pressure will be performed on each leg for a total of 20 minutes in both the Groups. For each pressure cycle on each side, SP6 pressure point will be rotated clock wise & anti-clock wise with the help of thumb/index finger of the Researcher. In each session of acupressure, the researcher took pre – test & post – test by giving a - Numeric Pain intensity Scale to the respondents experiencing dysmenorrhoea. For Group I participants it was total 6 sessions in a day & whole total there was12 readings in a day as acupressure was given every 4 hourly for the first day of menstruation and for Group II participants, it was total 3 sessions in a day & whole total there was 6 readings as acupressure was given at every 8 hourly for the first day of menstruation. Out of total number of acupressure therapies, initial two pre therapy observations were recorded for data analysis to assess the intensity of dysmenorrhoea from both the groups. The data analyzed in terms of the objectives and hypotheses using descriptive and inferential statistics. Finding of the study related to intensity of dysmenorrhoea revealed that there was a significant difference in pain intensity assessed by Numerical Pain Intensity Scale of Group I and Group II at t_{58} = .002 at the level of $p<0.001$. Hence it was inferred that acupressure therapy (SP6 point) in Group I was effective in reducing the intensity of dysmenorrhoea. Here, H2 was accepted. Thus it was concluded that, acupressure therapy (SP6 point) in Group I significantly reduces the intensity of dysmenorrhoea.

Index Terms- Respondents, intensity of dysmenorrhoea, acupressure therapy, SP6 point, first day of menstruation, effectiveness.

I. INTRODUCTION

Dysmenorrhoea is the most common gyaenecological disorder among adolescents with a prevalence of 60 – 93%. According to two United States Of America (USA) based studies, 42% of affected adolescents describe their menstrual pain as severe, 33% as moderate & 25% as mild (**Banikarim et al. 1999, Banikarim et al 2000, Granot et al. 2001**).

Primary dysmenorrhoea is defined as cramping pain in the lower abdomen occurring just before or during menstruation without pelvic abnormalities.

Primary dysmenorrhoea arises from the release of prostaglandins with menses, which is secreated during the luteal phase & subsequent menstrual flow**.** Excessive release of prostaglandins increases the amplitude & frequency of uterine contractions & causes vasospasm of uterine arterioles, resulting in ischemia & cyclical lower abdominal cramps.

Traditional Chinese Acupressure derived from acupuncture is a non – invasive technique.

To ease the symptoms, acupressure is applied on the specific points, to have a strong influence on blood flow & may help stop pain.

II. NEED OF THE STUDY

Dysmenorrhoea is a common distressing disorder in women that manifests during menstrual phase.

The symptoms such as head ache, vomiting, nausea, giddiness are considered as associated symptoms. The purpose of

this study was to find out the effect of acupressure therapy whether it is beneficial or not in alleviating the intensity of dysmenorrhoeal pain. The researcher find out that many of the adolescent girls having dysmenorrhoea which is very painful for them and makes them to skip their classes and they take medicines for dysmenorrhoea which has got many side-effects. So the researcher thought to conduct the study on Dysmenorrhoea that can be cured by acupressure therapy which has no side-effects and safe. Despite renewed interest in the use of acupressure for dysmenorrhoea, few studies have examined the effects of acupressure on primary dysmenorrhoea, hence the motivation for this study. Acupoint Sanyinjiao (SP6) was selected for study because it is the acupoint of choice in gyaenecology & is easy for women to locate & apply pressure to without medical assistance**.**

World Health Organization recognizes Acupressure science under Alternative Medicines or Traditional Medicines. It considers acupressure as one of the alternative medicinal treatment which is important in solving the health problems of the world. For developing countries, therapies like acupressure are a boon. It is not only affordable for the common people but also it can be useful in taking medical care to the villages where conventional medicinal treatment is hard to find. **(Suei, Feng.2005)**.

The natural and holistic approach of acupressure in dysmenorrhoea has absolutely no adverse effect as no pharmaceuticals are being introduced into the body. It's safe for all because it only helps your body to function better. The worse possible side-effect is a slight chance of minimal soreness at the site of pressure point stimulation after repeated treatments.

So far, there have been numerous studies supporting the effectiveness of acupressure therapy (SP6 point) on reducing dysmenorrhoea. During clinical experience , investigator felt the need to implement an intervention to reduce the agonizing pain which is not only cost effective but can be widely used by everyone in various different settings. Thus a study was undertaken which had a significant implication on intensity of dysmenorrhoea which could collectively reduce the pain during menstruation.

III. PROBLEM STATEMENT

Apre – experimental study to assess the effectiveness of acupressure therapy (sp6 pressure point) in the intensity of dysmenorrhoea among nursing students at S R nursing college of Gwalior

IV. OBJECTIVES:

1.) To assess the intensity of dysmenorrhoea among nursing students before & after acupressure therapy of Group I.

2.) To determine the intensity of dysmenorrhoea before & after acupressure therapy among nursing students in Group II.

3.) To determine the association between the intensity of dysmenorrhoea & selected demographic variables in both the Groups i.e. Group I and Group II.

4.) To evaluate the effectiveness of Acupressure therapy in reducing dysmenorrhoea among Group I.

5.) To evaluate the effectiveness of Acupressure therapy in reducing dysmenorrhoea among Group II.

6.) To compare the effectiveness of Acupressure in the intensity of dysmenorrhoea among Group I and Group II.

V. HYPOTHESES:

1. **H1:** There is significant association of Group I and Group II between the intensity of dysmenorrhoea & the socio – demographic data at level of p≤ 0.05.
2. **H2**: There is significant difference in the intensity of dysmenorrhoea among nursing students of Group I at the level of p≤ 0.05.
3. **H3**: There is significant difference in the intensity of dysmenorrhoea among nursing students of Group II at the level of p≤ 0.05.
4. **H4**: There is significant difference in the intensity of dysmenorrhoea among nursing students of Group II and Group II at the level of p≤ 0.05.

VI. CONCEPTUAL FRAMEWORK

The present study used the Traditional Chinese Medicine theory. **(Fig.1, Page No. 9)**

VII. RESEARCH METHODOLGY

Research Design Two group pre-test post-test pre-experimental design selected for this study. **(Fig. 2, Page No. 28)**

Population Nursing students having dysmenorrhoea during the first day of menstruation. The method of sampling employed was purposive sampling Sample size The sample size was 60 nursing students, 30 in each group Setting Choithram Student Nursing Hostel, Indore Tool The tool for collection of data for this study consisted of two sections.

- Section I-'a' Socio-Demographic data of Nursing students

'b' Assessment related to dysmenorrhoea

- Section II consisted of - Numerical Pain Intensity Scale

Validity The prepared tool along with the statement, objectives, hypotheses, operational definitions and criteria check list were given to 5 experts of obstetric speciality for establishing content validity. Necessary changes were made as per their suggestion.

Reliability The tool was tested for reliability on 6 respondents i.e. Nursing students having dysmenorrhoea during their first day of menstruation

I. Reliability of Numerical Pain Intensity Scale: Due to Subjectivity in the response the reliability of the tool could not be calculated.

Pilot Study The pilot study was conducted in S R Nursing Student Hostel, Indore from 15th November to 10th December 2016.

Data for the pilot study were collected from 6 respondents who fulfilled the inclusion criteria.

The analysis of the pilot study revealed that the objectives of the study could be fulfilled. Based on this information, investigator proceeded with the actual data collection for the main study.

VIII. DATA COLLECTION PROCEDURE

Written permission was obtained from the administrative authorities of the S R Nursing Hostel prior to the data collection. The study was carried out not exactly as that of the pilot study, some changes has been made after pilot study because of ethical issue. Instead of experimental & control group, it is now being changed to group I & group II who will be receiving (Sp6) acupressure at every 4 hourly & every 8 hourly respectively. A total of 60 samples were selected for the study, who were Nursing students of S R College of Nursing living in a S R Nursing Hostel of Gwalior .

Prior to the data collection, informed consent was obtained from each respondent and confidentiality was assured to the subjects. This study comprised of 60 nursing students who met the inclusion and exclusion criteria, were assigned each to Group I and group II (N = 30 + 30 = 60).

1. **Pre Intervention Score:** Pain during menstruation (Dysmenorrhoea) was recorded by the tool (standardized Numerical Pain Intensity Scale).
2. **Intervention: Group I:** Acupressure therapy was given at every 4 hourly intervals on SP6 point during first day of menstruation. 5 – Minutes cycles of acupressure has been performed on each leg for a total of 20 minutes. For each pressure cycle on each side, SP6 pressure point rotated clock wise & anti-clock wise with the help of thumb/index finger. In each session of acupressure therapy the researcher took pre – test & post – test by giving a - Numeric Pain intensity Scale to the nursing students experiencing dysmenorrhoea. There was total 12 readings, as acupressure therapy is given every 4 hourly

Group II: Acupressure therapy was given at every 8 hourly intervals on SP6 point during first day of menstruation. 5 – Minutes cycles of acupressure has been performed on each leg for a total of 20 minutes. For each pressure cycle on each side, SP6 pressure point rotated clock wise & anti-clock wise with the help of thumb/index finger. In each session of acupressure therapy the researcher took pre – test & post – test by giving a - Numeric Pain intensity Scale to the nursing students experiencing dysmenorrhoea. There were total 6 readings as acupressure therapy is given at every 8 hours interval.

3. Post Intervention Score: After the therapy, pain intensity was recorded again.

IX. FINDINGS

Section I 'a' Socio-demographic data of nursing students
Group I

The findings showed that out of 30 nursing students among Group I, majority 17(56.7%) belonged to age of 19-21 years, 8(26.7%) belonged to 22-24 years, 3(10.0%) belonged to 25-27 years, 2(6.7%) belonged to 16-18 years and 0(0%) belonged to 28-30 years.

Regarding educational status of nursing students, 21 (70.0%) were doing B.Sc. Nursing and 9 (30.0%) was doing M.Sc. Nursing.

Majority 19 (63.3%) had their menarche at the age of 13-14 years, 9 (30.0%) at the age of 11-12 years and 2 (6.7%) at the age of 15-16 years.

Majority 15 (50.0%) of nursing students have their menstrual duration of 4 days, 10 (33.3%) have for ≥5 days, 5 (16.7%) have for 3 days and 0 (0%) have for 2 days.

Regarding menstrual cycle of nursing students among Group I, majority 24 (80.0%) has their menstrual cycle within 28 days, 3 (10.0%) of nursing students has their menstrual cycle within 21 days, 3 (10.0%) has their menstrual cycle within 36 days and 0 (0%) has within 15 days.

Majority, 9 (30.0%) of nursing students have dysmenorrhoea lasting for 1 day, 8 (26.7%) lasting for ≥2 days, 8 (26.7%) have dysmenorrhoea lasting for 1-6 hours and 5 (16.7%) have dysmenorrhoea for 7-12 hours.

Regarding usage of medication, 10 (33.3%) use medicines for dysmenorrhoea and 20 (66.7%) of nursing students said they don't use medications for dysmenorrhoea.

Group II

Findings of the study reveals that out of 30 nursing students among Group II, majority 15(50.0%) belonged to age of 19-21 years, 6(20.0%) belonged to 22-24 years, 4(13.3%) belonged to 16-18 years, 3(10.0%) belonged to 25-27 years and 2(6.7%) belonged to 28-30 years.

Regarding educational status of nursing students, 20 (66.7%) were doing B.Sc. Nursing and 10 (33.3%) was doing M.Sc. Nursing.

Majority 20 (66.7%) had their menarche at the age of 13-14 years, 5 (16.7%) at the age of 11-12 years and 5 (16.7%) at the age of 15-16 years.

Majority 19 (63.3%) of nursing students have their menstrual duration of 4 days, 7 (23.3%) have for ≥5 days, 3 (10.0%) have for 3 days and 1 (3.3%) have for 2 days.

Regarding menstrual cycle of nursing students among Group I, majority 22 (73.3%) has their menstrual cycle within 28 days, 4 (13.3%) of nursing students has their menstrual cycle within 21 days, 3 (10.0%) has their menstrual cycle within 36 days and 1 (3.3%) of nursing students menstruation come within 15 days.

Majority, 13 (43.3%) of nursing students have dysmenorrhoea lasting for 1 day, 12 (40.0%) lasting for 1-6 hours, 3 (10.0%) have dysmenorrhoea lasting for ≥2 days and 2 (6.7%) have dysmenorrhoea for 7-12 hours.

Regarding usage of medication, 23 (76.7%) does not use medicines for dysmenorrhoea and 7(23.3%) of nursing students said they use medications for dysmenorrhoea. (Tab. 1, Fig.4-10, Page No.

'b' Assessment related to dysmenorrhoea
Group I

The findings showed that out of 30 nursing students among Group I, majority 19 (63.3%) experiencing dysmenorrhoea since ≥5 years, 6 (20.0%) from last 3-4 years and 5 (16.7%) from last 1-2 years.

Regarding pre-menstrual symptoms, majority 16 (53.3%) has irritability, 12 (20.0%) has other pre-menstrual symptoms (out of 12, 9 of them has abdominal pain, 1 facial pimple, 1diarrhea, and1 back pain), 1 (3.3%) has tension, 1 (3.3%) has both irritability and tension, 0 (0%) has dysphoria, 0 (0%) has combination of irritability, tension, and any other, and 0 (0%) has both irritability and any other.

Majority 13 (21.7%) of nursing students said their intensity of dysmenorrhoea is static, 11 (36.7%) said their intensity of dysmenorrhoea decreasing and 6 (20.0%) said increasing.

Majority 24 (80.0%) of nursing students said their dysmenorrhoea starts with menses, 6 (20.0%) their dysmenorrhoea starts before menses and 0 (0%) said their dysmenorrhoea starts after menses.

Regarding location of pain, majority 18 (60.0%) has lower abdominal pain, 4 (13.3%) has both lower abdominal pain and pain in pubic area, 4 (13.3%) has both lower abdominal pain and pain in lumbar area, 3 (10.0%) has all of the above and 0 (0%) has pain in lumbar area.

Majority 26 (86.7%) of nursing students said their pain is radiating sometimes, 3 (10.0%) said never, and 1 (3.3%) said always.

Majority 12 (40.0%) experience intermittent type of pain, 10 (33.3%) experience continuous type of pain, 6 (20.0%) has spasmodic pain, 1 (3.3%) has colicky type of pain, 1 (3.3%) has both continuous and spasmodic, 0 (0%) has continuous and colicky type of pain, 0 (0%) has intermittent and spasmodic type of pain.

Majority 22 (73.3%) of nursing students said their pain aggravates during day time, 4 (13.3%) said pain aggravates during night, and 4 (13.3%) said pain aggravates during other time (early morning).

Regarding severity of pain, majority 13 (43.3%) has pain in standing position, 8 (26.7%) has pain in all of the above, 7 (23.3%) has pain in sitting position, 1 (3.3%) has pain in lying down position, 1 (3.3%) has pain in both sitting standing position, 0 (0%) has pain in sitting and lying down position.

Majority 22 (73.3%) said their pain sometimes aggravates with daily activities, 7 (23.3%) said their pain always aggravates with daily activities, and 1 (3.3%) said never.

Regarding Academic session majority 24 (80.0%) said sometimes their academic session is affected, 4 (13.3%) said always and 2 (6.7%) said never.

Regarding measure taken to get rid of pain, majority 19 (63.3%) take prone position, 3 (10.0%) take other (Hot water bag), 3 (10.0%) take both prone position and hot water bag, 2 (6.7%) take knee-chest position, 2 (6.7%) do massaging, 1 (3.3%) go for both prone position and knee-chest position, 0 (0%) take knee-chest position, massaging and hot water bag, and 0 (0%) go for knee-chest position and massaging.

Group II

The findings of the study reveals that out of 30 nursing students among Group II, majority 14 (46.7%) experiencing dysmenorrhoea since ≥5 years, 8 (26.7%) from last 3-4 years and 8 (26.7%) from last 1-2 years.

Regarding pre-menstrual symptoms, majority 17 (56.7%) has irritability, 4 (13.3%) has a combination of irritability, dysphoria and other (abdominal pain), 3 (10.0%) has other pre-menstrual symptoms (out of 3, 1 has abdominal pain, 1 facial pimple, and 1diarrhea), 3 (10.0%) has both irritability and tension, 1 (3.3%) has tension, 1 (3.3%) has dysphoria, 1 (3.3%) has both irritability and any other.

Majority 14 (46.7%) of nursing students said their intensity of dysmenorrhoea is static, 9 (30.0%) said their intensity of dysmenorrhoea decreasing and 7 (23.3%) said increasing.

Majority 24 (80.0%) of nursing students said their dysmenorrhoea starts with menses, 5 (16.7%) their dysmenorrhoea starts before menses and 1 (3.3%) said their dysmenorrhoea starts after menses.

Regarding location of pain, majority 13 (43.3%) has lower abdominal pain, 5 (16.7%) has all of the above, 4 (13.3%) has both lower abdominal pain and pain in pubic area, 3 (10.0%) has pain in pubic area, 3 (10.0%) has pain in both lower abdomen and in lumbar area, and 2 (6.7%) has pain in lumbar area.

Majority 20 (66.7%) of nursing students said their pain is radiating sometimes, 5 (16.7%) said never, and 5 (16.7%) said always.

Majority 17 (56.7%) experience intermittent type of pain, 5 (16.7%) experience continuous type of pain, 3 (10.0%) has spasmodic pain, 2 (6.7%) has both continuous and spasmodic type of pain, 1 (3.3%) has colicky type of pain, 1 (3.3%) has both continuous and colicky, 1 (3.3%) has both intermittent and spasmodic type of pain.

Majority 19 (63.3%) of nursing students said their pain aggravates during day time, 6 (20.0%) said pain aggravates during other time (early morning), and 5 (16.7%) said pain aggravates during night.

Regarding severity of pain, majority 12 (40.0%) has pain in all of the above positions, 9 (30.0%) has pain in standing position, 5 (16.7%) has pain in sitting position, 2 (6.7%) has pain in lying down position, 1 (3.3%) has pain in both sitting and standing position, 1 (3.3%) has pain in both sitting and lying down position.

Majority 22 (73.3%) said their pain sometimes aggravates with daily activities, 5 (16.7%) said their pain always aggravates with daily activities, and 3 (10.0%) said never.

Regarding academic session majority 23 (76.7%) said sometimes their academic session is affected, 4 (13.3%) said never and 3(10.0%) said always.

Regarding measure taken to get rid of pain, majority 12 (40.0%) take prone position, 6 (20.0%) do massaging,5 (16.7%) go for any other (hot water bag), 2 (6.7%) take knee-chest position, 2 (6.7%) go for prone position and hot water bag, 1 (3.3%) go for knee-chest position, massaging and hot water bag, 1 (3.3%) take both knee-chest position and massaging, and 1 (3.3%) go for prone position and knee-chest position.

Section- II- Intensity of Dysmenorrhoea Measured On Numerical Pain Intensity Scale of Group I

Data presented in Table No. 3 shows the intensity of dysmenorrhoea among Group I measured on Numerical Pain Intensity Scale. It depicts that 15 (50%) of respondents

experienced Horrible pain and 15 (50%) experienced Agonizing pain before starting acupressure therapy. After giving acupressure therapy, there was reduction in the intensity of dysmenorrhoea as 19 (63.3%) of the respondents had uncomfortable pain and 11 (36.7%) of them had Annoying pain.

Section- III- Intensity of Dysmenorrhoea Measured On Numerical Pain Intensity Scale of Group II

Data presented in Table No. 4 shows the intensity of dysmenorrhoea among Group II measured on Numerical Pain Intensity Scale. It depicts that 17 (56.7%) of respondents experienced Agonizing pain and 13 (43.3%) experienced Horrible pain before starting acupressure therapy. After giving acupressure therapy, there was reduction in the intensity of dysmenorrhoea as 17 (56.7%) of the respondents had uncomfortable pain, 8 (26.7%) experienced Dreadful and 5 (16.6%) of them had Annoying pain.

Section IV-Association between the intensity of dysmenorrhoea & selected demographic variables.

The data in Table 5 depicted the computed chi-square values between the intensity of dysmenorrhoea and the variables like age, education, age at menarche, menstrual cycle, menstrual duration, duration of dysmenorrhoea, and usage of medication are not associated with intensity of dysmenorrhoea.

Section V- Assessment of intensity of dysmenorrhoea

Measured on Numerical Pain Intensity Scale: There was a significant difference in the pre-intervention and post intervention score of pain intensity among Group I (acupressure given at every 4 hourly for the first day of dysmenorrhoea) at the level of p≤0.001 and there was a significant difference in the pre-intervention and post intervention score of pain intensity among Group II (acupressure given at every 8hourly for the first day of dysmenorrhoea) at the level of p≤0.001 and there was a significant difference in pain intensity assessed by Numerical Pain Intensity Scale of Group I (acupressure given at every 4 hourly for the first day of dysmenorrhoea) and Group II (acupressure given at every 8 hourly for the first day of dysmenorrhoea) at the level of P≤0.001. Hence it was inferred that acupressure therapy (SP6 point) in Group I (acupressure at every 4 hourly) was effectieve in reducing intensity of dysmenorrhoea. Here, H2 was accepted. (Tab.)

X. DISCUSSION

The findings related to the socio-demographic data revealed that among Group II, majority 15(50.0%) belonged to age of 19-21 years. Regarding educational status, 20 (66.7%) were doing B.Sc. Nursing and 10 (33.3%) was doing M.Sc. Nursing. Regarding age at menarche majority 20 (66.7%) of the respondents had at the age of 13-14 years and 19 (63.3%) of the respondents have their menstrual duration for 4 days with majority 22 (73.3%) of them had menstrual cycle within 28 days. Regarding the duration of dysmenorrhoea, majority, 13 (43.3%) have dysmenorrhoea lasting for 1 day. It was inferred that 23 (76.7%) does not use medicines for dysmenorrhoea.

Among Group I, majority 17(56.7%) belonged to age of 19-21 years. Regarding educational status, 21 (70.0%) was doing B.Sc. Nursing. Majority 19 (63.3%) of the respondents had their menarche at the age of 13-14 years and 15 (50.0%) of the respondents have their menstrual duration for 4 days. Regarding menstrual cycle majority 24 (80.0%) of them had menstrual cycle within 28 days. Regarding the duration of dysmenorrhoea, majority, 9 (30.0%) have dysmenorrhoea lasting for 1 day. It was inferred that 10 (33.3%) does not use medicines for dysmenorrhoea.

Findings of the study related to assessment of dysmenorrhoea in Group II revealed that majority 14 (46.7%) experiencing dysmenorrhoea since ≥5 years and regarding pre-menstrual symptoms, 17 (56.7%) has irritability and 14 (46.7%) of respondents said their intensity of dysmenorrhoea is static. Majority 24 (80.0%) of respondents said their dysmenorrhoea starts with menses and 13 (43.3%) has said they have lower abdominal pain. Regarding radiation of pain during dysmenorrhoea majority 20 (66.7%) of respondents said their pain is radiating sometimes (lower back and thighs) and 17 (56.7%) experience intermittent type of pain. Majority 19 (63.3%) of respondents said their pain aggravates during day time, and regarding severity of pain, 12 (40.0%) has pain in all of the positions (standing, sitting and lying down position). Regarding aggravation of pain during dysmenorrhoea with daily activities majority 22 (73.3%) said their pain sometimes aggravates with daily activities, and 23 (76.7%) said sometimes their academic session is affected. Regarding measure taken to get rid of pain, majority 12 (40.0%) take prone position.

Among Group I, majority 19 (63.3%) experiencing dysmenorrhoea since ≥5 years and regarding pre-menstrual symptoms, majority 16 (53.3%) has irritability and 13 (21.7%) of respondents said their intensity of dysmenorrhoea is static. Majority 24 (80.0%) of respondents said their dysmenorrhoea starts with menses and 18 (60.0%) has said they have lower abdominal pain. Regarding radiation of pain during dysmenorrhoea majority 26 (86.7%) of respondents said their pain is radiating sometimes (lower back and thighs) and 12 (40.0%) experience intermittent type of pain. 22 (73.3%) of respondents said their pain aggravates during day time, and regarding severity of pain, majority13 (43.3%) has pain in standing position. Majority 22 (73.3%) said their pain sometimes aggravates with daily activities, and 24 (80.0%)) said sometimes their academic session is affected. Regarding measure taken to get rid of pain, majority 19 (63.3%) take prone position.

The above findings were supported by following study:

Amita Singh, Dukhu Kiran, Harminder Singh, Bithika Nel, Prabhakar Singh and Pavan Tiwari, (2008)[15], conducted a cross-sectional descriptive study on "prevalence and severity of dysmenorrhea, among first and second year female medical students" which was conducted on 107 female medical students, all participants were given a questionnaire to complete; questions were related to menstruation elucidating variations in menstrual

patterns, history of dysmenorrhea and its severity, pre-menstrual symptom and absenteeism from college and /or class; to detect the severity of dysmenorrhea Participants were given 20 minutes to complete the questionnaire. The mean age of subjects at menarche was 12.5 (±1.52) years, with a range of 10-15 years. The prevalence of dysmenorrhea was 73.83%; of these 6.32% severe, 30.37% moderate and 63.29% were mild grade. The average duration between two periods and the duration of menstrual flow were 28.34 (±7.54) days and 4.5 (±2.45) days respectively. Prevalence of other menstrual disorders like irregularity, prolonged menstrual bleeding, heavy menstrual bleeding and PCOD were 7.47%, 10.28%, 23.36% and 3.73% respectively. Among female medical students who reported dysmenorrhea; 31.67% and 8.68% were frequently missing college & classes respectively. Premenstrual symptom was the second most (60.50%) prevalent disorder and 67.08% reported social withdrawal. Dysmenorrhea and PMS is highly prevalent among female medical students, it is related to college/class absenteeism, limitations on social, academic, sports and daily activities.

Findings of the study related to association between the intensity of dysmenorrhoea and socio-demographic variable revealed that the computed chi-square values between the intensity of dysmenorrhoea and the variables like age, education, age at menarche, menstrual cycle, menstrual duration, duration of dysmenorrhoea, and usage of medication are not associated with intensity of dysmenorrhoea. Hence it was inferred that there was no association between the intensity of dysmenorrhoea and socio-demographic variable and here, H1 was rejected.

Major findings showed that there was a significant difference in the intensity of dysmenorrhoea assessed by Numerical Pain Intensity Scale of Group I and Group II at t_{58} = 12.19 at the level of $p<0.001$. Hence it was inferred that acupressure therapy (SP6 point) in Group I was effective in reducing the intensity of dysmenorrhoea. Here, H2 was accepted.

The above findings were supported by following study:

Mohsen, Adib et.al., (2011)[37], at Iranconducted a study to assess the effectiveness of acupressure on primary dysmenorrhoea in Iranian medical sciences students. A randomized controlled pre and post – test design was employed to verify the effects of SP6 acupressure on dysmenorrhoea. A total of 30 young college female students with primary dysmenorrhoea were randomly allocated to intervention (n = 15) and control (n=15) groups. The intervention group received SP6 acupressure during menstruation cycle and the control group received light touch on the SP6 acupoint. Using a Visual Analog Scale, the severity of dysmenorrhoea was assessed prior to and immediately, 30 min, 1, 2, and 3 h following treatment. Significant differences were observed in the scores of dysmenorrhoea between the two groups immediately after (3.50 ± 1.42 vs. 5.06 ± 1.43, p = 0.004) and also 3 h after treatment (1.66 ± 1.98 vs. 4.80 ± 1.37, p = 0.000) Acupressure on the SP6 meridian can be an effective non – invasive nursing intervention for alleviating primary dysmenorrhoea and its effects last for 3 h post – treatment.

XI. CONCLUSION

After the detailed analysis, this study leads to the following conclusion:

The crux of this study finding lay open that the acupressure therapy at every 4 hourly intervals for the first day of dysmenorrhoea is highly beneficial in reducing the intensity of dysmenorrhoea. Hence, the health care workers in the gyenecological ward and in any of the setting should strive to encourage the adolescent girls and women at reproductive age to practice acupressure therapy, which would be highly satisfying to cope with the pain experiences during menstruation. The health care workers should shift themselves from the traditional belief and opinion based practice towards clinical decision based on the best available evidence, thereby providing a positive attitude to the women at reproductive age.

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The Substitution of Rice Bran Flour on the Acceptability and Color Characteristics of *Gracilaria* sp Seaweed Cake

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Abstract- Cake is a baked dough with the basic ingredients of flour, sugar, eggs and fat. The substitution of cake with rice bran flour can increase the nutritional value of the cake because it contains dietary fiber which is beneficial for the body's digestion. The purpose of this study was to determine the level of acceptance of panelists and the color characteristics of *Gracilaria* sp seaweed flour with substitution rice bran flour. The concentration used is 0% (A), 100% (B), 2.5% (C), 5% (D), and 7.5% (E). The results showed that the substitution of rice bran flour had a significant effect on the color of the cake.

Keywords: cake, *Gracilaria* sp seaweed, rice bran flour, color, substitution, organoleptic

I. Introduction

Cake is a semi-wet food product with basic ingredients of flour, sugar and eggs. In the cake with the addition of *Gracilaria* sp seaweed flour as the raw material for making cake, the results are not maximized in increasing nutritional value such as dietary fiber, it is necessary to add rice bran flour which is rich in fiber content. Rice bran is a food that has high nutritional and non-nutritional content, such as vitamin B, vitamin E, dietary fiber, protein, oil (essential fatty acids), and oryzanol. Bran is a good source of dietary fiber (soluble fiber and insoluble fiber). Soluble fiber has been shown to reduce blood cholesterol and LDL levels.[1] Rice bran has a protein content of 16.5%, fat content of 21.3%, carbohydrate content of 49.4%, and dietary fiber content of 25.3% .[2]

Product appearance is the most important attribute on a product, this is because the appearance of a good product tends to be considered to have a good taste and high quality. The appearance of a product in general can be determined by color. Colors can give the impression of liking before consumers consume these foods. Rice bran flour has a rather dark color, so it is necessary to do research to find out the substitution of rice bran flour for the color of *Gracilaria* sp seaweed cake and the panelist receiving power.

II. Material and Method

Material

The main ingredients used are seaweed flour *Gracilaria* sp, rice bran flour, flour, refined sugar, eggs, margarine, skim milk, ovalet, and vanilla. While the tools used are digital scales, mixers, pans, and ovens. The tool used to test the color of cake is Chromameter CR-400.

Method

The method used in this research is the experimental method. The treatment used in this study was a variation of the concentration of rice bran flour. The experimental basis used in this study was a completely randomized design with 4 treatments and 5 replications. The substitution concentration of rice bran flour used is 0% (A). 100% (B), 2.5% (C), 5% (D), and 7.5% (E). Data were analyzed using the Kruskal-wallis test, and the color analysis was analyzed using the One Way ANOVA test.

Processing of cake

The cake making process is material preparation, shaking, printing, and baking. All cake-making ingredients are weighed according to the recipe. Margarine, ovalet and sugar are shaken first until white, then added eggs one by one and added with dry ingredients (wheat flour, seaweed flour *Gracilaria* sp and rice bran flour). After the cake mixture is mixed evenly, the mixture is poured into the mold (pan). The roasting process in an oven with a temperature of 160^0C for 35 minutes.

III. RESULT

Evaluation of hedonic organoleptic tests was carried out by panelists, which amounted to 100 people. The components assessed are appearance, aroma, taste, and texture. The organoleptiok test was used to determine the acceptability and preference of panelists for *Gracilaria* sp seaweed cake with substitution of bran flour. The results of organoleptic tests on Gracilaria sp seaweed cake with rice bran substitution can be seen in Table 1.

Table 1. Test of organoleptic *Gracilaria* sp seaweed cake substitution of rice bran flour

Treatment	Appearance	Flavor	Taste	Texture	Total
A (0%)	3,29	3,26	3,18	3,16	3,22
B (2.5%)	3,32	3,40	3,29	3,24	3,31
C (5%)	3,25	3,18	3,10	3,07	3,15
D (7.5%)	3,26	3,09	2,94	2,98	3,06

On the assessment of organoleptic parameters the highest value was obtained in treatment B (2.5%) and the lowest in treatment D (7.5%). The highest parameters of appearance were obtained in treatment B (2.5%) and the lowest in treatment C (5%). The highest parameters of flavour were obtained in treatment B (2.5%) and the lowest in treatment D (7.5%). The highest parameters of taste and texture were obtained in treatment B (2.5%) and the lowest in treatment D (7.5%). Overall, the panelists' acceptance of *Gracilaria* sp seaweed cake with rice bran substitution was obtained in treatment B with a value of 3.31.

The results of the color testing show that there is a real effect of *Gracilaria* sp seaweed cake with substitution of rice bran flour on the characteristics of Iightness (L), redness (a) and yellowness (b). This is indicated by the value of each characteristic which gives a value of $p < 0.05$. The color characteristics of *Gracilaria* sp seaweed cake with substitution of rice bran flour can be seen in Table 2, the Lightness (L) graph can be seen in Figure 1, the redness (a) graph can be seen in Figure 2 and the yellowness graph (b) can be seen in Figure 3.

Table 2. Characteristics of color *Gracilaria* sp seaweed cake substitution of rice bran flour

Treatment	Color		
	L*	a*	b*
A (0%)	$69,87 \pm 0,61^b$	$1,65 \pm 0,03^b$	$35,30 \pm 0,06^c$
B (2.5%)	$71,67 \pm 0,11^c$	$0,60 \pm 0,04^a$	$35,80 \pm 0,65^c$
C (5%)	$71,28 \pm 0,13^c$	$1,34 \pm 0,20^b$	$33,00 \pm 0,17^b$
D (7.5%)	$69,16 \pm 0,12^a$	$1,35 \pm 0,01^b$	$32,16 \pm 0,10^a$

Based on the ANOVA results, it can be analyzed that the different treatment of rice bran flour gives a significant effect ($p < 0.05$) on the color characteristics of lightness, redness and yellowness. Then proceed to Tukey's further test. In lightness characteristics, the A treatment obtained a lightness value of ($69,87 \pm 0,61^b$), B treatment obtained a lightness value of ($71,67 \pm 0,11^c$), C treatment obtained lightness value of ($71,28 \pm 0,13^c$) and D treatment obtained lightness value of ($69,16 \pm 0,12^a$). The graph of lightness values can be seen in Figure 1.

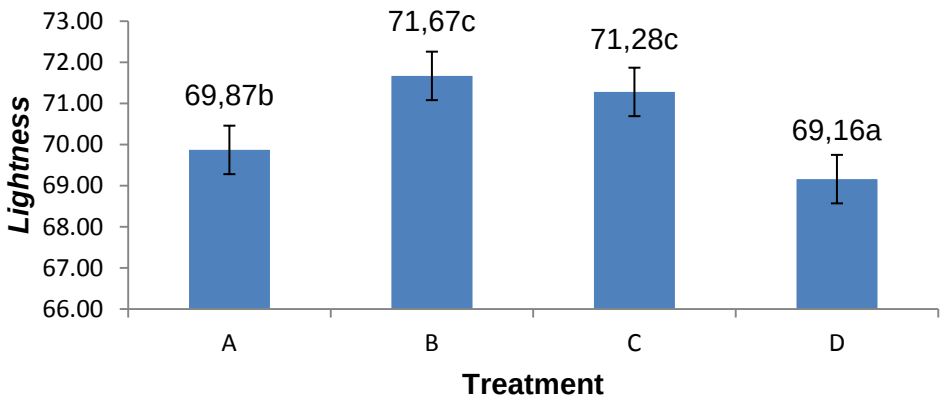

Figure 1. Graph of Lightness (L) *Gracilaria* sp seaweed cake with substitution of rice bran flour

In redness characteristics, the A treatment obtained a redness value of (1,65 ± 0,03[b]), B treatment obtained a redness value of (0,60 ± 0,04[a]), C treatment obtained redness value of (1,34 ± 0,20[b]) and D treatment obtained redness value of (1,35 ± 0,01[b]). Graph of redness value can be seen in Figure 2.

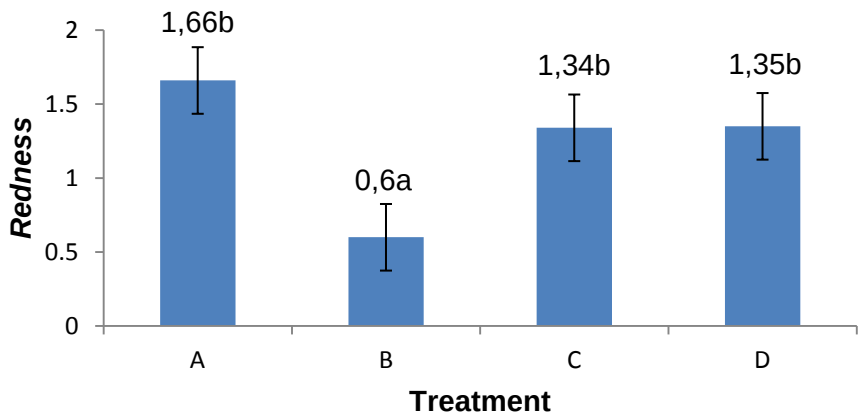

Figure 2. Graph of redness (a) *Gracilaria* sp seaweed cake with substitution of rice bran flour

In yellowness characteristics, A treatment obtained yellowness value of (35,30 ± 0,06[c]), B treatment obtained yellowness value of (35,80 ± 0,65[c]), C treatment obtained yellowness value of (33,00 ± 0,17[b]) and D treatment obtained yellowness value of (32,16 ± 0,10[a]). The graph of yellowness values can be seen in Figure 3.

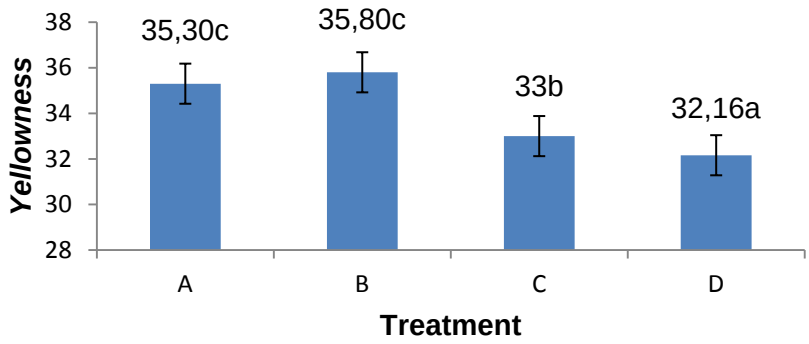

Figure 3. Yellowness graph (b*) Gracilaria* sp seaweed cake with substitution of rice bran flour

IV. DISCUSSION

Lightness (L*) is the brightness of color in food. L* values between 0 - 100 indicate colors from black to white. The value of lightness (L*) shows that the higher the substitution concentration of rice bran flour the lower the L value. The highest value of cake brightness of *Gracilaria* sp seaweed was found in treatment C (2.5%) which was 71.67 and the lowest value was found in treatment B (100%) which was equal to 57.71. The maillard reaction is one of the causes that affect the value of brightness in cake. maillard reaction is a non-enzymatic browning reaction associated with reducing sugar groups such as fructose, lactose, and maltose in a hot atmosphere causing the color of the food to become brownish. The maillard reaction to the cake occurs because of the high temperature heating process.[3]

Redness (a*) has a positive and negative range value. Positive values indicate red and negative indicates green. The highest a* value is obtained in treatment A (0%) of 1.65 and the lowest value is in treatment C (2.5%) which is equal to 0.60. The value of redness produced on cake can be affected due to the roasting process due to the reaction of the Maillard making. The values a * and L * values generated on cake are inversely proportional. The higher the L* value, the a* value will be lower.[4]

The higher the value of yellowness value (b) the more yellow the color will be. + b (positive) value from 0 to +70 for yellow and –b (negative) value from 0 to -70 for blue. The highest b value was obtained in treatment C (2.5%) of 35.80 and the lowest value was found in treatment B (100%) of 25.03. The yellowish color of cake is influenced by the addition of rice bran flour, the more addition of rice bran flour will reduce the yellowish color of the product and vice versa.[5]

V. CONCLUSION

Gracilaria sp seaweed cake with rice bran substitution can give a significant influence ($p < 0.05$) on the color produced, namely ligtness, redness, and yellowness. In addition, differences in the concentration of rice rice bran substitution also had an influence on the level of preference of panelists. The panelists' preferred concentration of rice bran flour was treatment C (2.5%).

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Prevalence of hypothyroidism in patients with gallstones: a hospital-based study

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Abstract- Gallstones are the most common biliary pathology. For decades, there has been a discussion, whether thyroid disorders could cause gallstone disease due to the low bile flow in hypothyroid subjects. The present study was conducted on 200 patients of gallstone diseases admitted in the Department of Surgery, Regional Institute of Medical Sciences Hospital, Imphal, after taking due permission from the Institutional Ethics Committee. Among the 43 hypothyroid patients with gallstones, 38 were found to be in subclinical state. Females showed predominance with 65.7%. Subclinical hypothyroid was more in the age group 46-55 years. Hypothyroidism in choledocholithiasis patients was more in subclinical state. When treating patients with gallstone disease, clinicians should be aware of the possible hypothyroid background and consider examining the thyroid function, atleast in elderly female patients.

Index Terms- gallstones, hypothyroidism, subclinical, Sphincter of Oddi.

I. Introduction

Among the most common gastrointestinal illnesses requiring hospitalization and frequently occur in young, otherwise healthy people, gallstone diseases have a prevalence of 11% to 36% in autopsy reports.[1] For decades, there has been a discussion whether thyroid disorders could cause gallstone disease. Particularly there are several explanations for a possible relation between hypothyroidism and gallstone disease.[2] The existence of gastrointestinal hypoactivity in hypothyroidism has been well known. Thyroxine has a direct effect on the control mechanisms of Sphincter of Oddi motility. Since the effect of thyroxine on the pre contracted SO is relaxing, the absence/insufficient concentration of thyroxine may result in increased tension of the SO in hypothyroidism.[3] A 90% of hypothyroid patients have elevated cholesterol levels, triglyceride levels, or both. In hypothyroidism, decreased LDL receptor activity leads to impaired removal of cholesterol from the serum and reduced regulation of HMG-CoA reductase expression leads to decreased cholesterol synthesis. Even though THs reduce the synthesis of bile salts in human hepatocytes[4], there is a decrease in biliary bile salt concentration in hypothyroidism.[5] This altered cholesterol and bile salts ratio may cause bile to supersaturate in cholesterol leading to the formation of gallstones.

Of late an increased occurence of hypothyroidism has been noted in patients with gallstone disease admitted in the Department of Surgery, RIMS. And in our present setup there have been no studies being done on the relationship between gallstone disease and thyroid disorders. Hence, this study is taken up to determine the prevalence of hypothyroidism in gallstone patients according to certain variables of interest, e.g. age, sex, in a Manipuri population.

II. MATERIALS AND METHODS

The study was conducted after taking due permission from the Institutional Ethics Committee. It was done in the Department of Surgery, Regional Institute of Medical Sciences, Imphal, Manipur. It was a cross-sectional study conducted on 200 patients admitted for gallstone diseases during the period of September 2014 to August 2016. Patients with any known thyroid disorders or unstable haemodynamic status, pregnant patients and those who were unwilling to participate were excluded from this study.

Detailed history and complete clinical examination of the patients were recorded. Routine investigations included complete haemogram, urine (routine and microscopy), KFT, LFT, HBsAg, HCV-Ab, R-Ab, blood sugar(random or fasting/PP), chest X-Ray, ECG, BT,CT. Patients diagnosed clinically for gallstones underwent transabdominal ultrasonography to evaluate most of the biliary system. Thyroid hormone levels TSH(0.465-4.68 mIU/L), T3(1.49-2.60 nmol/L), T4(71.2-141 nmol/L) were checked by Chemiluminescence method on Vitros ECIQ instrument, using morning fasting blood samples in the Biochemistry Department, RIMS, Imphal. Results were tabulated, analyzed and subjected to statistical analysis using SPSS 16.0 software for windows. Chi-square test was used to find the significance between the proportions. A $p<0.05$ was considered as statistically significant.

III. RESULTS

As shown in table 1, hypothyroidism was found in 43 (21.5%) patients while hyperthyroidism was found only in 9 (4.5%) patients.

Table 1: Distribution of gallstone patients by thyroid function test.

Thyroid function test	Frequency	Percentage(%)
Euthyroid	148	74
Hypothyroid	43	21.5
Hyperthyroid	9	4.5
Total	200	100

Maximum number of patients with hypothyroidism were in the age group of 46-55 years comprising of 17(39.5%). The minimum age was 21 years.

Among the 126 female patients, 29(23.1%) had hypothyroidism. Only 6(4.7%) had hyperthyroidism. While for male patients, 14(18.9%) had hypothyroidism and 3 (3.9%) had hyperthyroidism, as shown in table 2.

Table 2: Distribution of different thyroid status by sex.

Sex	Thyroid status		
	Hypothyroid	Hyperthyroid	Euthyroid
Female	29 (23.1%)	6 (4.7%)	91 (72.2%)
Male	14 (18.9%)	3 (3.9%)	57 (77.2%)
Total	43	9	148

Majority of the hypothyroid patients were diagnosed to have subclinical hypothyroidism with 38 patients out of total 43 cases. Out of 38 subclinical hypothyroid, 25(65.7%) were present in females and 13(34.3%) were present in males, as shown in table 3.

According to age distribution, 46-55 years group had maximum number of subclinical hypothyroid with 36.8%, as shown in table 4.

Among the seven choledocholithiasis patients with hypothyroidism, five were subclinical with 71.4% of the cases.

Table 3: Distribution of hypothyroidism in gallstone patients by sex.

Sex	Subclinical	Clinical
Female	25(65.7%)	4(80%)
Male	13(34.3%)	1(20%)
Total	38	5

Table 4: Distribution of hypothyroidism in gallstone patients by age.

Age (years)	Subclinical	Clinical
<25	3(0.08%)	0
26-35	4(10.4%)	0
36-45	11(28.9%)	1(20%)
46-55	14(36.8%)	3(60%)
56-65	2(0.05%)	1(20%)
>65	3(0.08%)	0
Total	38	5

IV. DISCUSSION

Gallstone disease is a worldwide disease and it remains to be one of the most common health problems leading to surgical intervention.[6] During the last two decades, the etiologies of gallstones have been evaluated more seriously. In addition to classic risk factors such as age, gender, obesity and genetics, the associations between gallstones and delayed emptying of the biliary tract in hypothyroidism have been shown. This is related to the lack of the pro-relaxing effect of the thyroid hormone on Sphincter of Oddi contractility.[7]

Defect in motor activity of the gallbladder are thought to play a role in cholesterol nucleation and gallstone formation. Gallbladder filling is facilitated by tonic contraction of Sphincter of Oddi, which create a pressure gradient between the bie ducts and the gallbladder. In response to a meal, the gallbladder empties by a coordinated motor response of gallbladder contraction with sphincter of Oddi relaxation. Hormonal and neural pathways are involved in the coordination of the gallbladder with the sphincter of Oddi.[1]

In a study by Singh RR et al[8], percentage of females with gallstones diagnosed hypothyroid, euthyroid and hyperthyroid was 24.4%, 65.85% and 1% respectively. Similarly, in the present study, percentage of females diagnosed as hypothyroid, euthyroid and hyperthyroid were 23.1%, 72.2% and 4.7% respectively.

In the study by Ahmad MM et al[2], there was a female gender predisposition with 87% of patients being females in the choledocholithiasis with hypothyroidism group. Further, on evaluation it was found that around 17% of females with choledocholithiasis had subclinical hypothyroidism. There was a prevalence of 16% of hypothyroidism in choledocholithiasis group as compared to 8% in the cholelithiasis. But in the present study, prevalence of hypothyroidism in patients with choledocholithiasis was 31.8%.

A study by Laukkarinen J et al[9] has shown subclinical hypothyroidism to be common problem among patients with CBD stones. They concluded that hypothyroidism played a role in the formation of CBD stones secondary to its effects on SO relaxation; which in turn might be influence on emptying of the biliary system. This statement is well supported in the present study where 71.4% of the choledocholithiasis patients with hypothyroidism were subclinical.

Wang Y et al[10] noted that the majority of the patients who were diagnosed as having choledocholithiasis with hypothyroidism were having subclinical hypothyroidism with 75% of the patients and only 25% having clinical hypothyroidism. The prevalence of subclinical hypothyroidism in women older than 60 years of age was 11.4% in CBD-stone patients compared with 1.8% in control patients.

Serum TSH is a hallmark of thyroid dysfunction. The subclinical form of hypothyroidism is characterized by increased serum TSH levels along with normal T4 levels and a lack of clinical symptoms. The mean TSH levels among the case group were higher than the control group. Although subclinical

hypothyroidism was more common in patients with CBD stones, the difference was not significant. There were more females with subclinical hypothyroidism in both groups in the study by Ajdarkosh H et al[11]. The present study also showed higher percentage of 65.7% in females with subclinical hypothyroidism.

V. CONCLUSION

While treating patients with gallstone disease, clinicians should be aware of the possible hypothyroid background and consider examining the thyroid function, atleast in elderly female patients in which the prevalence of subclinical hypothyroidism is the highest.

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Rural backwardness and child labour in Assam

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Abstract- Assam is the most important part of North East India with huge amount of natural resources such as forests resources, water resources & mineral resources like petroleum, natural gas, coal, limestone etc. Despite these resources, the region is still facing serious problems of unemployment and poverty. Most of the people of Assam are living in rural areas. But the people of rural areas are still backward. This paper tries to analyze the causes of backwardness of rural areas of Assam. The main reasons of backwardness are ineffective implementation of government policies, misutilisation of loan, unawareness and prevalence of child labour etc. This paper focuses mainly prevalence of child labour as a cause of rural backwardness in Assam.

Index Terms- child labour, rural backwardness.

I. Introduction

Assam is a state which provides doorway to the seven sisters. Its population is 31205576(according to 2011 census) of which 26807034 people live in rural areas and 4398542 people live in urban areas. The total no.s of villages are 26395 and the total no.s of towns are 226. Thus we notice that huge amount of people of Assam live in rural areas. Most of the village people are uneducated and they do not aware about their prospects of development using their own resources, skills and abilities. They are being unemployed because of their lack of knowledge and unawareness about their possibilities.

If we see our history through back, we will see most of the rural people are characterized by peasant farming though some farmers have larger amount of land. The family heads of the peasant farmers want their family members to earn income along with their children. Because of this, a huge portion of rural people send their children to the jobs market for earning money. This leads to the problem of child labour.

II. Child Labour Problems and Rural Backwardness

Children can be considered as a potential capital to the economy because it leads to the generation of new knowhow through research & development which leads the economy to a new direction. In case of removing rural backwardness, poverty and unemployment, removal of child labour can boost the economy. Rural people are very much unaware about the prosperity of their children to grow to a extent that can improve the economic status of their family. To supplement the economy to compete with world economy, at first we need to improve our individual economic status. If economic status of each and every people of the rural Assam is improved then whole Assam will grow to a extent that can compete with other developed regions. Due to lack of this unawareness, the poor people send their children to work instead of sending them to the school for their better life. Generally this happens more to girls in rural areas. Rural people do not show much intention to send their girls to higher & higher education. Because they think that this is an unnecessary task.

Therefore the negative impact of the psychological reasons leads to the deterioration of mental health of rural poor people. From the historical fact, it is proved that one-third of the children of the developing world are failing to complete the four years of education. According to UNICEF, in the world's poorest countries, around one in four are engaged in child labour. The most important is that, in these countries they are engaged in work that is potentially harmful to their health.

According to 1971 census, amount of child labour exist in India stood at 10753985 of which Assam beared 239349. And in 2011, amount of child labour exist in India stood at 12666377 of which Assam bearing 351416. From the data we have noticed that in 2011, India has been able to reduce its child labour to 43 lakh of which Assam bearing 99512.

Table: Distribution of Working children under age of 5-14 years

YEAR	1971	1981	1991	2001	2011
ASSAM	239349	No data have	327598	351416	99512
INDIA	10753985	13640870	11285349	12666377	4353247

Though Assam has been able to succeed in reducing child labour in 2011 in comparison to earlier periods, but there still have large amount of child labour. To reduce poverty from Assam, specially from rural areas we need to remove child labour totally.

Rural Assam bears a huge portion of unemployment. One of the basic reasons is child labour which has occurred due to unawareness among old generation about their children's prosperity of earning better income. They prefer current income rather than better future income. They want that their children must help them to earn for the family. Due to this when they get maturity, they are either unemployed or employed with a very little income sources. It leads them to enter into a vicious circle of poverty.

III. Other causes of Rural backwardness-

Another most common reason for the underdevelopment of rural Assam is Debt. Rural people of Assam seek loans from government for investment purpose. But once they got the amount from bank or any other sources, they instead of utilizing it for productive purpose they use it for consumption purposes. They spend the amount either to repay the earlier loan or use it for consumption purpose. Due to this, they are unable to repay their loans. It forces them to take another higher amount of loan or obliges them to sell their property to repay the loan.

Another reason which hinders the growth of rural Assam is the unawareness among youth about their future. They waste a huge portion of time of their childhood/adulthood period in irrelevant activities such as 'adda'. It does not provide any current benefit rather it deteriorates their future life.

Another factor responsible for backwardness of rural area of Assam is government defective policy, corruption and delay in implementation. Actual beneficiaries are deprived of getting the benefit of the schemes. In rural Assam a major portion of people do not have the ration card.

IV. Preventive Measures:

To compete with global regions we need to remove poverty and unemployment which can be removed by making awareness among rural people about their children's possibility of prosperity of higher income levels. Through this, we can supplement the rural economy of Assam to grow with urban one. In this case government should encourage NGO, or administrative officials to take initiative such as workshop to make awareness about their possibility of future prosperity.

Government should properly implement the child labour act,1986, so that no one can use them for income generation. And if any person is found to break the law, the government should punish him/her as he/her needed to provide the full cost of schools fees to the minimum education level of this child through sending the child to school. It will create fear among people who exploit the child earlier. For this, government bureau must be corruption free.

Government should provide a cell in each department which directly related to beneficiaries where beneficiaries can get the benefit of schemes without interference of intermediaries. But the benefit amount should be divided in terminals after scrutinizing the usefulness of first amount so that the beneficiaries are unable to use the amount for their consumption purpose. It will force them to invest the amount for the productivity purpose. It will create the employment generation, income generation and thus will increase the efficiency and productivity of the economy.

V. Conclusion:-

Assam is agri-based region. Most of the people engage in agricultural activities. They have enough resources and potentials. Most the young generation spend their time in unproductive activities. To increase the growth of the region, government should provide opportunities such as loans to the small scale handicraft industries, tax free for employment generation productive activities etc. Through this, government can remove the poverty and unemployment problems from the region and can help the rural Assam to compete with global region.

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The impact of innovation management on high growth entrepreneurship in some selected SME's in Nigeria.

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Abstract- The broad aim of this research is to analyse the impact of innovation management on high growth entrepreneurship in selected SME of Nigeria. As the growth of SMEs in Nigeria is intense, new entrepreneurs need innovative ideas for starting a new business. So an analysis of innovation management for identifying its importance on the high growth entrepreneurship in SME has been conducted with this research. To conduct this study, the researcher used different literatures related with this research topic to identify and analyse factors relating to this and the effectiveness of this. The researcher accessed 20 persons as sample with a well structured questionnaire to collect required information on this regards. After proper analysis and reports from the collected data analysed statistically, the researcher identified that there is a high requirement of innovation management in SME industry of Nigeria for the entrepreneurs to invest and to sustain.

Index Terms- SME, Innovation management, Innovation types, GDP.

I. Introduction

The power of SME has been noticed by the government authority in developing countries where this contributes much to the economy of a developing country. Like other developing countries, the government of Nigeria has been initiating different programs for enhancing its economy through industrialisation. In this context, the increased interest on SME has been contributing with a large portion i.e. 48.47% to national GDP (Are et al., 2019). And thus, the importance of SME has been increasing along with the initiating activities by young adults to start their careers in this sector. The young entrepreneurs are orienting toward establishing small and medium enterprises where they are now experiencing a highly competitive market (Are et al., 2019). So they should assess the importance of innovation management to make contribution to the high growth SME entrepreneurship of Nigeria and to create a position in this sector. As the economy of Nigeria is bow being dominated by SME, the investment in this sector is on the rise. The SMEs in agriculture, industry and services contribute to the economy where a large investment is incurred in service sector. For getting the opportunities of SME business and creating a position in this sector, the entrepreneurs should assess the importance of innovation and implement the innovation management while initiating any small and medium enterprises (Božić and Rajh, 2016). So a proper study should be developed to analyse the importance and the impact of innovation management in the high growth entrepreneurship in SME of Nigeria.

II. Aim of the Research

With the proper analysis and results, the researcher has aimed at identifying the importance of innovation management in entrepreneurship in SME. The broad aim of this research is to analyse the impact of innovation management on high growth entrepreneurship in selected SME of Nigeria.

III. Objectives of the Research

To achieve the aim of the research, some objectives have to be developed and attained by the researcher. In this context, some objectives of this research are mentioned below:

- To identify the importance of innovation in SME of Nigeria
- To find out types of innovation that can affect the entrepreneurship in SME of Nigeria
- To find out the impact of innovation management on high growth entrepreneurship in selected SME of Nigeria

IV. Research Questions

- What is the importance of innovation in SME of Nigeria?
- How do different types of innovation can affect the entrepreneurship in SME of Nigeria?
- What is the impact of innovation management on high growth entrepreneurship in selected SME of Nigeria?

V. Research Hypothesis

- **H_0;** There is no significant impact of innovation management on high growth entrepreneurship of SME in Nigeria.
- **H_1;** There is significant impact of innovation management on high growth entrepreneurship of SME in Nigeria

VI. Literature review

Some published literatures have been studied and analysed relating to this research topic for getting insight, understanding and way of result finding have been discussed below:

VII. Role of SME sector in Nigeria

Nigeria, a developing country, has been trying to get out from the economic bindings and constraints relating to its low growth economy. In this context, the government of Nigeria has provided much support and initiated different programs to encourage young adults for investing in different SMEs (Are et al., 2019). With the initiative the government has experienced overwhelming results in recent years where this sector contributes to the national economy of Nigeria with 48.47% approximately (Are et al., 2019). Entrepreneurs of this country have been investing most in service sector other sectors such as agriculture, industry etc. where this sector hold around 84.06% employment of this country (Abbakin, 2019). It is also reported that in near future about 37 million new jobs will be created through flourishing of SME (Abbakin, 2019). So the economy of Nigeria is largely dependent on SME sector and thus such enterprises have been mushrooming everywhere. In this context, an effective innovation program should be assessed and practiced by the entrepreneurs to manage their business properly and to attain desired success.

VIII. Importance of innovation in SME of Nigeria

As the economy of Nigeria is largely dependent on SME sector and thus such enterprises have been mushrooming everywhere. So a highly competitive industry is created with the advancement of such programs of encouraging people to become entrepreneurs in SME sector. According to Wonglimpiyarat, (2016) to sustain and get success in this highly competitive industry, the entrepreneurs should practice innovation and manage the innovation efficiently. They should analyse the different sectors of SME industry and implement innovation in one of the promising sector. For example, while investing in service sector, the entrepreneurs should apply innovation and manage this efficiently for attaining success and profit. Y, (2016) stated that analysing present condition of high growth SME industry of Nigeria, innovation management is the only solution to attain a position, create indentify and maximise profit to contribute the economy.

IX. Types of innovations affecting SME

From a deep analysis four types of innovation can be identified such as architectural innovation, radical innovation, disruptive innovation and incremental innovation which can be used for investment in SME of Nigeria. Odunayo, (2014) stated that by applying architectural innovation one has to identify new market with existing technology, by disruptive innovation existing market can be accessed with new technology. He also added that radical innovation suggest to find new features in new market with new technologies and incremental innovation suggest to find opportunities in existing market with existing technology. So by analysing these four types of innovation, the entrepreneurs should apply one type by assessing the opportunity of market and current condition of this industry.

X. Impact of innovation management on SME

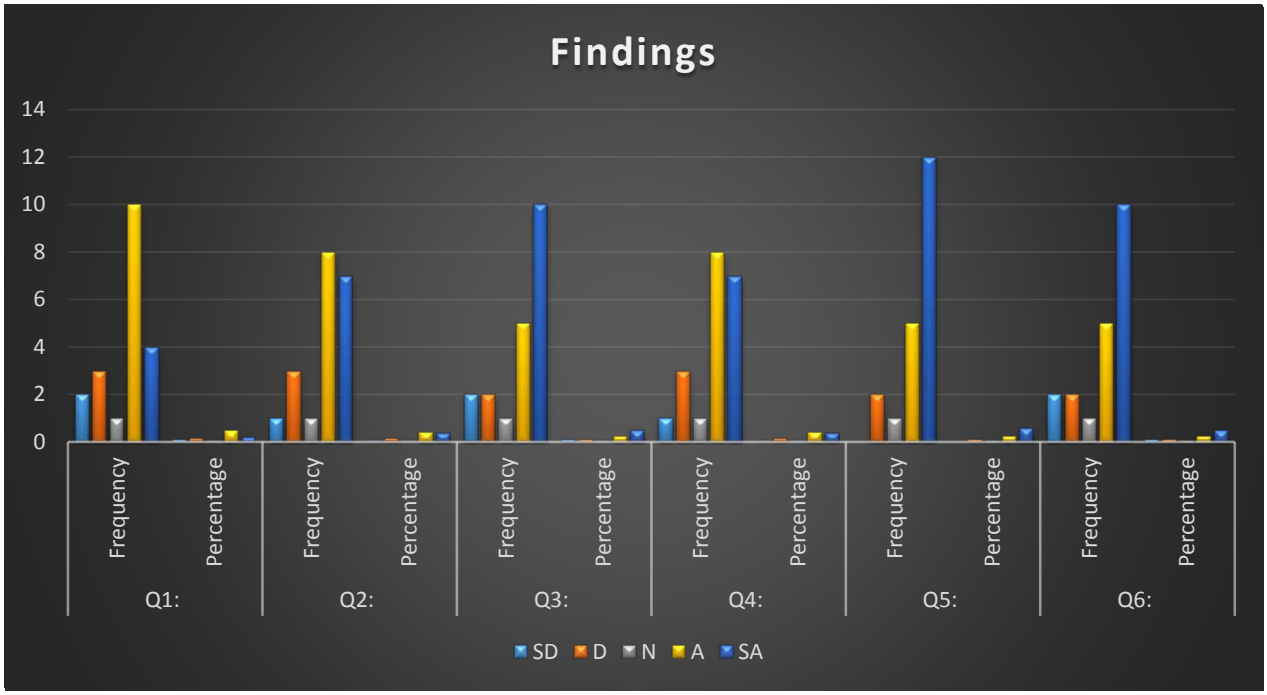
According to Dahlstrand and Stevenson, (2010) with the effective implementation of innovation in small and medium enterprises an entrepreneurs can attain success in achieving desired goals where they should ensure effective management of innovation. To create a position in market and to attract customers, entrepreneurs should invest in some innovative business idea. As the SME sector of Nigeria is large enough and contributes highly to economy, it is found highly competitive. In such condition, new entrepreneurs of this sector should come with innovation on services, products and business operation along with design which will ensure success. For achieving the required success from SME in Nigeria where there is found intense competition nowadays (Dahlstrand and Stevenson, 2010). So by proper management of innovation in establishing any small and medium enterprise, the entrepreneurs should use innovation program and manage the innovation effectively. Chen, Lin and Chu, (2012) stated that for the required success to attain in this high growth SMEs of Nigeria, the entrepreneurs should assess the importance of innovation and invest in this sector on different innovation ideas. In finding out the required results from this sector, the entrepreneurs need to think innovatively where they will be able to assessing the importance and impact of innovation management on SMEs of Nigeria.

XI. Methodology

For conducting this research article, the researcher selected quantitative research method where he used frequency and percentage analysis to analyse data. In addition, he also used tables and graphs to show the responses of the questionnaire. In the analysis of the collected data, the researcher used statistical package for the social sciences (SPSS) to develop the analysis and present analysis statistically. For collecting required data, the research selected 20 persons who are entrepreneurs in SME sector of Nigeria where they were selected using simple random sampling technique. To get responses and to collect quantitative data from them a questionnaire was developed using 5 point Likert scale. However, the research also used Pearson chi square for identifying the relationship between variables of this study.

XII. Findings and Results

Questions		SD	D	N	A	SA	Total
Q1: Do you agree that innovation management as a tool that affect SME?	Frequency	2	3	1	10	4	20
	Percentage	10%	15%	5%	50%	20%	100%
Q2: Do you agree that different types of innovations are required to use while investing in any SME?	Frequency	1	3	1	8	7	20
	Percentage	5%	15%	5%	40%	35%	100%
Q3: Do you agree on the fact that to get customers and to sustain in the high growth SME sectors innovation management is highly required?	Frequency	2	2	1	5	10	20
	Percentage	10%	10%	5%	25%	50%	100%
Q4: Do you agree that innovation management has much impact on entrepreneurs of SME in Nigeria?	Frequency	1	3	1	8	7	20
	Percentage	5%	15%	5%	40%	35%	100%
Q5: Do you agree that due to innovation management there is growing number of entrepreneurs enter into SME in Nigeria?	Frequency	0	2	1	5	12	20
	Percentage	0%	10%	5%	25%	60%	100%
Q6: Do you agree that innovation management positively impact on developing entrepreneurs in the SME industry in Nigeria?	Frequency	2	2	1	5	10	20
	Percentage	10%	10%	5%	25%	50%	100%



The findings show that innovation management is a tool that positively impact SME in Nigeria. The researcher found that different types of innovations are required to use while investing in any SME and to get customers and to sustain in the high growth SME sectors innovation management is highly required. The research also found that innovation management has much impact on entrepreneurs of SME in Nigeria and due to innovation management there is growing number of entrepreneurs enter into SME in Nigeria. In addition, this research figured out that innovation management positively impact on developing entrepreneurs in the SME industry in Nigeria.

XIII. Recommendations

Through proper analysis and discussion, the researcher has identified some recommendations to be developed for this study and they are:

- The entrepreneurs should be encouraged to think about innovation management.
- A culture of innovative thinking and implementation needs to be created.
- They should be educated with proper training about the innovation management process and types of innovation
- To ensure sustainability of the recent growth in SME sector, the government should encourage entrepreneurs to use innovations in business development.
- For developing proper innovative ideas and its implementation, entrepreneurs should be trained properly.
- All the possible sectors of SME should be brought under innovation management program for increasing investment.

XIV. Conclusion

The researcher has developed this study to analyse the importance and the impact of innovation management in the high growth entrepreneurship in SME industry of Nigeria. With proper analysis of different literatures and collected data through questionnaire, the researcher has found a positive relationship between innovation management and entrepreneurship in SME. The researcher can state the fact that in this high growth sector of Nigeria requires innovative ideas to be invested with for future growth. Though some effectiveness has been found through this research study, a further investigation and research is highly required because the researcher experience limitation in time, cost, resources etc.

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Customer's Intention to Use Green Banking Products: Evidence from Sri Lanka

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Abstract- In recent years, both academics and banking professionals are paying more attention towards the green banking concept due to its significant influence on environment management in banking context. In Sri Lanka, People's bank adapted to the green banking practices in 2015 with YES savings accounts as the first state sector bank which introduced the green banking products to their customers. Even though there are so many convenient facilities and benefits available with green banking in People's Bank since 2015, the problem is that there is a less customers' intention to use these green banking products. Thus this study aims to investigate factors affecting for the customers' intention to use green banking products in people's Bank. Data were collected by distributing a structured questionnaire among the sample of 371 customers in People's bank in Kandy branch. Customers' purchase intention has been considered as the dependent variable and green product awareness, green product trust, green product image, green benefits, green perceived value and green product security & privacy have been considered as independent variables. The results indicate that there are significant positive effects of green product awareness, green product benefits, green perceived value and green product privacy & security on the customers' intention while there are significant negative effect of green product image and green product trust on the customers' intention to use green banking products in People's bank.

Index Terms- *Environmental Sustainability, : Green Brand Dimensions, Green Products, Purchase Intention*

I. INTRODUCTION

he Green banking means "promoting environmentally friendly Tpractices and reducing carbon footprint from banking activities" (Schultz, 2010). Simply, green banking refers to the efforts taken by banks to encourage environmentally friendly investment and green banking essences are an active & smart way towards future sustainability. According to the Institute for Development and Research in banking Technology (2013), "Green banking is an umbrella term referring to practices and guidelines that make banks sustainable in economic, environmental, and social dimensions." The ultimate objective of practicing green banking is to protect the natural environment, to make proper use of organizational resources, to reduce paper work, to get the cost and efficiency of time (Chen & Chang, 2012).

If companies want to take on green initiatives, they have to apply the model of green banking into all aspects of banking activities (Ottman, 2008). Because the society is more ready to buy eco-friendly products with enough dependable information, corporation have to provide trustworthy information for their customer in order to develop their green brand and enhance green knowledge (Peattie, 1992). It is troublesome for banks to convince their customers to purchase their items without giving adequate data to their clients. Bank must show more information about the green execution of their items to get their client`s.

The idea of green banking was built up in 1980 at Triodos bank from Dutch which started environmental sustainability in the banking sector. The first green bank was commenced its operations in Mt. Dora, Florida, United States in 2009. After that the banks everywhere throughout the world, for example, banks in Bangladesh, India, and so on are persuaded to continue with green banking practices.

In Sri Lanka, banking sector is begun to rehearse the green banking concept in 2013. This valuable concept is firstly introduced by one of private sector bank in Sri Lanka, the commercial bank PLC (Shaumya, 2016). Among the 25 licensed commercial banks and 7 licensed specialization banks in Sri Lanka (People's Bank, 2015), only few domestic commercial banks are formally initiated green banking concept including private sector banks such as Commercial bank PLC, Hatton National Bank, Sampath Bank PLC, and Seylan Bank PLC limited.

People's Bank has recently announced the launch of Sri Lanka's first ecological-friendly savings product for youth under the name of "YES". They launched the green banking concept parallel to their 54th anniversary celebration (People's Bank, 2015).The "YES" account has made a large part of the youth to promote savings across Sri Lanka, now it is designed to offer paperless banking services. So, this account is expected to encourage the younger generation to preserve the environment with minimal use of paper, which can lead the route for a more sustainable future in the coming time. Under the concept of "YES with green", the account holders will no longer receive any correspondence through the paper, but will be encouraged to receive all their banking services electronically in it, including the bank e-statement, debit and credit card increasing the use of mobile banking and internet banking involves taking advantage of the banking services themselves and other means of paperless communication (Daily FT, 2018). People's Bank is hopeful to popularize the topic to change its banking services and reach the

electronic form, marking the bank's commitment towards operation as an environment-friendly organization

People's Bank has initiated a paradigm shift to its traditional banking model through the introduction of green banking concept. Currently the bank provides internet and mobile based banking facilities that reduce environmental impacts and all credit applications are screened for environmental impacts where such impact assessments are required by law. The Bank is also developing green products that will be delivered entirely on an electronic, paperless platform. The bank hopes to gradually transfer the entire banking process into a secure, electronic platform. (People's Bank, 2015)

As now there are numerous green banking products available in the People's Bank, with the Young Executive Savings (YES) account. Among them, green accounts with E-Statements, Green loans, green deposits, Green debit and credit cards, Mobile banking and Internet Banking facilities are available to the clients. People's Bank Internet Banking entrance will enhance with present day innovation & administration effectiveness. This is one of the real saving money directs in future. According to the literature reviews, most of the past research articles highlighted that there is a less customer awareness and purchase on Green Banking product and they recommended that there is an urgent need of identify the factors affecting for customers' intention to use green products.

Although few research works have been done on green banking dimension and no studies have looked at all these together and no instrument has been developed to measure green banking in Sri Lanka (Shaumya, 2016). There are few empirical studies embraced in Sri Lankan setting in regard to green banking products and clients' intention. With a specific end goal to satisfy this hole, this investigation will be led theoretically and empirically in People's Bank Sri Lanka. Hence the the main objective of this research is to examine green brand dimensions & customer intention to use green product.

11 LITRATURE REVIEW

"Green banking defined as promoting environmentally friendly practices and reducing carbon footprint from banking activities" (Schultz, 2010). Institute for Development & Research in Banking & Technology (2013) states that "green banking is an umbrella term referring to practices & guidelines that make banks sustainable in economic, environment & social dimensions". Simply the ultimate objective of green banking concept is efficiently carry out banking activities through the use of new technology and infrastructure facilities with the minimal impact on the environment. "Green banking is a part of green initiative

taken by stakeholders to save environment" (Ritu, 2014). In order to protect environment while providing standard services to its customers, banks must aware about the all type of implications on environment, before financing any kind of project. According to (Shakil, Azam, & Raju, 2014), green banking means eco-friendly

overall reduction of external carbon emission and internal carbon footprint. Banks can reduce their carbon footprints by adopting the measures such as paperless banking, energy consciousness, using mass transportation, green building, go online, save paper, use of solar and wind energy (Chaurasia, 2014). According to (IBA, 2014), green bank is like a normal bank, which considers all the social and environmental/ecological factors with an aim to protect the environment and conserve natural resources. It is also known as ethical bank or sustainable bank. taken by stakeholders to save environment" (Ritu, 2014). In order to protect environment while providing standard services to its customers, banks must aware about the all type of implications on environment, before financing any kind of project.

According to (Shakil, Azam, & Raju, 2014), green banking means eco-friendly or environment friendly banking to stop environmental degradation to make this planet more habitable & it helps to overall reduction of external carbon emission and internal carbon footprint. Banks can reduce their carbon footprints by adopting the measures such as paperless banking, energy consciousness, using mass transportation, green building, go online, save paper, use of solar and wind energy (Chaurasia, 2014). According to (IBA, 2014), green bank is like a normal bank, which considers all the social and environmental/ecological factors with an aim to protect the environment and conserve natural resources. It is also known as ethical bank or sustainable bank.

According to (Malu, Agrawal, & Jajoo, 2014), banks can play an important role in reducing the carbon footprint in the society. In the past, reducing poverty, inequality and unemployment in the society was defined as economic development. But the concept of economic development had changed to sustainable development which means development that meets the needs of the present without compromising the ability of future generation to meet their own needs. Sustainability of banks can take two forms, in firstly banks can change their routine operations through recycling programs, paperless banking, using energy efficient resources, and support for community events for reducing population and so on and in secondly, they can adopt lending and investment strategies to promote environmentally responsible projects and can also develop green products to ensure the sustainability in their core business.

Green Product awareness

Green product awareness is defined as "The ability for a buyer to recognize and to recall that a brand is environmental friendly" (Tseng & Hung, 2013). Increasing awareness amongst customers on environmental threats caused by electronic products has pushed companies to incorporate eco-friendly attributes in their products to fulfill consumers green expectations (Ng, 2013). (Ottaman, 2008) Indicated that there is a strong positive effect & correlation of green awareness & brand preference. (Chen Y. , 2012) Stated that awareness about products create positive perception about the product & decrease the perceived risk of green products. Therefore, companies that offer environmentally sustainable products enhance green perceived value of their brands. Bankers need to focus on environmental issues & ensure that only financing for environmental-friendly projects. Institutions and industries which are financed by the banks must have waste recycling facilities and proper waste management and that should be systematically implemented. Also, those industries should not release any kind of chemicals that could harm the environment. To make this process successfully, it is necessary

to improve the awareness of customers. Seminars and meetings can be organized for this purpose. They can also protect the environment by implementing tree plantation and cleanliness activities in urban area. It will help to maintain and improve our way of living as well as environmental sustainability (Rahman & Perves, 2016).

Green Product Trust

"Green trust is a willingness to depend on a product or service based on the belief or expectation resulting from its credibility, benevolence & ability about environmental performance" (Chen Y. S., 2010). Hard and Saunders stated that "Trust is a level of the confidence that another party would behave as expected". (Ganesan, 1994), posited that "Trust is an extent of the willingness to depend on another partner base on the expectation resulting from the partner's ability reliability & benevolence". (Lee, Park, & Han, 2011) Stated that customer trust is a fundamental determinant of long-term consumer behavior. Hence, customers' purchase intentions are affected by trust (Harris & Goode, 2010). If buyers have had a trust experience with seller, they would possess a higher level of purchase intentions (Van der Heijden, Verhagen, & Creemers, 2003). Most of the previous researches have showed that, consumer trust would positively influence consumer purchase intentions (Schlosser, White, & Lloyd, 2006). (Lee, Park, & Han, 2011) Indicated that consumer trust positively affects customers purchase intentions.

Green Product Image

Green brand image is defined as "as a whole range of impressions, conceptions and apprehensions towards a brand in the customers' memory which is correlated to the sustainability and eco-friendly concerns" (Chen Y. S., 2009). The green brand image is a subset of the overall brand image. It is plausible that distribute environmentally friendly products, the current quality perception in the consumer mind can positively influence the growth of brand image. (Cretu, 2007) Stated the brand image as the mental views of the consumer, which refers to a specific brand that is related to the products produced by a company. (Ko, Hwang, & Kim, 2012) indicated that, the results of green marketing significantly affected to the creating a positive brand image for green products and their study verified that consumer intentions to use green banking products, generally identify in collection with product excellence and views of company social responsibility. It is understood that the green brand image has a positive effect on the choice of the brand. In other words, the reputation of the company is significantly affected by positive image of the brand and the reputation of the company increase the intention of customers to use green products. (Mourad & Ahmed, 2012). (Juwaheer & Pudaruth, 2012) Argued that the appropriate marketing strategy to

III METHODS AND METERIALS

Population of the study

According to (Sekaran & Bougie, 2009) Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate. Currently, Green banking products are only available with the YES savings accounts in the People's Bank. Therefore total "YES saving account holders" of the Kandy branch of People's Bank (Research site) will be taken as the population of the research.

Sample of the study

The sample population is a subset of the entire population, and inferential statistics is to generalize from the sample to the population (Cooper & Schindler, 2008). Among the population of total YES savings account holders, sample is calculated by using the Rao soft Sample Size Calculator (with the confidence level 95% and margin of error 5%). Researcher also used the Morgan table to calculate the sample (Krejcie & Morgan, 1970). According to those result, the 381 of YES savings account holders of the branch considered as the sample of this research.

Data Sources

In this research, researcher has used both primary and secondary data for gathered information regarding customers' intention to use green banking products. In this research, Primary data were collected from the questionnaire. A questionnaire is a set of printed or written questions with a choice of answers. All questions in the questionnaire were developed on the basis of objectives of the research project.

Operationalization of Variables

The present research is mainly a correlation type of study where it examined the relationship between one dependent variable with several independent variables at a time. The dependent variable of study is purchase intention of customers about green banking products. Green brand dimensions, which the help of related literature. Those are green product awareness, trust, image, benefit, security & privacy, perceived value. Thus this study undertakes six independent variables. Dependent variable will be measured mainly with two constructs while selected independent variable to reflect green brand dimensions (awareness, trust, image, benefit, security & privacy, perceived value) will be measured several constructs.

Purchase Intention: "The probability & willingness of a person to give green preference to products having eco-friendly features over the traditional products in their purchase considerations". (Ali & Ahmad, 2012)

Green Product Awareness: "The ability for a buyer to recognize and to recall that a brand is environmental friendly" (Tseng & Hung, 2013)

Green Product Image: "Whole range of impressions, conceptions and apprehensions towards a brand in the customers' memory which is correlated to the sustainability and eco-friendly concerns" (Chen Y. S., 2012)

Green Product Trust: "Willingness to depend on a product or service based on the belief or expectation resulting from its

credibility, benevolence & ability about environmental performance" (Chen Y. S., 2010)

Green Product Benefit: Usefulness or overall benefit is understood when a new service offers more value in terms of economic benefits, comfort and satisfaction compared to the present services (Rogers, 1983)

Green Perceived Value: "general evaluation of the net benefit of a service or product based on the judgment of a customer's" (Bolton & James, 1991)

Green Product Security & Privacy: "Privacy is the willingness of consumers to share information over the internet that allows purchases to be concluded. However, it is clearly that consumer concern with privacy of information is having an impact on the consumer Internet market and that for electronic commerce to reach its full potential, this concern still needs to be addressed" (Green, Yang, & Judge, 1998)

"Security is the Circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destructions, disclosure, modification of data, denial of service & fraud, waste and abuse" (Kalakota & Whinston, 1996)

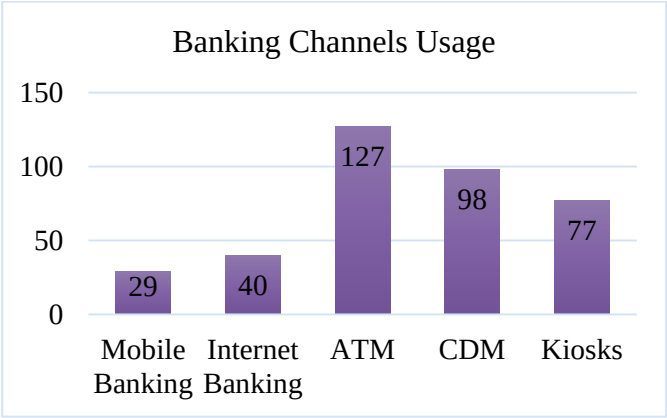
Method of Data Analysis

Structural Equation Modeling (SEM) techniques provide us with excellent tools for initial evaluation the differences of validity and reliability in measuring instruments among the wide selection of population groups (Raines-Eudy, 2000). As it implies, SEM is a powerful quantitative data analysis technique used for analyze theoretical relationships in structural models containing latent or/and unobserved variables and also it combines regression models and factor analysis (Meyers, Gamst, & Guarino, 2013) (Tabachnick & Fidell, 1996). Mainly two types of models can be analyzed using SEM: a measurement model and a structural model. The measurement model evaluates the range at which the approximate relations between the variables are reflected in the relationship between the observed variables. The structural model measures the extent of the relationship among latent constructs as well as the relationship among other measured variables.

There are two approaches to estimate the relationships in a structural equation model (SEM): Covariance-based SEM (CB-SEM), PLS-SEM (PLS path modeling) / VB-SEM (Henseler, Ringle, & Sarstedt, 2005). Results of this study were analyzed using PLS-SEM model based on the theoretical model developed using related literature. Partial Least Squares (PLS) modeling approach is aimed at estimating a specific set of hypothesized relationships on maximizing the explained variance of the dependent latent constructs (Hair, Ringle, & Sarstedt, 2011). PLS simulation of the model is carried out by calculating and evaluating various parameters which include item loading, reliability, and validity tests.

IV RESULTS AND DISCUSSION

Table 1: Graphical representation of banking channels



According to the Figure 01 Banking Channels usage, it is clearly evident that the majority of the account holders (34%) are doing transactions through the ATMs and 26% customers use CDM machines. Furthermore, 21% from the total sample use kiosks machines for bill payments. 8% and 11% of customers use mobile and internet banking for their money transfer activities.

Usage of Green Banking Features

Table 02: Usage of green banking features

	Frequency	Percent	Cumulative Percent
Green E-Statements	58	21.56	21.56
Green Loans	3	1.12	22.68
Green Credit & Debit cards	11	4.09	26.77
Green Mobile & Internet	92	34.20	60.97
Green bill payments	105	39.03	100.0
Total	269	100.0	

Source: Sample survey, 2018

According to the Table 2 usage of green banking features, out of the 269 Yes account holders, most of them (39%) are using green bill payment facility. 34% of customers are using green mobile & Internet while others use green E-statements, Green loans and Green Credit & Debit cards in 22%, 1% and 4% respectively.

Frequency of Green Banking Usage

Table 03: Frequency of green banking usage

	Frequency	Percent	Cumulative Percent
Always	49	18.21	18.21

Usually	192	71.38	89.59
Rarely	28	10.41	100.0
Total	269	100.0	

Source: Sample survey, 2018

The above table shows the frequency of green banking usage, Out of the 269 account holders, most of them (71%), usually use green banking services while 18% of the customers use green banking services for their daily transactions which means, they always use green banking services. 11% of them rarely use green banking

Satisfaction with Green Banking offers

Figure 4.10: Graphical representation of satisfaction with green banking offers

Reasons to use Green Banking

Table 4: Reasons to use Green Banking

	Frequency	Percent	Cumulative Percent
Save time & cost	67	24.91	24.91
24 hours availability	89	33.09	58.0
Online accessibility	71	26.39	84.39
Security & privacy	4	1.49	85.88
Convenience to use	23	8.55	94.43
Environment friendly	14	5.20	99.63
Curiosity	1	0.37	100.0
Total	269	100.0	

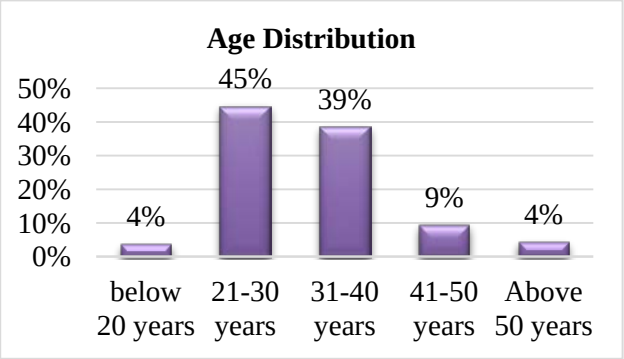
Source: Sample survey, 2018

Table 4 Implied that reasons to use green banking products. Out of the 269 account holders, 33% use green banking because it saves time & cost and 25% use it because of 24 hours availability. Because of online accessibility, 26% of them have been adopted to use those green products. Other reasons to use green banking are security and privacy, convenience to use and curiosity.

create a positive brand image is the initial step towards a company's success to attract more customers & create loyal customers for the company's products. Based on social cognitive theory, individuals act in a highly acceptable manner in society & tend to be choosing the products that are best known. It means that the brand's reputation & image to be a good reason for the buying activities, decisions and behaviors of the people.

Respondent's Age

Figure 5: Graphical representation of the respondents' Age Distribution



Source: Sample survey, 2018

Respondent's age was grouped into five age categories. The participants were asked to indicate their age category by keeping a next to the relevant option provided when analyzing the results, a dummy variables was adopted (below 20 years =1, 21-30 years=2, 31-40 years=3, and 41-50 years=4 and above 50 years=5). The age distribution of the population is shown in figure 05. As can be seen from the figure above, 45% of the sample population are between the ages of 21-30, which would suggest that most people who are engaged with green banking initiatives are in young age. It is clear that the willingness of the younger generation to involve in this is high (more than 50% of the total sample). 39% of the total sample represents from the 31-40 age category and 9% represents the 41-50 age category. 2% of the total sample were below 20 years. Above 50 age category include 1% of the total sample and it is the minimum responded age category. So these people can recognize as middle age people who willing to transaction with the bank and their ideas are mostly represent in this sample.

Occupation level of banking customers

Respondents were categories into seven groups and asked them to mark their occupation level in relevant option. In here, researcher has used dummy variables to analyze the results.

Table 6: Age distribution of the respondents

Occupation			
	Frequency	Percent	Cumulative Percent
GVT-EMPLOYEE	131	35.3	35.3
PVT EMPLOYEE	97	26.1	61.5
BUSINESSMAN	31	8.4	69.8
SELF-EMPLOYEE	14	3.8	73.6
STUDENT	81	21.8	95.4
HOUSE-WIFE	12	3.2	98.7
OTHER	5	1.3	100.0
Total	371	100.0	

Source: Sample survey, 2018

Figure 4.4 shows the graphical representation of the respondents who engaged with bank transactions while the table 4.1 shows the percentage of them. It is clearly evident that, majority of the account holders are employed in public sector and private sector. These are 35% and 26% respectively. The low percentage (1%) were taken by customers those have not business, private or public employment profession, were earn either normal or low usage of the bank service. The contribution of females higher than males. Considering the sample in occupation level, majority of the respondents were female who engaged with public sector. Student category consists with the 22% of the total sample.

Table 4.8: Validity and Reliability constructs of first order analysis

	Construct	Indicator reliability		Internal Consistency Reliability		Convergent Validity
		Loadings	t-statistic	Composite reliability	Cronbach's alpha	AVE
1.	***Green Product Awareness***					
	GPA1	0.926441	142.393729	0.980435	0.976715	0.877436
	GPA2	0.942640	163.422654			
	GPA3	0.932400	147.220722			
	GPA4	0.942754	180.565632			
	GPA5	0.940659	125.095715			
	GPA6	0.938339	161.399533			
	GPA7	0.933656	169.757163			
2.	***Green Product Trust***			0.970972	0.962552	0.904520
	GPT1	0.939989	178.050109			
	GPT2	0.944739	233.526687			
	GPT3	0.924394	136.635450			
	GPT4	0.900769	105.538966			
	GPT5	0.952894	224.870194			
3.	***Green Product Image***			0.966305	0.956346	0.851574
	GPI1	0.923894	80.767037			
	GPI2	0.920623	115.800991			
	GPI3	0.894984	80.126403			
	GPI4	0.930422	124.437910			
	GPI5	0.943432	151.037136			
4.	***Green Product Benefit***					
	GPB1	0.962796	235.082947	0.982710	0.978882	0.886183
	GPB2	0.947772	192.868306			
	GPB3	0.945355	196.682975			
	GPB4	0.948360	252.696412			
	GPB5	0.951570	193.556612			
	GBP6	0.950423	202.370548			
5.	***Green Perceived Value***			0.974133	0.966788	0.870001
	GPV1	0.943162	176.779188			
	GPV2	0.954598	192.500297			
	GPV3	0.929240	151.813546			
	GPV4	0.934577	114.424557			
	GPV5	0.936091	155.389202			
6.	***Green Product Security & Privacy***			0.958932	0.935687	0.882800
	GPSP1	0.955105	202.965359			
	GPSP2	0.952450	270.880854			
	GPSP3	0.916057	115.988143			
7.	***Purchase Intention***			0.968096	0.958757	0.858560

	PI1	0.933996	152.703112			
	PI2	0.943557	195.200895			
	PI3	0.923635	144.210494			
	PI4	0.928395	138.864873			
	PI5	0.902849	111.983519			

analysis. It shows a high association between the items and the questionnaire is consistently reliable.

Measurement Model Fitness (Outer Model)

Assessing reliability and validity of Reflective variables

In here, Indicator reliability (Outer loadings, T-statistics) and Internal consistency reliability (Composite reliability, Cronbach's alpha) was examined between indicators questionnaire items on reliability of constructs and, below validity of constructs Convergent validity (AVE) and Discriminant validity (Fornell-Lacker criterion) was considered. According to the above table it's clear that all generated outer loading values of the questionnaire items are above 0.7 which posits that altogether constructs under the analysis have indicator reliability and none of the items were omitted from the model) which means constructs are completely significance at On the other hand, t-stat values of the constructs preview higher values (all are above 2.58) which means constructs are completely significance at 99% significance level. Since, both the tests conclude that the model has a higher reliability in constructs. Concerning the Internal consistency reliability Cronbach's Alpha (CA) and Composite reliability (CR) was computed and was greater than 0.9 showing an excellent internal consistency of all indicators which reflect the independent variables, under the

Test of Validity

Validity primarily measures whether the constructs are adequately represented by the items in the defined model. Concerning validity, study undergo with two validity tests; Convergent validity and Discriminant validity. Convergent validity refers to the acquaintance with which a measure relates to (or converges on) the construct. To calculate convergent validity, each indicator's Average Variance Extracted (AVE) is evaluated. Therefore, accordance with the table 6.1 AVE measures of the indicators denote values greater than 0.7 that they all are above the recommended value of 0.5 where the first order analysis postulate that there is a convergent validity in the model. When it comes to the second test of validity which is Discriminant validity; which refers the extent to which a measure does not measure other constructs a different procedure has to be follow. To test this requirement (Fornell & Larker, 1981) has suggests the square root of AVE in each latent variable can be used in order to establish discriminant validity. To do that, a table which contains manually calculated square roots of AVE can be used as follows.

Table 4.9: Fornell-Larcker criterion analysis for checking Discriminant validity

	GPA	GPB	GPI	GPSP	GPT	GPV	PI
GPA	**0.936716**						
GPB	0.977031	**0.951063**					
GPI	0.953798	0.958504	**0.922808**				
GPSP	0.936394	0.941075	0.940834	**0.941373**			
GPT	0.978869	0.971942	0.958825	0.935504	**0.932738**		
GPV	0.969810	0.980139	0.956954	0.953941	0.961441	**0.939574**	
PI	0.957959	0.970083	0.942579	0.957139	0.946238	0.967729	**0.926585**

Source: Sample survey, 2018

In summary when it comes to the overall assessment of the measurement model, the validity and reliability of the measurement model were evaluated using the internal consistency reliability, indicator reliability, convergent validity and the discriminant validity. As in the methodology section, a measurement model has satisfactory internal consistency reliability when the CR or CA's of each construct exceeds the threshold value of 0.7. The results thus indicate that the items used have satisfactory internal consistency reliability. Next, the indicator reliability of the measurement model is measured by looking at the item loadings. From the validity guidelines, it is said to have satisfactory indicator reliability when each item's loading is at least 0.7, and this is significant at least at the level of 0.05. Based on the PLS-SEM analysis, all items have exhibited loadings exceeding 0.7 respectively. Thus, it can be said that all the items have exceeded 0.7 in this study demonstrated satisfactory indicator reliability. The measurement model's convergent validity was assessed by the value of the AVE which

have exceeded the recommended threshold value of 0.5. In this study, the discriminant validity is assessed by using the (Fornell & Larker, 1981) criterion. Based on the discriminant validity, the bolded elements represent the square roots of the AVE and the non-bolded values represent the inter-correlation values between the constructs.

4.7 Structural Model Fitness (Inner Model)

The second phase of the model testing, tested the theorized causation of the structural model, which was in the direction of the key constructs. Structural model primarily assesses hypothesized causal relationship between exogenous (independent) and endogenous (dependent) latent variables. This assessment will be done based on the five step guidelines which was suggested by (Hair, Ringle, & Sarstedt, 2011) in order to examine the inner model of a study using on PLS-SEM as below. Besides the measure proposed by Hair et al. (2014) study will evaluate the chi-square value to measure the goodness of fit the model in addition to R^2 measurement.

4.7.1 Assessment of Collinearity

Multicollinearity is a high degree of correlation (linear dependency) among several independent variables. It commonly occurs when a large number of independent variables are incorporated in a model. It is because some of them may measure the same concepts or phenomena. This can be detected by examining tolerance and the Variance Inflation Factor (VIF) that they are the two-major collinearity diagnostic factors that can help to identify multicollinearity in a model. As recommended if the tolerance values of the model > 0.2 have no collinearity problems. However, there is no formal VIF value for determining the existence of multicollinearity in a model. Generally, values of VIF that exceed 10 are often regarded as representing higher multicollinearity, over 5 regarded with moderate effect and over 3 regarded with lower collinearity effects.

Table 4.10: VIF values of the model

Coefficients			
Model		Collinearity Statistics	
		Tolerance	VIF
1	GPA	0.028	35.149
	GPB	0.025	39.892
	GPI	0.059	16.892
	GPSP	0.080	12.509
	GPT	0.033	30.554
	GPV	0.029	34.759
a. Dependent Variable: PI			

Source: Sample survey, 2018

In accordance to the above table which denotes VIF measures of the model. When concerning the relationships among independent variables and dependent variable. It shows that Green product Awareness (GPA), Green Product Benefit (GPB), Green Product Image (GPI), Green Product Trust (GPT), Green Product Security & Privacy (GPSP) and Green Perceived Value (GPV) represents higher collinearity effects. In here, All VIF values are higher than 10 & tolerance values are lower than 0.2, so it indicates there is muli-collinearity issue in the model. In other words,

when we consider the relationships between dependent (Purchase Intention) and independent variables. All independent variables represents a higher multi-collinearity effects with PI as well.

4.7.2 Assess the significance and relevance of the structural model relationships

In the second step of assessing the inner model, hypothesis suggested by the study was evaluated. Therefore, as discussed under chapter three hypothesis were listed down in order to in the table 6.5 with their path coefficients and t-statistics to clearly identify their significance of variables in the model as well the relationship between depend and independent variables.

Table 4.11: Path coefficients and significance among constructs

Hypothesis	Relationship	T statistics	Co-efficient	Results
H1	GPA>PI	2.714798**	0.176	Supported
H2	GPT>PI	2.881504**	-0.179	supported
H3	GPI>PI	0.543211	-0.023	Not-Supported
H4	GPB>PI	7.875054**	0.521	Supported
H5	GPV>PI	2.988954**	0.134	Supported
H6	GPSP>PI	8.705094**	0.364	Supported

** Significance at 95% level
Source: Sample survey, 2018

This segment of this chapter addresses whether or not the data gathered and analyzed earlier in this chapter serves to prove or disprove the hypotheses as initially set out in chapter three. They are discussed briefly below.

H1: The level of green brand awareness is associated positively with purchase intention of green banking products

According to the above table it is evident that there is positive relationship between green product awareness and the purchase intention of green products recording a coefficient value of +0.176. Purchase intention completely depend on the green product awareness where this statement is proved by the level of significance between these variables that the t-stat value is accepted at 95% significance level. Therefore this hypothesis is accepted showing an increase of the level of awareness by one unit will increase the purchase intention of customers by 0.176.

When comparing with the findings of past researches related to the green banking, in generally there is a significant positive relationship between the green product awareness and the purchase intention. It can be proved by the findings of (Mourad & Ahmed, 2012), (Chen & Chang, 2012) indicate that awareness about products, especially green products, create positive perception about the products.

So this study proved that green product awareness positively effect on purchase intention. That means, the researcher has found that if there is an awareness among the customers on green banking, they accept green banking products because they want to take effort to move from traditional banking to green banking by adopting newest technology.

H2: The level of green product trust is associated positively with purchase intention of green banking products

This study is evident that relationship between green product trust and purchase intention to use green products is negative. However, this finding is very differ from (Lee, Park, & Han, 2011), (Harris & Goode, 2010)and (Schlosser, White, & Lloyd, 2006). In their researches, they found that green product trust is a determinant of purchase intention of customers and consumer behavior and trust is the major determinant of buyer seller relationship. This could be due to the lack of product trust on customers' mind especially technical errors dissatisfaction about bank employees. Therefore, bank should be implement strategies to create the trust about their brands on consumers' mind.

H3: The level of green product image is associated positively with purchase intention of green banking products

According to our study it is evident that there is negative relationship between green product image and the purchase intention of green products recording a coefficient value of -0.023. Purchase intention is not completely depend on the green product image where the level of significance between these variables that the t-stat value is not accepted at 95% significance level.

However, the finding of this research is differ from previous research. (Mourad & Ahmed, 2012); (Hartmann, 2011); (Juwaheer & Pudaruth, 2012) found that there is a significant positive relationship between green product image and purchase intention of customers. This could be due to the lack of clear brand image.

H4: The level of green product benefit is associated positively with purchase intention of green banking products

This study proved that green product benefits positively effect on customers' purchase intention with 0.521. (Bahl, 2012) is also identified that green banking reduces paperwork, creates awareness to business people, helps sanction of loans at comparatively less rates and maintains environmental standard of lending. Cost saving is one of the important benefits of green banking (Heim & Zenklusen, 2005). Green banking avoids as much paperwork as possible and relies on online/electronic transactions for processing so that we get green credit cards and green mortgages. Less paperwork means less cutting of trees (Singh & Singh, 2012).

(Deka, 2016) Concluded that green banking clearly has direct and positive impact on sustainability. Because doing these practices customers can save energy, fuel, paper, water, time as well as money. Significantly it results reducing the carbon footprint from their banking practices. Green banking practices are very convenient, easy and cost effective for the bank customers. It saves the customers trips to the bank. They need not to go to the bank for banking transaction; hence they can save time as well as money. It is a type of anytime-anywhere banking. Green banking practices are also beneficial to the banks because they cause less postage cost and also reduce the workload of the bank personnel.

So this study proved that green product benefit positively effect on purchase intention. That means, this hypothesis is accepted showing an increase of the level of green product benefits by one unit will increase the purchase intention of customers by 0.521.

H5: The level of green perceived value is associated positively with purchase intention of green banking products

This study proved that there is positive relationship between green perceived value and purchase intention to use green products recording +0.134. Therefore this hypothesis is accepted showing an increase of the level of awareness by one unit will increase the purchase intention of customers by 0.134.

According to the (Doszhanov & Ahmad, 2015) they explored that there is significant positive relationship between green perceived value and purchase intention to use green products. Green products have great value both for individuals and for environment. Therefore, there is a good opportunity for organizations highlight the value of their products to enhance customers' intention to use environmental friendly products. Findings of this research support the findings of (Cheah & Phau, 2011), (Chen & Chang, 2012), (Steenkamp, 2006) and (Koller, Floh, & Zauner, 2011) indicated that green perceived value for customers' make positive perception about green banking products.

H6: The level of green product security & privacy is associated positively with purchase intention of green banking products

According to the above table it is evident that there is positive relationship between green product security & privacy and purchase intention of green products recording a coefficient value of +0.364. Purchase intention completely depend on the green product security & privacy where this statement is proved by the level of significance between these variables that the t-stat value is accepted at 99% significance level. Therefore this

hypothesis is accepted showing an increase of the level of security & privacy by one unit will increase the purchase intention of customers by 0.364.

4.7.3 Assess the level of R^2 (Coefficient of determination)

Coefficient of determination or R square value explains to which extent a percentage variation of dependent variables is explained by independent variables. Simply, it tells us how well the regression model fits our data. This value generally varies between the scales of 0-100%.

Table 4.12: Measure of Goodness of fit

	R Square	Adjusted R Square
PI	0.96031	0.95966

Source: Sample survey, 2018

In this model both R square values of the dependent variable reported as 0.96031. Usually, higher the value of R^2 better the model fits with the observations. However, based on the results we can conclude that 96% variation of the purchase intention is been clearly explained by the independent variables of the study while remaining variations 4% of purchase intention goes unexplained in the model.

Sometimes the value of R^2 can be misleading when assessing the goodness-of-fit of a model where we can look for the value of adjusted R^2 at that time. The adjusted R-Squared compares the explanatory power of regression models that encompass different numbers of predictors. When the R^2 becomes meaningless in a model the value of the adjusted R^2 will be useful.

V CONCLUSION AND RECOMMENDATION

Findings

Objective of the study was to find the factors affecting for the customers' purchase intention to use green banking products. Therefore many factors of green banking dimensions were used to find the relationship on purchase intention. Research findings were summarized as follows;

- There is a significant positive effect of green product awareness on customers' purchase intention to use green banking products.
- There is a significant negative effect of green product trust on customers' purchase intention to use green banking products.
- There is a significant negative effect of green product image on customers' purchase intention to use green banking products.
- There is a significant positive effect of green product benefit on customers' purchase intention to use green banking products.
- There is a significant positive effect of green perceived value on customers' purchase intention to use green banking products.
- There is a significant positive effect of green product security & privacy on customers' purchase intention to use green banking products.

Conclusion

Data presentation and data analysis results were used to make the findings. The conclusion were derived based on the above findings.

The objective of this study were identify the factors affecting for the customers' purchase intention to use green banking products. All the factors were qualitative and data were analyzed by using factor analysis and structural equation model. Most of the customers were female and have good income level. As well as they have good awareness about green banking and they were doing savings as their main transaction. Majority of them were highly satisfied with green banking.

The results of the study indicate that green product awareness, perceived value, benefit, security & privacy are positively associated with the customers; purchase intention about green banking. However trust, image are associated with purchase intention in negatively.

The study has implications for both bank management and academicians. By adopting an appropriate methodology and ensuring reliability and validity, the study has a sound basis for both theoretical and managerial implications. Empirically, this study explores the existing green banking practices in people's bank, Sri Lanka. The conceptual framework developed through this study provides an effective tool to measure green banking purchase intention.

Recommendations

According to the research conclusions we can see that green product awareness, green product trust, image, benefit, security and privacy and green perceived value were significantly effect on the customers' intention to use green products in people's bank. Therefore following recommendations are vital to the increasing purchase intention of green products.

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Assess the significance and relevance of the structural model relationships

In the second step of assessing the inner model, hypothesis suggested by the study was evaluated. Therefore, as discussed under chapter three hypothesis were listed down in order to in the table 6.5 with their path coefficients and t-statistics to clearly identify their significance of variables in the model as well the relationship between depend and independent variables.

CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

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The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments.

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The Influence Of Using Snake And Ladders Game Media Against Learning Outcomes Of Fourth Grade Elementary School

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Abstract: The study aims to improve student learning outcomes through the use of snake and ladders game media. Research location is at Budi Luhur Elementary School, Banyuurip Lor I Surabaya. The research approach used is quantitative. The research conducted was Quasi Experimental with the design of Nonequivalent Control Group Design. The study population was all fourth grade students at Budi Luhur Surabaya Elementary School and the sample of this study was IVA class amounting to 32 children as experimental class and IVB class as the control class amounted to 27 children. Data collection techniques used tests in the form of pretest and posttest questions as many as 20 items. The data analysis technique used is the validity test, reliability test, normality test, homogeneity test, t-test test. The results showed that snakes and ladders games had an influence on student learning outcomes. This can be seen from the T-test test results indicating that Thitung amounted 5,728 > ttabel 2,023. So it can be concluded that the use of snake and ladders games to improve the learning outcomes of fourth grade SD Budi Luhur Surabaya.

Keywords: *Media, Snake and Ladders Game, Learning Outcomes*

INTRODUCTION

The task of educators and education personnel who are obliged to create an educational atmosphere that is meaningful, fun, creative, dynamic, and dialogic and has a professional commitment. Learning in schools has many subjects, one of which is social science subjects which often make it difficult for students to learn the material. Social science is integration or combination of subjects in history, geography, and economics, as well as other social science subjects (Sapriya, 2015, p. 06). In addition, according to Saidiharjo (1996, p. 4) that social science is the result of a combination of a number of subjects such as: geography, economics, history, sociology, anthropology and politics. Social science various disciplines of social science and humanities as well as human activities that are packaged scientifically in order to provide insight and deep understanding to students, especially at the elementary and secondary levels (Susanto, 2015, p. 137).Basically the essence of social scienceis a study of humans and their world (Hidayati, 2008, p. 1.19). The nature of social science in elementary schools provides knowledge and skills as a medium of training for students in forming character as citizens as early as possible. Social science learning in elementary schools is a subject that students follow aimed at knowing knowledge about humans and the social environment around them. Knowledge in social science is done in a special way, namely, by observing, experimenting, inferring, compiling theories, and so on. So that social science learning is carried out to foster a mindset, and communicate as one part of the activity. A teacher in a school must be able to find alternative media learning that allows students to be able to develop and have good learning outcomes in the classroom learning process. In addition, the use of learning media must be interesting and creative according to the needs and abilities of the students.

Based on the results of preliminary observations that the fourth grade students still look passive and the learning outcomes of their students are still low, and the learning process has not reached the maximum learning objectives. In addition, the teacher in the learning process in the class often uses conventional methods (lecture method), so the learning process runs in one direction. Learning is a communication of one student with other students in the environment can be realized from the personal side, as well as a theory (Sardiman, 2004, p. 22). If the learning process only runs in one direction that is more teacher-centered, then here students only listen, take notes, and exemplify the ways or steps applied by the teacher, and they only complete assignments given by the teacher, without any thought or action depth and further about the assignment. Learning outcomes are the results of an act of teaching and learning (Dimyati and Mudjiono, 2009, p. 03). With the low or decreasing learning outcomes, especially social studies subjects, fourth grade students at Budi Luhur Surabaya Elementary School, out of 20 students, some of whom were seen in their report cards scored low. As a result of the frequent lack of students able to memorize and understand social science learning material, and their problem solving skills are still low in doing assignments or answering questions, so getting social science learning outcomes are less satisfying. According to Semiawan (2008, p. 20) playing is an exciting activity, and requires skills according to experience.

Thus the efforts to carry out the learning process, so that students are more understanding, interested, and mastering social science materials appropriately, and can present the atmosphere of a learning process that is exciting, motivating, exciting, and intellectual, so the need to use creative learning media so that it can support the success of learning in social studies subjects well for students at the school. Media is any aid tool as a communication or channeling tool between teachers and students to achieve learning goals. According to Sudjana and Rivai (2013, p. 02) explain that the benefits of learning media include: learning will attract attention, learning materials will be more meaningful, teaching methods will vary, and students will do more learning activities. Whereas according to Daryanto (2013, p. 05) generally explains the benefits of media namely: clarifying the message so that it is not too verbalitis, overcoming the limitations of space, time, and sensory power, arousing passion for learning, and allowing children to learn independently.So in this study, researchers will use learning media with Elementary School game. This *snake and ladders* includes simple games, players can have more than one person to finish until the last box or finish, the game uses dice to determine which player steps and has a snake image to go down, the stairs to go up are connected boxes. According to Sidik (2008, p. 24) the *snake and ladders* is game where players occupying a snake box are required to go down and players occupying a ladder box will rise. In addition, the *snake and ladders* game media can also be designed according to your own creations as a medium of learning in the classroom, of course with changes to the rules of the game in accordance with the material delivered by the teacher. The use of *snake and ladders* game media that is creatively designed can help students in understanding the material that has been taught, such as answering questions, in the form of questions according to the learning objectives, namely increasing social studies learning outcomes in fourth grade students. The game can be used in learning to provide a pleasant experience for students, because there is interaction or communication between players, can provide a basis for the achievement of various skills to solve problems about learning delivered. *Snake and ladder* game is a game that is now much forgotten and abandoned most elementary school age students. Therefore, the researcher chose the *snake and ladders* game media to aim to improve students' social studies learning outcomes in the learning process in the fourth grade, and to introduce students to the *snake and ladders* game better. The researcher wants students to be able to memorize the Social science material correctly and create a pleasant, joyful atmosphere so that students are able to compete and cooperate with each other in understanding the social studies learning materials provided by a teacher. Therefore, from the problems presented above, the researcher will conduct a study entitled “the ınfluence of using *snake and ladders* game media against learning outcomes of fourth grade elementary school”.

METHOD

The research approach used is quantitative. Quantitative research is a way to get and solve problems faced and carried out systematically, and all data collected can be in the form of a series (Nasehudin, 2012, p. 68). The type of research used is experiment. The type of quantitative research that will be applied aims to measure the influence of independent variables namely *snakes ladders creations*game media and the dependent variable is social studies learning outcomes. The research design used was *quasi-experimental*. With the research conducted is *nonequivalent control group design*. The location of the research and data collection conducted in class IVA and IVB at Budi Luhur Elementary School Surabaya, which is located at Banyuurip Lor I, Sawahan District, Surabaya City. In the experimental group (IVA) learning was done using *snake and ladders* game media, while for the control group (IVB) using conventional learning methods. The time of study in April 2018 is in the even semester of the 2017/2018 academic year.

The sampling technique in this study is *purposive sampling*, which is the determining the sample by considering certain objectives. The study population consisted of 4 study groups in class IV, the selected sample were IVA class student as experimental class numbering 12 female and 20 male students, So the total 32 children, while IVB class as control class was 19 female and 8 male students, So the total 27 children. All students of IVA and IVB class at SD Budi Luhur Surabaya average age 11-12 years, with the majority of ethnic Javanese.

The instruments used were test sheets, namely pretest and posttest. The data collection that is to be obtained in this study is data on student learning outcomes in cognitive assessment. Before the treatment is carried out, students are given a pretest and after the treatment students are given a posttest question, as data collection. Data analysis techniques in this study include:
Test the validity of using the product moment correlation the following formula (in Arikunto 2010, p. 213):

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X^2)\}\{N\sum Y^2 - (\sum Y^2)\}}}$$

Reliability uses the Cronbach's Alpha the following formula (in Arikunto 2010, p. 231):

$$r_{11} = \left(\frac{k}{k-1}\right)\left(\frac{V_t - \sum pq}{V_t}\right)$$

The normality test uses the Chi-square the following formula (in Winarsunu, 2015, p. 81):

$$x^2 = \sum\left[\frac{(fo - fe)^2}{fe}\right]$$

The homogeneity test was carried out to find out whether the control class with conventional learning used the activity sheet of students and experimental classes by using media as a learning evaluation to have the same or not variance in both circumstances, with the following formula (in Sundayana, 2014, p. 144):

$$F = \frac{Varians\ besar}{Varians\ kecil} = \frac{(simpangan\ baku\ besar)^2}{(simpangan\ baku\ kecil)^2}$$

Next is the hypothesis test, in the form of a t-test and normalized gain. T-test is used to prove whether the hypothesis is accepted or rejected. Because the number of N1 and N2 is not the same, The t-test is carried out using the following formula (in Sugiyono, 2015, p. 273):

$$uji\ t-test = \frac{X_1 - X_2}{\sqrt{\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

RESULT

The validation test of the pretest and posttest questions was carried out before the study to the expert validator which aimed to determine the validity of the questions used during the study. Validation tests also use SPSS 21 for Windows. The following results obtained by the pretest questions amounted to 20 and the posttest questions amounted to 20. According to (Sundayana, 2014, p. 68) as for signs of a valid question in processing with SPSS 21 for windows indicated by a sign * or ** processing item validity. Before conducting research, researchers first test the validation of learning media and the validation of learning devices to expert lecturers and find that learning media and learning devices are appropriate for use in research. Furthermore, the researchers also tested the feasibility of the items which aimed to determine the validity and reliability of the items. Based on the calculation results of 20 items, it is said that all are valid after being tested. Instruments about the pretest and posttest students produce a correlation value of more than 0.3061, then it meets the requirements that $R_{count} > R_{table}$. So, all question items are declared valid and the next stage is the reliability test. Reliability testing shows instruments that can be trusted as data collection tools. For the results of testing the reliability of the instrument as follows:

Table 1. Result of Pretest Reliability

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
.823	.812	20

Source: secondary data proceed, 2017

Based on table 4.2 above, the magnitude of Cronbach's Alpha is 0.823. Where the value of R_{table} at the significance level of 5% is 0.3061. It shows that the pretest problem used is reliable because of $R_{count} > R_{table}$ which is 0.823 > 0.3061.

Table 2. Result of Posttest Reliability

Reliability Statistics		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**
.770	.772	20

Source: secondary data proceed, 2017

Based on table 4.4 above, the size of Cronbach's Alpha is 0.794. Where the value of R_{table} at the significance level of 5% is 0.3061. Shows that the posttest question used is reliable, because $R_{count} > R_{table}$ is 0.770 > 0.3061. So from that, it can be concluded that the instrument on learning outcomes is reliable, so that it is appropriate to be used for research.

1. Data on Student Learning Outcomes

In this study the pretest and posttest questions were given in IVB class as a control class and in the IVA class as an experimental class, namely the use of *snake and ladders* game media at Budi Luhur Surabaya Elementary School. Data on learning outcomes can be obtained from the pretest and posttest values in the control class and the experimental class. The results of the pretest and posttest values were conducted aimed at knowing the level of material understanding in students towards the learning process. Comparison of the average value of the results of the two classes is shown in the diagram below:

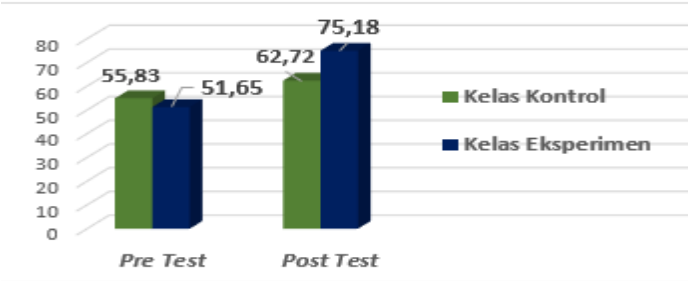

Diagram 1. Average Control Class and Experimental Class

From diagram 4.1, it can be seen that there is an increase in the value of student learning outcomes at the pretest and posttest, namely the control class and the experimental class. In the control class the average value of the pretest was 55.83 and the posttest value with an average value of 62.72, while the experimental class had an average pretest score of 51.65 and the posttest average value was 75.18.

2. Analysis of Test Data Results

Normality Test

In this study using the normality test using Chi-square. If the chi-kuadrat count is smaller than the chi-kuadrat table, then the data is normally distributed, but if the value of chi-kuadrat count is greater than the chi-kuadrat table, then the data is abnormally distributed.

Table 3. Pretest Control Class Normality Test

Interval	fo	fe	fo-fe	$(fo-fe)^2$	$(fo-fe)^2/fe$
40-45	4	2,5353	1,4647	2,14535	0,84619023
46-51	6	5,0706	0,9294	0,86378	0,170351509
52-57	5	14,3964	-9,3964	88,2923	6,132945247
58-63	6	11,2671	-5,2671	27,7423	2,462243382
64-69	4	3,3496	0,3496	0,12222	0,033481306
70-75	2	0,5987	0,5987	0,35844	0,255792257
Total	**27**				**9,901003931**

Source: secondary data proceed, 2017

Based on the results of calculations in table 4.4, then Chi-square can be obtained a significant value of the pretest results in the control class with 9,901 < 11,070 declared normal distribution.

Table 4. Pretest Normality Test Experiments

Interval	fo	fe	fo-fe	$(fo-fe)^2$	$(fo-fe)^2/fe$
36-41	5	3.4944	1.5056	2.26683136	0.648704029
42-47	7	5.4912	1.5088	2.27647744	0.414568298
48-53	7	15.7344	-8.7344	76.28974336	4.848595648
54-59	5	12.096	-7.096	50.353216	4.162798942
60-65	5	4.2464	0.7536	0.56791296	0.133739864
66-71	3	2.2688	0.7312	0.53465344	0.235654725
Total	**32**				**10.44406151**

Source: secondary data proceed, 2017

Based on the calculation results in table 4.5, then Chi-square can be obtained a significant value from the pretest results in the experimental class with a result of 10,444 < 11,070, stated to be normally distributed.

Homogeneity Test

The homogeneity test was carried out aimed to find out whether the control class in conventional learning used the student activity sheet and the experimental class that used media as an evaluation in learning had the same variance or not. The calculated data are pretest and posttest data, namely in the control class and experimental class. The homogeneity test calculation is as follows:

Homogeneity of pretest control class:

$$S = \sqrt{\frac{n\sum f.x^2 - (\sum f.x)^2}{n\,(n-1)}} = \sqrt{\frac{27(86352{,}75) - (1507{,}5)^2}{27\,(27-1)}} = \sqrt{84} = 9{,}1615$$

Homogeneity of pretest experimental class:

$$S = \sqrt{\frac{n\sum f.x^2 - (\sum f.x)^2}{n\,(n-1)}} = \sqrt{\frac{32(88134) - (1653)^2}{32\,(32-1)}} = \sqrt{88{,}58770} = 9{,}4121$$

$$F = \frac{(Varian\ bear)^2}{(Varians\ kecil)^2} = \frac{(9{,}4121)^2}{(9{,}1651)^2} = 1,\ 0546$$

From the results of the above calculations, the results obtained are that T_{count} is 1.0546 and T_{table} at the level of 5% = 0.05 T_{table} value (26.31), which is the result of $T_{count} < T_{table}$ with the results obtained that is equal to 1.0546 < 1.8573, so it can be concluded that the calculation of the data is declared homogeneous, that is, the hypothesis H_a is accepted and H_o is rejected.

Homogeneity of the posttest control class:

$$S = \sqrt{\frac{n\sum f.x^2 - (\sum f.x)^2}{n\,(n-1)}} = \sqrt{\frac{27(109302.75) - (1693{,}5)^2}{27\,(27-1)}} = 10{,}8887$$

Homogeneity of the posttest experimental class:

$$S = \sqrt{\frac{n\sum f.x^2 - (\sum f.x)^2}{n\,(n-1)}} = \sqrt{\frac{32(187362) - (2406)^2}{32\,(32-1)}} = 14{,}4365$$

$$F = \frac{(Varian\ besar)^2}{(Varians\ kecil)^2} = \frac{(14{,}4365)^2}{(10{,}8887)^2} = 1{,}7578$$

Based on the results of the above calculations, it can be obtained the results of T_{count} of 1.7578 and T_{table} at the level of 5% = 0.05 T_{table} value (26.31), that is with the results of $T_{count} < T_{table}$ with the results obtained that is equal to 1.7578 , so that it can be concluded that the calculation of data, declared homogeneous posttest control class and experimental class, hypothesis Ha is accepted and Ho is rejected.

***T-test* Test**

T-test is used to prove whether the hypothesis is accepted or rejected. The hypothesis in the t-test includes if $T_{count} < T_{table}$, then Ha is accepted and Ho is rejected, and if $T_{count} < T_{table}$, then Ho is accepted and Ha is rejected. In the t-test with the calculation of SPSS 21 assistance at the level of 5% as a significant level to obtain the results determine how much chance to make the risk of making a mistake in making the decision to reject the hypothesis correctly (Siregar, 2013, p. 41). The following are the results of the t-test test with the help of SPSS 21 as follows:

Table 5. T-test Test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Kelas	Eksperimen	10.864	.002	5.728	57	.000	16.280	2.842	10.588	21.972
	Kontrol			5.993	50.011	.000	16.280	2.717	10.824	21.737

Source: secondary data proceed, 2017

Based on the calculation of the SPSS 21 assisted t-test, if at a significant level below 0.05 it means there is influence. The t-test test conducted obtained a significant value of 0,000, it can be concluded that Ha is accepted and Ho is rejected, then there is the influence of the use of media *snake and ladders* game on student learning outcomes.

DISCUSSION

This study aims to determine whether there is influence of *snakes and ladders* game media on social studies learning outcomes of fourth grade students at Budi Luhur Surabaya Elementary School. The study was conducted at Budi Luhur Surabaya Elementary School by using two classes namely IVA class as the experimental class and IVB class as the control class. The study was conducted for 1 day from each of the two classes. This test is done twice namely the pretest and posttest. Learning outcomes are abilities that students have before and after the learning process. This is supported by the explanation of Dimyati and Mudjiono (2009, p. 3) which states that learning outcomes are the results of an action from the learning process. Student learning outcomes in this study focus on cognitive aspects obtained through test. This was stated by Arifin (2014, p. 226) a test is a measurement technique in which there are various questions and statements that must be done by respondents or students. Learning media can instill true and concrete, and realistic basic concepts (Asnawir and Usman, 2002, p. 14). Before conducting research, researchers conduct media and learning tools to expert validators. After obtaining approval and suggestions from expert validators, the researchers conducted an instrument trial. Furthermore, the validation test carried out was the validation of the pretest and posttest. Based on the calculation results that the learning outcomes test questions in the form of multiple choice questions consisting of 20 items obtained were declared valid, the test questions using SPSS 21 help. Then test the reliability of the instrument using the Cronbach's Alpha formula. Reliability test based on calculations with the help of SPSS 21 obtained results at the pretest of 0.834, R_{table} with a level of 0.05 with N = 20 which is 0.3061, then $R_{count} > R_{table}$ which is 0.823 > 0.3061, then declared reliable. The reliability test on the posttest question was 0.770, the Rtable value at a significant level of 0.05 with N = 20 was 0.3061, which showed that the posttest question used was reliable because of $R_{count} > R_{table}$ which was 0.770 > 0.3061.

Based on the analysis of the results of the research presented, the discussion of this chapter discusses the results of the research and focuses on the findings obtained by justifying the findings with the study of theory. Before treatment using *snake and ladders* game media, students were given a pretest with the aim of how far the students' knowledge of the material to be taught about ethnic and religious diversity in my country, then given treatment, and after the treatment was given a posttest sheet aimed at knowing student social studies. After conducting the research, then the data collection process was carried out by pretest and posttest in the control class and experimental class. The results obtained by the average value of the control class pretest were 55.83 and the posttest value was 62.72. In the experimental class the average value of the pretest was 51.65 and the posttest average value was 75.18. This shows that there is a difference in the increase in the average value of the two classes.

To find out the effect of using *snake and ladders* game media on students' learning outcomes, the pretest and posttest normality test was carried out in the control class and experimental class which aimed to find out the samples studied included normality distribution or not. Normality test using the chi-square formula. Based on the results obtained in the Chi-square table, a significant value was obtained on the results of the pretest control class with results of 9.901 < 11.070, stated to be normally distributed. Based on the calculation results in the Chi-square table, a significant value was obtained on the results of the experimental class pretest with the results of 10,444 < 11,070 declared normal distribution. Then the posttest results from the control class and the experimental class. Based on the results of calculations in the Chi-square table can be obtained a significant value on the results of the control class posttest with a result of 10.025 < 12.592, declared normality distribution. The calculation results in the Chi-square table can be obtained a significant value on the results of the control class posttest with a result of 9.815 < 15.507, stated to be normally distributed. From the data obtained from the results of the normality test that the pretest and posttest data from the control class and the experimental class, expressed normal distribution. From the homogeneity test of the two classes, the results of pretest data as big as and posttest results can be obtained, the results show that t_{count} is 1.7578 and T_{table} at the level of

5% = 0.05 T_{table} value (26.31), that is, $T_{count} < T_{table}$ with the results obtained are equal to 1.7578 < 1.8573, so it can be concluded that the calculation of the data is declared homogeneous.

Based on the results of this study shows that the use of *snake and ladders* game media in further material understanding may affect student learning outcomes. Other findings supporting this study were conducted by Nachiappan (2014) and research conducted by Golchai (2012) that the use of *snakes and ladders* game in delivering material to students, so as to show good results and Optimality. Another opinion that is corroborating and in line with this research is that proposed by Kunandar (2011, p. 62) states that learning outcomes are a certain ability in the affective, cognitive, psychomotor realms of students that have been achieved from the learning process. Supported also by previous research from Istuningsih, Baedhowi, and Sangka (2018) that improve student learning outcomes by using learning media, one of the effective ways in accordance the implementation of curriculum 2013 Implementing scientific approach to teaching and learning activities to achieve student-centered learning.

Based on the results of the calculations obtained in t-test T_{count} 5,728 > T_{table} 2,023, then Ho is rejected and Ha is accepted. In the 5% *t-test* as a significant level to obtain the results determine how much chance to make the risk of making a decision to reject the hypothesis correctly (Siregar, 2013, p. 41). Based on the calculation of the *SPSS 21* assisted t-test, if at a significant level below 0.05, it means there is influence. It can thus be concluded that there is significant difference between the learning outcomes of the experiment class and the control class. Supported by previous research from Kusumatuty, Baedhowi, and Murwaningsih (2018) that learning outcomes used lower conventional learning compared to learning outcomes using E-Book media. So, effective and creative learning media is suitable for improving the learning outcomes of elementary school students. So learning to use snakes and ladders game media is effective to improve student learning outcomes, this is evidenced by the existence of significant differences 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 concluded, among others: *snake and ladders* game media that deserves to be used to improve student learning outcomes in Elementary School. Based on the research results there is a significant value of 0.000 < 0.05. It is based on the results of t-test, where the value of T_{count} 5,728 > T_{table} 2,023, it can be concluded that Ha is accepted and Ho is rejected. It can be concluded that learning using the *snake and ladders* game media is effective to improve student learning outcomes, because there significant differences in learning outcomes between experimental classes and control classes. Then it can be concluded, that is the influence *snake and ladders* game media of learning outcomes of fourth grade between before treatment (pretest) and after treatment (posttest). Based on the results of data analysis and conclusions, it can be suggested a number of suggestions including in the learning process the use of instructional media is expected to be improved not only *snake and ladders* game media, but also other media to encourage students to learn and in this study still have many short comings. media design so that further researchers are expected to add more interesting media updates.

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Development of Quiz Card Based Media To Improve Understanding Reading Skills Of 5th Grade Students

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Abstract: This study aims to develop and test the feasibility, practicality, and effectiveness of learning media in the form of *quiz card*-based learning media to improve reading skills of understanding. The research model used is the Four-D research and development (R & D) model. The feasibility of learning media is based on the results of validation. The practicality of the media is based on the results of observations student and teacher activities, and media practicality questionnaires. The effectiveness of the media was tested by *nonequivalent control group design*. The results showed that *quiz card*-based learning media were feasible, practical, and effective. *Quiz card* based learning media has an influence on student learning outcomes. This can be seen from the results of the t-test showing that t_{count} which is 2.565 > than t_{table} 2.093. The use of *quiz card*-based learning media also received a very good response from students, which amounted to 90.5%. So it can be concluded that the *quiz card*-based learning media is feasible, practical, and effective to improve reading skills in the fifth grade students' understanding in primary school.

Keywords*: critical thinking, learning media, nonfiction text, quiz cards.*

INTRODUCTION

Reading comprehension skills are very important to be mastered by students because reading comprehension skills play a role in the activities and results of everyday student learning. According to Dalman (2013, p. 87), reading aims to understand the meaning of the contents of the reading in the text. In line with the opinion of Tarigan (2008, p. 21), understanding reading skills have the purpose of understanding the contents of the reading correctly and accordingly. In accordance with the 20013 curriculum, there is material on nonfiction texts in five class semester 2. According to Pranoto (2009, p. 5) Nonfiction is an essay or text that is not imaginary, a text that is a form of real experience based on the field. Through learning nonfiction texts, students will be required to understand the reading, conclude the reading text, find out the location or target stated in the text, and answer questions based on the text.

Based on observations at Tuban State Elementary School in general, the implementation of Indonesian language learning in relation to reading comprehension skills in texts still uses traditional methods. The teacher presents it with the lecture method and only uses textbooks as a source of learning. In addition, the teacher is also still having difficulty in determining the appropriate media to deliver material on understanding reading skills. The teacher only relies on the reading text in the book to deliver learning material, even though if only the reading text contained in the book is taught the atmosphere of learning becomes less interesting and seems boring because it is not interspersed with *games* or interesting images. This situation causes teacher-centered learning and the atmosphere of learning to be monotonous, unattractive, and cannot stimulate students to think critically (Ariani, 2010, p. 26). As a result, motivation and interest in student learning is reduced so that the learning outcomes obtained are less than the minimum completeness criteria. These conditions need to be considered by fifth grade teachers to create changes in learning activities in order to attract students' attention and can stimulate students to think critically so that the learning outcomes obtained increase.

Based on these problems, learning media are needed that can facilitate students in understanding the learning material delivered and stimulating students to think critically. As expressed by Gagne (in Sadiman et al., 2010, p. 6), media are various types of components in the student environment that can stimulate them to learn. Meanwhile, Briggs (in Sadiman et al., 2010, p. 6) suggests that media are all physical tools that can present messages and stimulate students to learn. Submission of students' reading comprehension skills should use media that is more interesting and fun for students. 5th grade students in elementary school like games that can hone strategies and brains like a quiz game. One of the appropriate media to implement is a *quiz card* based learning media. This media will make students think critically and answer questions pleasantly. Students can think critically and will better understand what they see compared to just listening to the explanation by the teacher. From this description, a *quiz card*-based learning media can be developed to improve reading comprehension skills of fifth grade students in elementary school. The use of *quiz card*-based learning media in learning is expected to provide a new atmosphere for students so that

learning is more interesting and fun. In addition, the *quiz card*-based learning media are also expected to be able to improve student learning outcomes.

This study aims to describe the feasibility of *quiz card*-based learning media to improve comprehension reading skills of fifth grade students in Tuban State Elementary School, describing the practicality of *quiz card*-based learning media to improve reading skills in fifth grade students' understanding at Tuban Elementary School, and describe the effectiveness of *quiz card*-based learning media to improve reading skills in the five grade students' understanding at Tuban Elementary School.

METHOD

The development model used in developing *quiz card*-based learning media is the R & D model Four-D which adapted from Thiagarajan (1974, p. 37). Based on the steps of the Four-D development model, this study reached up to four stage. Data collection instruments used in this study were interviews, documentation, observation sheets, questionnaires, and test results. The feasibility analysis of *quiz card*-based learning media is done with a validation sheet that uses a linkert scale. The practicality analysis of *quiz card*-based learning media uses the teacher and student response observation sheets, as well as the practicality *quiz card*-based media practicality questionnaire. Furthermore, the effectiveness analysis of *quiz card*-based learning media can be seen from student learning outcomes tests. Tests of learning outcomes through the processing stages as follows, (1) test the validity of the expert (lecturer) and tested on students using the *product moment* correlation formula, (2) the test of learning outcomes is tested reliability using the *spearman brown* formula, (3) test normality with Chi squared formula, (4) homogeneity test with variant formula, and (5) t-test test using *nonequivalent control group design*.

RESULT OF RESEARCH

The results of the feasibility test of *quiz card*-based learning media were obtained from the validation sheet and the media feasibility questionnaire filled in by students. Validated components are media *quiz cards*, learning devices, and research instruments. While the media feasibility questionnaire was given during individual trials and small group trials. The results of the validation sheet from the validator are as follows:

Table 1. Validation Result

Validation sheet	Percentage	Category
Quiz card media (media expert)	75,16%	Revision
Quiz card media (media expert)	88,78%	Worth using without revisions
Material/contents	90,41%	Worth using without revisions
Language	86,55%	Worth using with revisions
Pre-test	86,98%	Worth using without revisions
Post-test	88,78%	Worth using with revisions
Teacher and Student Activity Sheets	88,75%	Worth using without revisions
Teacher and Student Response Sheets	91,75%	Worth using without revisions

Source: secondary data proceed, 2019

From the results of the validation sheet, it was stated that the *quiz card* media, learning devices, and instruments were suitable for use in learning. While the results of the results of the questionnaire response to the *quiz card* media eligibility are as follows.

Table 2. Results of Feasibility Questionnaire Media

Trials	Number of Students	Scores Obtained	%	Interpretations
Trial Limited	10	88	79,77	Very good with

				revisions
Scale Trial Size	25	478	95,16	Very good

Source: secondary data proceed, 2019

The results of the student questionnaire responses state that the *quiz card*-based learning media are appropriate according to the percentage of trials limited and scale trial size. The practicality of *quiz card*-based learning media can be seen from the results of the learning implementation observation sheet, student activity observation sheet, and the practicality *quiz card*-based media practicality questionnaire filled by two grade fifth teachers of elementary school. The results of the percentage of learning implementation are as follows.

Table 3. Teacher Activity Observation

Observer		**Total**	**Percentage**	**Information**
O1	**O1**			
22	23	45	93,75	Very good

Source: secondary data proceed, 2019

Based on the data above, it can be concluded that the implementation of learning using *quiz card* based learning media is very good. Furthermore, student activities during learning can be seen as follows.

Table 4. Student Activity Observation

Observer		**Total**	**Percentage**	**Information**
O1	**O1**			
74	74	158	93,75	Very good

Source: secondary data proceed, 2019

According to the table above, it can be concluded that student activities during the implementation of learning using *quiz card*-based learning media are in a very good category. For the media practicality questionnaire, the results can be seen in the following table.

Table 5. Results of Practicality Questionnaire Using *Quiz card* Media

Respondents		**Total**	**Information**
1	2		
26	27	53	Very good
Percentage		94,6%	

Source: secondary data proceed, 2019

Table 5 shows that *quiz card*-based learning media is very good or practical to use in learning activities. The effectiveness of *quiz card*-based learning media is known through the results of 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 criteria of the question 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, 4, 7, 10, 11, 12, 14, 15, 17, 18, 20, 22	3, 5, 6, 8, 9,13, 16, 19, 21, 23, 24, 25

Source: secondary data proceed, 2019

From the 15 valid questions, 10 questions were taken to serve as learning outcomes test instruments. After testing the validity, then performed reliability testing using the spearman brown formula. From the results of the calculation, the reliability of the problem is 0.876. Referring to the interpretation of reliability according to Guilford, the test can be concluded to have very

high reliability. Questions that have been tested for validity and reliability will be used for questions of pretest and posttest in the experimental and control classes during the field trials. The results of the pretest and posttest will be tested by t-test to determine the effectiveness of *quiz card*-based learning media. However, before being tested by t-test, the results of pretest and posttest were tested for normality first using the chi-square formula. The results of the pretest and posttest normality test are as follows.

Table 7. Normality Test

Normality test	X count	X table	Information
Experimental pretest	1,823	9,49	Distributed data normal
Control Pretest	2,342	9,49	Distributed data normal
Experimental posttest	2,075	9,49	Distributed data normal
Control posttest	2,613	9,49	Distributed data normal

Source: secondary data proceed, 2019

After a normality test, the next step 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 Fh <Ft, with Ft of 2.15. The following are the results of the pretest and posttest homogeneity test.

Table 8 Homogeneity Test

Homogeneity Test	F count	F table	Information
Pretest	1,84	2,15	Homogenous
Posttest	1,96	2,15	Homogenous

Source: secondary data proceed, 2019

After it is known that the two classes are normal and homogeneous, the next step is to do a t-test with the criteria used is H_o accepted if $t_{count} < t_{table}$. The t-test is carried out using the following formula (in Arikunto, 2010, p. 349):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{SD\ x_1^2}{N_1 - 1} + \frac{SD\ x_2^2}{N_2 - 1}}}$$

Based on the results of the calculation above, it is found that student learning outcomes after learning are 2,565. This can be interpreted that 2,565 ≥ 2,093, it can be concluded that H_o is rejected and H_a is accepted. Thus it can be concluded that there is a significant difference between the learning outcomes of the experimental class students and the control class.

DISCUSSION

The feasibility of learning media is based on the results of validation to media experts and material experts, the development of *quiz card*-based learning media to improve reading comprehension in very good categories. After going through the validation stage and declared feasible to use, the *quiz card*-based learning media can be continued in the next stage, namely trials limited and scale trials size. In addition to validating *quiz card*-based learning media, validation of learning devices and research instruments was used. The results of all the validations state that the research instruments and instruments are feasible to use. Based on the results of the feasibility analysis, the appropriate *quiz card*-based learning media is used to improve reading skills in the five grade students' understanding in Tuban Elementary School.

The practicality of *quiz card*-based learning media can be seen from the observation sheet of the implementation of learning with a score of 93.75%, observation sheet of student activity with a score of 93.75% very good category, and practicality *quiz card*-based learning media questionnaire filled by two class five teachers elementary school scores 94.6% with very good categories.

The effectiveness of instructional media is based on the question of pretest and posttest for the experimental and control classes in the field test, namely five class of primary school. Five class as the control class, while next five class as the experimental class. Field trials were carried out using the *nonequivalent pretest posttest group design* technique. Furthermore, to find out the effectiveness of *quiz card*-based learning media is to do a t-test. Based on the t-test that has been done, the results are 2,565. With t_{tablel} for df 19 is 2.09. From these results it can be interpreted that 2,565 ≥ 2,093, it can be concluded that Ho is rejected and Ha is accepted. Thus it can be concluded that there is a significant difference between the learning outcomes of the

experimental class students and the control class. Supported by previous research from Sofiya (2018) that the use of lower learning outcomes compared to traditional learning using learning outcomes sparkol media. So, learning using media based *quiz card* learning is effective for improving student learning outcomes, this is evidenced by the existence of significant differences 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 concluded, among others: (1) a decent *quiz card*-based learning media is used to improve reading skills in the fifth grade students' understanding at primary school. This can be seen from the results of the media feasibility validation and questionnaire which states that based *quiz cards* media are suitable for use. (2) practical *quiz card*-based learning media are used to improve reading skills in the fifth grade students' understanding at primary school. This is based on the calculation of the percentage of the results of observations of the implementation of learning, teacher and student activities, and the practicality questionnaire of learning media. The percentage of learning implementation was 93.75%, the percentage of student activities was 93.75%, and the practicality questionnaire of *quiz card*-based media was 94.6%. The three results are in a very good category. (3) effective media quiz-based learning media used to improve reading skills of students' understanding in five class at primary school. This is based on the results of the t-test, where the value of $t_{count} > t_{table}$, which is 2.565> 2.093. Based on this, Ho is rejected and Ha is accepted. So it can be concluded that learning uses a *quiz card*-based learning media effective to improve student learning outcomes, because there are significant differences in learning outcomes between the experimental class and the control class. This research is limited to the learning process understanding reading skills. Based on the results of the data analysis and Conclusions, it can be suggested a number of suggestions in the learning process Including the use of instructional media is expected to be improved not only the media but Also quiz cards of other media to encourage students to learn and in this study still have many shortcomings. media design so that further Researchers are expected to add more interesting media updates.

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Effect Of Demineralization With Sulfuric Acid On Yield, Gel Strength, Viscosity, And Amino Acids Of Gelatin Extracted From Fish Bones Lencam (*Lethrinus lentjan*)

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Abstract- Gelatin is a protein that is hydrolyzed from collagen. Gelatin is an easily digestible protein, containing all essential amino acids except tryptophan. Gelatin can be obtained from the skin and bones of animals. The highest production of gelatin is sourced from cows and pigs. Because some religions prohibit the consumption of foods that containing cows or pigs. For this reason, it is necessary to have an alternative source of gelatin which is lawful and can be consumed by all people. One alternative source of halal gelatin is lencam fish bone waste (*Lethrinus lentjan*). Making the gelatin from this fish bone can be done by soaking (demineralization) using acid. One of the acid solution that can be used is sulfuric acid (H2SO4). Soaking with acid solution can convert the triple helix structure into a single helix on the tropocollagen. Demineralization in this study using 5% sulfuric acid for 12, 24, and 36 hours. Gelatin extracted from *Lethrinus lentjan* bones yielded higher 14, 6%, gel strenght hingher 368 bloom, and viscosity higher 6,2cP. The higher amino acid in this study is Gly (Glycine) 18,29%. Generally there are 15 kinds of amino acids contained in gelatin. Amino acids composition determined by HPLC (*High Performance Liquid Chromatography*).

Keyword: *Gelatin, demineralization, yield, gel strenght, viscosity, amino acids*

I. INTRODUCTION

Gelatin has the molecular formula $C_{102}H_{151}N_{31}O_{39}$. Gelatin is a protein composed of several amino acids, at least there are 18 amino acids making up gelatin, including: glycine, alanine, phenylalanine, isoleusine, methyonine, and others[1]. Gelatin is a natural product because it can be obtained through partial hydrolysis of collagen from the skin and bones of animals. Gelatin is a derivative of protein derived from collagen fibers found in cartilage[2]. Gelatin is a type of protein derivative from collagen fibers that can be obtained from extraction from bone. The character of gelatin is very unique as it has the ability to turn the shape of the sol into a gel, is amphoteric and maintain colloidal properties. Gelatin is usually used for food processing, microbiological media, and cosmetics[3].

The process making gelatin consist of 3 steps, degreasing, demineralization, and extraction. Demineralization is one of most important process in making gelatin. The demineralization process is the process of soaking in an acid solution to continue the swelling of the bones so collagen in the bones easily comes out. Demineralization aims to remove calcium and other salts to obtain ossein (bone that has undergone demineralization, namely calcium removal)[4]. The quality of gelatin can be seen from yield, gel strength, viscosity and amino acid profile[5].

Yield is one of the most important parameters to determine the effectiveness process of the gelatin making. Gel strength is one parameter to determine the physical quality of a gelatin product[6]. Viscosity is one of the requirements in determining the feasibility of using gelatin for industrial use. Viscosity is one of the important rheological properties in food products. Viscosity is needed to test the quality, control quality and control process as long as needed[7]. The quality or physical chemistry of gelatin is basically determined by

amino acids making up the gelatin molecule[8]. The chemical quality of gelatin is a protein composed of amino acids proline, glycine and hydroxyproline[9]

II. MATERIALS AND METHOD

Materials needed are lencam bones *(lethrinus lenjan)* that was obtained from PT. Alam Jaya Surabaya, sulfuric acid (H2SO4), aquadest, aluminum foil and calico fabric.

In this study using an experimental method. The treatments are used in this study is variation of the times demineralization with sulfuric acid solution (H2SO4). The experimental design used in this study was a completely randomized design with 3 treatments and 5 replications. The variation of the times demineralization used were 12, 24, adn 36 hours. The process of making gelatin have a three steps, degreasing, demineralization, and extraction.

Degreasing process is done by boiling fish bones in boiling water at 100°C for 15 minutes. Then meat on the fish bones is cleaned. And then the bone is cut about 2-4 cm. **Demineralization** carried out by soaked fish bones in a 5% sulfuric acid solution for 12, 24 and 36 hours. After demineralization, the bone will increase swelling called ossein. This ossein then washed in running water to neutralize the pH. Neutral ossein is added distilled water and extracted. **Extaction** gelatin doing in waterbath at 70°C for 6 hours.

III. RESULT

Results of the study showed that the longer demineralization caused the yield, gel strenght, and viscosity increase. The highest yield was 14,6% , the highest gel strength was 368 Bloom or 9,2 N and the highest viscosity was 6.2 cP at 36 hours demineralization. While the lowest yield was 11,2%, the lowest gel strength was 256 Bloom or 6,4 N and the lowest viscosity was 2.0 cP at demineralization 12 hours. The results of the amino acid profile test showed that the highest amino acid of lencam bones gelatin was Glycine at 18.29% and the lowest was L-Tyrosine at 0.48%. The result of yield, gel strenght, and viscosity presented in Fugure 1. The result of amino acids can seen in Table 1.

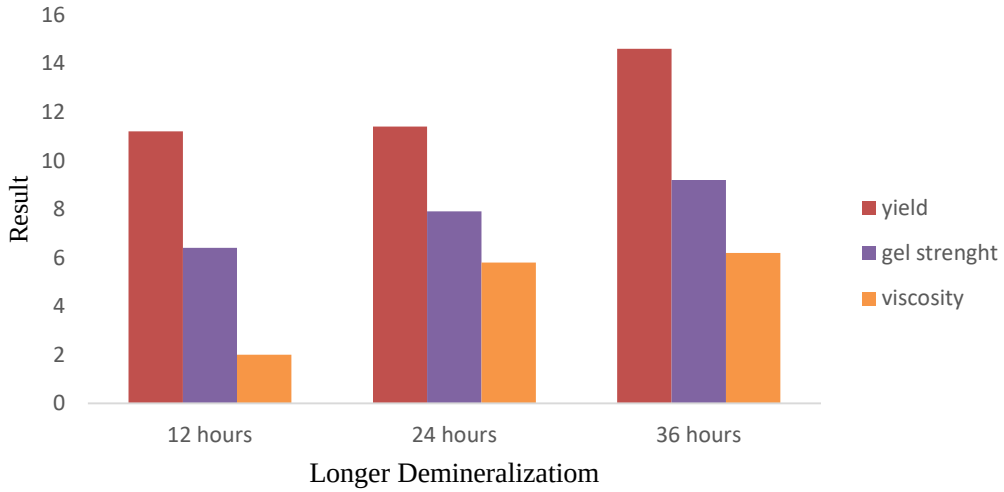

Figure 1. The Result of Yield, Gel Strenght, and Viscosity

Table 1. Amino Acids Profile

No	Parameter	Unit	Result
1	L-Serine	%	2,86
2	L-Glutamic Acid	%	6,70
3	L-Phenylalanine	%	1,94
4	L-Isoleucine	%	0,85
5	L-Valine	%	1,61
6	L-Alanin	%	6,99
7	L-Arginine	%	6,25
8	Glysin	%	18,29
9	L-Lysin	%	2,52
10	L-Aspartic Acid	%	3,46

11	L-Leusin	%	1,90
12	L-Tyrosin	%	0,48
13	L-Proline	%	8,31
14	L-Threonin	%	1,99
15	L-Histidine	%	0,67

IV. DISCUSSION

Yield is the one of the important parameters and properties in making gelatin. The resulting yield value determines the efficiency and effectiveness of the raw material extraction process in gelatine making. The gelatin yield was calculated based on the weight of the gelatin per weight of the cleaned fish bone[10]. In this study, yield showed differences in each times demineralization. At 12 hours demineralization showed the yield was 11,2%, at 24 hours the yield was 11,4%, and 36 hours the yield was 14,6%. The highest yield was obtained at 36 hours demineralization. The yield if compared with comercial gelatin is higher, it was 8,68%[11].

Yield of gelatin extracted from fish bones *Lethrinus lentjan* increased with the lenght of the demineralization. Sulfuric acid is a strong acid so that it can increase the yield of gelatin compared to using weak acids. Selected acid solution for demineralization process can affect the yield obtained. Acid solutionn can affect swelling of cartilage determines the presence of protons from acids that enter the cartilage structure that replaces minerals or the presence of empty space in the tropocollagen. The H+ ion from the acid will involve the carboxyl gropu so that it can disrupt the bond between molecular molecules that can affect the yield rate produced[12].

Gel strenght is one of the aspects needed to determine the quality of gelatin. Gelatin can be assessed from various aspects, including gel strenght and viscosity. The higher gel strenght and gelatin eviscosity can increasing the gelatin quality[13]. Gel strenght in this study showed differences in each time demineralization. At 12 hours demineralization showed the gel strenght was 6,4N or 256 Bloom, at 24 hours the gel strenght was 7,9N or 316 Bloom, and at 36 hours the gel strenght was 9,2N or 368 Bloom. The highest gel strrenght was obtained at 36 hours demineralization. The result of gel strenght in this study is according to the standards *Gelatin Manufacturing Institue of America* (GMIA), 2012[14].

Gel strenght of gelatin extracted from fish boned *Lenthrinus lentjan* increased with the lenght of the demineralization. The acid treatment is able to degrade collagen molecules to asimple level, being able to transform the structure of the triple helix protein into single chain. Gel strenght depends on the amino acid chain lenght. If the condition of the collagen has been hydrolyzed to a simple level, the strenght of the gel can increase. Hydrolyzed collagen can produce a long polypeptide chain[15].

Viscosity of gelatin using the acid method has a higher value. The right extraction method will affect the short lenght of the formed α-helix amino acid chain. If the α-helix amino acid chain is long can cause the molecular weight of the gelatin increase, then the flow rate will obstructed. If the flow rate is increasingly inhibited, the value of the gelatine viscosity gets bigger[16]. Viscosity in this study showed differences in each lenght demineralization. At 12 hours demineralization showed the viscosity was 2 cP, at 24 hours the viscosity was 5,8 cP, and at 36 hours viscosity was 6,2 cP. The highest viscosity was obtained at 36 hours demineralization. The result of viscosity in this study is according to the standards *Gelatin Manufacturing Institue of America* (GMIA), 2012[14]

Viscosity in this study increased with the lenght of demineralization. The difference value of viscosity can be caused by the extraction process and the composition of the raw materials used where each material has a different level of cross-linking strenght of the tropocollagen as well age, genetic, and environmental factors. The weak cross link causes collagen to be easly hydrolyzed, this hydrolysis can reduce the molecular weight of gelatin. This is causes reduce the viscosity of the gelatin[17].

Amino acid profile analysis can provide important information about the composition of essential and non essential amino acid as well as to show the overall amino acid composition which ca affect the flavor characteristics of the samples analyzed[18]. The highest amino acids in this study is glycine, obtained 12,89%. And the lowers amino acids is L-Tyrosine was 0,48%. The most important amino acid in gelatin is glycine, proline, and hydroxyproline.

The main amino acids that obtained in gelatin are glycine, proline. And hydroxyproline. Glycine and proline are the main amino acids making up gelatin. Gelatin contains 9 of the 10 essential amino acids needed by the body, one essential amino acid which is almost not contained in gelatin is triptopan. The amino acid composition causes gelatin as a multi-using material in various industries[13].

V. CONCLUSION

The best gelatin extracted from fish bones *Lethrinus lentjan* obtained at 36 hours demineralization. The result is yield was 14,6% , the gel strength was 368 Bloom or 9,2 N and the viscosity was 6.2 cP. For the amino acids in this study, the highest amino acids is glycine was 18,29%.

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CharacteristicsOf Gelatin Extracted From Red Snapper Skin (*Lutjanus argentimaculatus*) In Difference Time Extraction

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Abstract- Red snapper skin is on eof the alternative gelatin resource. Gelatin is a protein obtained from the results of partial hydrolysis of skin, bones, and white connective tissue. The type of gelatin is divided into two types, gelatin type A (acid immersion) and type B (base immersion). The purpose of this study wa to determine the best extraction time with 5 hours, 6 hours, and 7 hours treatment. The result showed the best value at 7 hours extraction, containing yield (18,60%), gel strenght (8,97 N), and viscosity (6,48 cP). In addition, gelatin in this study containing higher glycine (16,54%) as amino acids profile.

Keyword: *fish skin,gelatin, yield, gel strenght, viscosity, amino acids*

I. Introduction

Fish skin is the untapped waste. Fish skin produces 6-7% waste from the weight of fish. Fish skin contains 69,6% water, 26,9% protein, 2,5% ash, and 0,7% fat.[1] Each animal skin has a different characteristic or structure based on the type of animal used. Fish skin consist of the dermis layer which has a number of collagen fibers (Lagler *et al.*, 2018). Skin waste contains collagen and produces gelatine from the collagen hydrolysis.[6]

Gelatin is a protein obtained from the partial hydrolysis of skin, bone, and whitw connective tissue. Gelatin absorbs 5-10 times water of the weight.[9] The breakdown of collagen into gelatin can occur through the breakdown of the triple helical protein into a random coil protein. The breakdown of collagen protein can be done using acids or bases and enzymes.[10] Gelatin contains proteion 84-86% and has a mineral ocntent 8-12%. Gelatin contains 9 of 10 types of essential amino acids. One type of amino acid hardly available in gelatin is tryptophan.[3] Gelatin composed of 18 amino acids including alanin. Phenylalanin. Isoleucine, methyonin, etc.[11] The chemical structure of gelatin is a protein derivative of collagen fibers found in skin, bones, and cartilage. Gelatin has the composition of the main amino acids, glycine, proline, and hydroxyproline.[4]

Characteristic of gelatine can seen from yield, viscosity, gel strenght, and amino acids contains. Gel strenght and viscosity are important parameters of gelatin, because they can affect the application of gelatin in products.[2] The result of amino acids are used to determine the content of essensial and non-essential amino acids.

II. MATERIALS AND METHOD

Materials used in this study are red snipperskin*(Lutjanuss argentimaculus)* that was obtained from PT. Alam Jaya Surabaya, ascorbic acid,NaOH, water, aquadest, aluminum foil and filter papper.

The research method in this study consist of two stage, preliminary research and main ressearch. Preliminary research was conducted to determine the best extraction time in producing gelatin from red snapper skin. The variation of the extraction were 2 hours, 4 hours, and 6 hours. The main research was conducted after the best result were obtained from the preliminary esearch. The variations of time extraction in main research were 5 hours, 6 hours, and 7 hours. The main research conducted to determine the quality of gelatin with the best characteristics. Making gelatin from red snapper skin can started by cleansed the skins from meat and waste residue. The the skins is cut to a size 2-3 cm. Then immerse in 0,1M NaOH solution for 2 hours. Then wash it to neutral pH and soak again with ascorbic acid for 20 hours. After that, washed again to neutral ph and extraction at 5, 6, and 7 hours. Then the gelatine liquid is filtered and then gelatin is dried in the oven for 24 hours. Sheet results were analyzed for the chemical physical characteristics of gelatin in red snapper skin

III. RESULT

The results showed that the longer extraction process was increasing the value of gel strength and viscosity. At 5-hour extraction treatment, the gel strength value was 4.36N and the viscosity was 3.23 cP. At 6-hour extraction resulted in a gel strength value was 6.71N and a viscosity was 4.94 cP. At 7 hour extraction the highest gel strength value was 8.91N and the highest viscosity value was 6.48 cP. The highest amino acid results with the best treatment were glycine at 16.54% and the lowest amino acid value of L-Tyrosine 0.37%.

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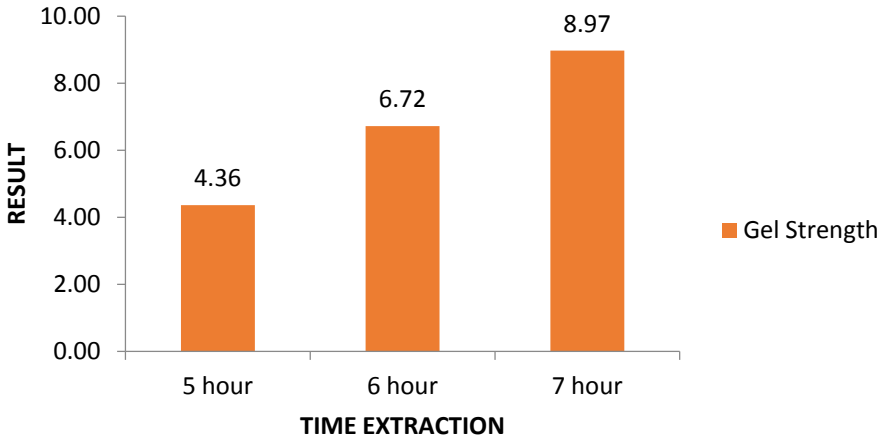

Figure 1. The Result of Gel Strength

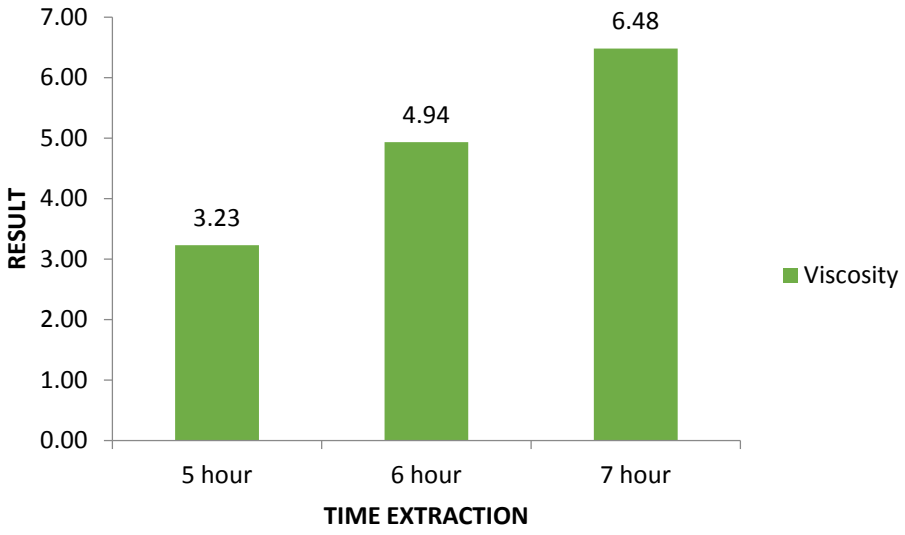

Figure 2. The Result of Viscosity

Table 1. Amino Acids Profile

No	Parameter	Unit	Result
1	L-Serine	%	21,81
2	L-Glutamic Acid	%	6,68
3	L-Phenylalanine	%	1,36
4	L-Isoleucine	%	0,53
5	L-Valine	%	1,20
6	L-Alanin	%	7,04
7	L-Arginine	%	3,47
8	Glysin	%	16,54
9	L-Lysin	%	2,85
10	L-Aspartic Acid	%	3,54
11	L-Leusin	%	1,46
12	L-Tyrosin	%	0,37
13	L-Proline	%	7,77
14	L-Threonin	%	1,70
15	L-Histidine	%	0,39

IV. DISCUSSION

The results of gel strength gelatin extracted from red snapper skin showed differences in each extraction time. At 5 hours extraction, gel strength was 4.36 N or 198.36 g / bloom, 6 hours extraction was 6.72 N or 294.56 g / boom, and 7 hours extraction was 8.97 N or 386 , 48 g / boom. Gel strength has increased with the treatment of extraction time. The strength of the gel produced is in accordance with the standards set by the *Gelatin Manufactures Institute of America* , which is 50-300 g / bloom. Based on ANOVA, the gel strength of gelatin extracted from red snapper skin was found to be significantly different ($P < 0.05$), so it can be said that the difference in extraction time affected the gel strength of gelatin extracted from red snapper skin. Based on Tukey's advanced test, the gel strength of gelatin with differences in extraction time of 5 hours, 6 hours, and 7 hours showed significantly different results. The strength of gel gelatin depends on the length of the amino acid chain. The collagen hydrolysis process depends on the right phase in the polypeptide chain where hydrogen bonds are broken, cross covalent bonds and also as peptide bonds, the gelatin structure is produced with higher peptide chains for higher gel production.[8]

The results of gelatin viscosity of red snapper skin showed differences in each treatment extraction time. At 5 hours extraction, a viscosity was 2.32 cP, at 6 hours extraction was 4.94 cP, and 7 hours extraction was 6.48 cP. Low viscosity values can be caused by the extraction process, where extraction has not been able to hydrolyze and break down the peptide bond structure in the skin of theprotein.[5] Based on ANOVA results, the gelatin viscosity of red snapper skin was found to be significantly different ($P < 0.05$) so that it can be concluded that extraction time affected the viscosity of gelatin in red snapper skin. Based on Tukey's advanced test, the gelatin viscosity of snapper skin with extraction duration was 5 hours, 6 hours, and 7 hours indicating that it was significantly

different. Viscosity values have a relationship with molecular weight, molecular distribution, and average gelatin. Molecular weight is related to the amino acid chain produced. The longer the amino acid chain, the higher the viscosity value. In the 7-hour extraction treatment the highest gel strength value was obtained. This shows that collagen protein is completely hydrolyzed.

Amino acid values with a 7 hour extraction treatment showed that amino acid content has different values where L-Serine was1.81%, L-Glutamic Acid was 6.68%, L-Phenylalainwas 1.36% , L-Isoleucine was 0.53%, L-Valine was 1.20%, L-Alanine was 7.04%, L-Arginine was 3.47%, Glycine was 16.54%, L-Lisinewas2, 85%, L-Acid Aspartate was3.54%, L-Leusinwas1.46%, L-Tyrosinewas 0.37%, L-Prolinewas 7.77%, L-Threoninwas1.70%, L -Histidinewas0.39%. The highest value is glycine at 16, 54%, this is because glycine is the most found amino acid in gelatin. This type of amino acid accounts for 23% of the total amino acids. It is known that thermal stability is influenced by the number of amino acids. Gelatin is made from the partial hydrolysis of collagen.[7]

V. CONCLUSION

The best treatment for making gelatin in red snapper skin is extraction time of 7 hours with a gel strength value of 8.91N. Viscosity of 6.48 cP, and the highest amino acid was 16.54% by glycine and the lowest was 0.37% in L-Tyrosine

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Role of Misoprostol in First Trimester Abortion

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Abstract- Missed abortion is the failure of fetal development and retained in uterus not expelled with closed OSE. ultra sound show an empty gestational sac or fetus without cardiac activity, constitute approximately 5% clinically diagnosed pregnancy, 95% of surgical termination was effective ,surgical termination have many complication as risk of general Anesthesia and risk of bleeding during surgery with risk of trauma to uterus or intestine or bladder due to perforation to uterus with increase maternal morbidity in all the world with costs .of surgery and hospitalization with risk infection and risk of infertility due to uterine adhesion many studies show that medical management might be more suitable instead of surgical evacuation we perfume our study Al Zahraa hospital of gynecology and obstetrics in Al Najaf number of patient in first trimester pregnancy use misoprostol 800 Mg vaginally and compare an effectiveness with other studies for the same subject we found its very effective with low side effect , we recommend its use better than waiting for spontaneous onset of abortion with loss of time during which is emotional disturbance for the mother is occur with risk coagulation disturbance that increase need for blood and increase maternal morbidity missed abortion is failure of fetal development before 20 weeks with closed cervix and slight vaginal bleeding and uterus failed to expelled it.

Index Terms- Misoprostol. First Trimester. Abortion

I. Introduction

Misoprostol is a synthetic prostaglandins E1 analogue which was originally development to prevent non-steroidal anti-inflammatory drugs related gastric ulcers however it was has been used for various other indication in obstetrics and gynecology medical management using misoprostol combined with mifepristone for missed abortion has been widely studied mifepristone is expensive that's why misoprostol alone is recommend and its safety and its effectiveness is proved it could be given oral sublingual or vaginal while dose ranged from 100 micrograms to 800 *Mg* that most suitable route and dose of misoprostol is not yet established ,single dose 800*Mg* misoprostol be vaginal or oral route for missed abortion was recommended.

The usual treatment is suction curettage, however an increase number of studies have shown that medical treatment is effective and safe more than waiting spontaneous expulsion. there is so many regimens for administrating misoprostol 800 *Mg* single dose 800 *Mg* misoprostol alternatively 600*Mg* for sublingual rout, treatment may be repeated twice with a 3 hr. interval, but more studies needed to evaluate the additional efficacy of repeated, doses of misoprostol, during treatment hospitalization is not necessary as the time expulsion varies considerable from hours or over several weeks the patient should be near hospital when bleeding occur. misoprostol has side effects as:

1. bleeding many large amount or spotting, bleeding continue with misoprostol for two weeks, patient should be attach provider when bleeding occur.
2. cramping usually start with in the first few hours but may be begin with in minute after misoprostol use
3. fever with chills are common side effect but transient
4. nausea and vomiting
5. diarrhea
6. skin rash

Following administration misoprostol un dissolved tablet may be found in the vaginal examination ,this doesn't affect the absorption of misoprostol routes misoprostol administration oral vaginal sublingual buccal or rectal ,vaginal rout associated with slower absorption greater effect on cervix and uterus there is no significant difference between vaginal misoprostol that administrated dry that vaginal misoprostol administrated moisture with water saline or acetic acid , sublingual rout cause uterine contraction at a rate equivalent to vaginal administration and has less variation in absorption .buccal rout has pattern of absorption similar to vaginal rout

II. Methods and Martial

our study Al Zahraa hospital of gynecology and obstetrics in Al Najaf we took 30 patients , (83.4%) were admitted to hospital with first trimesters missed abortion ,we use 800 *Mg* of misoprostol vaginally , initial dose than repeat 400 *Mg* after 8hr up to three days in three doses of 400 *Mg* , most of them starting heavy vaginal bleeding and open OSE need evacuation under analgesia only other end with complete abortion proven by ultra sound other end with in complete abortion with slight vaginal bleeding followed by another dose of misoprostol and frequent ultra sound until be complete . 5 patients (16.6%) from 30 patients retained missed abortion and under general anesthesia in operating theater after five days of misoprostol administration in comparison with other studies its acceptable result.

III. Discussion.

misoprostol prostaglandin E1analogue has cervical ripening and uterotonc properties that make it useful missed abortion Graziosi et al reported success rate 60% using 800 *Mg*

misoprostol without complication. Gronlund et al used 400 *Mg* of misoprostol alone or in combination with mifeprostol and conclude that misoprostol is effective in most case and addition of mifeprostol doesn't increase the success rate Ayres-de-Campos et al use 600 *Mg* he founded its safe and effective for inducing complete abortions 800 *Mg* of misoprostol can be administrate sublingual twice with 3-4hr interval for maxims three doses ,can be given orally or sublingual ,vaginally can be repeated 6-8hr for three doses major expulsion occur in 4hr after administration of misoprostol ,hospitalization is not necessary Buccal and vaginal rout have similar effect on uterine tone and activity, administration of NSAIDS for pain relief doesn't alter the efficacy of misoprostol no drug interaction with misoprostol Vaginal rout is more effective than oral rout , sublingual rout is more effective than oral rout

IV. Conclusion.

use misoprostol in termination of first trimester abortion is very effecting due to uterotonic and cervical ripening properties with low side effect with improve maternal outcome and decrease maternal morbidity from missed abortion regardless to rout of administration whether vaginal or sublingual or oral.

V. Recommendations.

Further studies are required in the same subject that concentrated upon the most effective rout for administration of misopristol with short period of activity and less side effect

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Development of Solar Power Intelligent Street Lights System

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Abstract- The lack of natural light during night time in the urban environment has always been a problem. From people not being able to see where they are going, to the greater chance of being attacked or mugged at night which as we all know is a problem that has been in existence since humans started living together. The main advantage of this system exists in the reduction of costs related to energy consumption by the street light by integrating a vehicle/human detection algorithm into the system. The introduction of this vehicle/human detection algorithm further reduces the power consumption costs. In this project, solar PV is used to supply the energy to charge the battery. The battery later powers the operation of the whole system. The 12-17V of the solar is buck to a steady 12V for battery charging. A light sensor is connected to the microcontroller that sense the light during day time, when the presence of day light is sensed the microcontroller turns ON the mosfet of the buck converter. If the voltage of the solar PV is greater than 12V, it charges the battery and switches off the load transistor. But at dawn, when the solar PV voltage is less than 12V the microcontroller turn OFF the buck converter mosfet and switch ON the load transistor. When no vehicle or human is detected for 10mins the microcontroller dims the LED lamp. If vehicle or human is detected the microcontroller brighten the LED lamp and inform the next microcontroller to brighten its LED lamp. If the next street light did not detect a vehicle or human after 10 mins it dims the lamp but if it detects a vehicle or human the lamp remain brightened. The microcontroller uses the ultrasonic sensor to detect object and the PIR sensor to detect human. The RF module is used for communication between the microcontrollers to inform each other the presence of vehicle or human.

Index Terms- PIR, Ultrasonic, LDR, microcontroller, Buck converter, street Light and control

I. Introduction

Street Light or Lamp is a source of light raised on the edge of a road, pathway or walkway to illuminate its environment in the event of night time or bad weather conditions. Most street lights of today are designed to automatically turn ON/OFF when needed: dusk, dawn, or the onset of dark weather. The goal of this project is to design a circuit that makes an automatic street light intelligent enough to dim it's light during the wee hours of the night while also having the capability of brighten it's light during the same hours of the night on the detection of any vehicular or human movement thus reducing energy consumption by the street lights while increasing their life span.

II. Literature Review

There are several attempts to control the road lighting for saving energy and to reduce light pollution. In [1, 2] a road lighting intelligent control system was proposed. The system was based on wireless network control that can implement real-time monitoring for road lighting. The proposed system uses the Zigbee wireless networks and GPRS standard to monitor the status of the lamps. Similar work using zigbee, solar panel, IR sensor, air velocity sensor, and rain sensor are given in Kavitha and Thiyagarajan [17].

In order to monitor and control each street light, the Wireless Sensor Network (WSN) was developed in [3].The system consists of sensor node, Remote Terminal Unit (RTU) and control centre. The sensor nodes were installed at each lighting pole and make up a network with RTUs. The sensor senses the status of the lamp and the light intensity. Using the Power Line Communication (PLC) [3-4], the status and the control signals can be sent from the RTU and the control centre or vice versa. Another related work that uses the WSN is given in [5].Similar works that uses PLC to remote control the terminal nodes (of the lamps) are given in [1, 4].

Another system for controlling the road lighting is proposed in [6] where the streets are divided into regions. By using vehicle-detection loops in each region, the number of vehicles entering that region can be obtained. Thus, using a dedicated network and control system, any region can be switched on or off depending on whether there are vehicles detected in that region or not. This system can save 23.7% power if put to use.

Siliang [7] described a street lighting system based on a wireless sensor network which could run automatically and controls street lights in accordance to sunrise and sunset algorithm as well as light intensity. This system integrates a temperature-humidity sensor which is digital in nature and also monitors the street lights in real time.

Kalaiarasan [8] described a solar energy based street light capable of fully maximizing power output from solar panels by the use of a sun auto-tracking system. The system utilizes an AT89C51 microcontroller which integrates all other constituent circuits to fully control and power street lights automatically without the need of any manual operation.

Sa'ad [9] described an automatic street lighting system that can be switched ON during the night and OFF during the day. This can be implemented by the use of a Light Dependent Resistor (LDR), a photoelectric sensor and a micro-controller. The LDR controls the ON/OFF switch; the photoelectric sensor detects vehicular movements to activate street lights placed on each side of the road which is controlled by the micro-controller.

Costa [10] examined a solar panel based LED street lighting system. Here the lighting system comprises a solar panel as a primary source, battery as a secondary source and LED consider as a lighting source. Using DC converter, batteries are charged during day time through solar panel. DC converter is controlled by Maximum Power Point Tracker (MPPT) algorithm; through this the system can attain reducing power consumption.

Yongqing [11] discussed controlling solar LED street lights utilizing programmed control circuit. This system consists of three working modes such as light control delay, delay quenching and delay plus low power. Light control delay is used to turn OFF lights in daytime and turn ON light after sunset. Delay quenching mode is used to turn ON/OFF lights automatically based on setting time. Delay plus low power is used to changing the pulsed lighting power based on setting time. The above three working mode scan be used in different situations flexibly and conveniently. This system can be used for the place such as streets, shops and so on.

Hemalatha [12] proposed street light control system utilizing PIC microcontroller and GSM technology. The street lights turn ON/OFF automatically based on the RTC (Real Time Clock). Information about the street lights and street light maintenances are transmitted through GSM.

Vijayakumar and Srinivas [13] proposed an energy efficient street lighting system based on ZIGBEE wireless technology, GSM modem, and LDR sensor interface with (ATMEGA16) microcontroller. The streetlights can be controlled using mobile phones, the option in the mobile phones is ON/OFF/DIMMING. Utilizing ZIGBEE technology the power consumption is reduced. Similar work using LDR, IR, Motion, Humidity and Temperature sensor with a PIC16F micro-controller is given in Archana [15]

Rajput [14] presented on intelligent street lighting system based on GSM/GPRS technology and wireless sensor network integrated with a C8051F350 microcontroller. Using GPRS Technology, the location of the street lights can be identified and the information of street lights is gathered by sensors. It is fully based on location aware application and WSN application. The system always needs internet connection for sending street light information to the maintenance team. Automatic Street light control systems based on IR sensor, LDR sensor is interfaced with 89S52 microcontroller. The system provides power saving, cost effective and 90%, reduce of manual work.

Subramanyam and Reddy [16] suggested an efficient management of street lights in manual mode controlled through a Graphical User Interface (GUI). The ZIGBEE wireless technology can be used for monitoring and controlling at PC end. This can save 60%-70% power using LDR, IR sensors and LED light.

III. MATERIALS AND METHODS

The block diagram of the intelligent street light is shown in figure 1. Figure 1 illustrates how the different units components are connected together to achieve the design of this system.

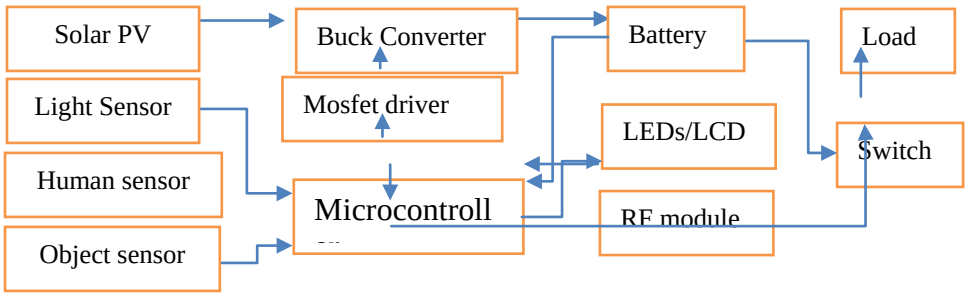


Figure 1: Block diagram of Intelligent Street Lights system.

Figure 2 shows the circuit diagram of the Intelligent Street Lights. The solar voltage is stepped down by using voltage divider principle to give a maximum 5v which is the equivalent of the solar 17v. The voltage from the voltage divider is fed into pin 2 of the PIC16f877a microcontroller [17] which converts the analogue voltage values to digital values. This digital values is compared with the equivalent 12v stored in the memory of the PIC16f877a, so that if the solar voltage is greater than 12v the PIC16f877a continuously turn on and off the buck converter mosfet in such a way that a steady 12v is supply at the load to charge the battery but if the solar voltage is less than 12v the PIC16f877a stops switching on/off the buck converter mosfet. LDR sensor [18] is used to detect light presence, during the day the PIC16f877a uses the LDR connected to pin 4 to senses the presence of light by detecting high voltage. When light is sensed the PIC16f877a turn off the load transistor that is connected to pin 21, but when it is night the LDR gives low voltage and the PIC16f877a turn on the load transistor to switch on the LED lamp. The charged battery is expected to power the system through the night, but the PIC16f877a also read the battery voltage via the second voltage divider which is connected to pin 3. If the voltage of the battery is greater than 10V the load transistor will remain turn ON but if the battery voltage goes below 9v the load transistor will be turned OFF. The HC-04 ultrasonic [19] and PIR sensor [20] that are connected to pin 19 and 20 are to detect the presence of object and human respectively. The RF module [21] connected to pin 25 and 26 and they used for communication with other street light PIC16f877a. The transmitter module transmits string to inform the next microcontroller of the incoming presence of vehicle or

human while the receiver module is accept the string inform of the street light before it of the presence of vehicle or human. When this string of information is received the PIC16f877a either brightens or dims the LED lamp depending on the presence or absence of vehicle/human after 10mins. LCD is used in the simulation to display the information but the implementation only need LEDs.

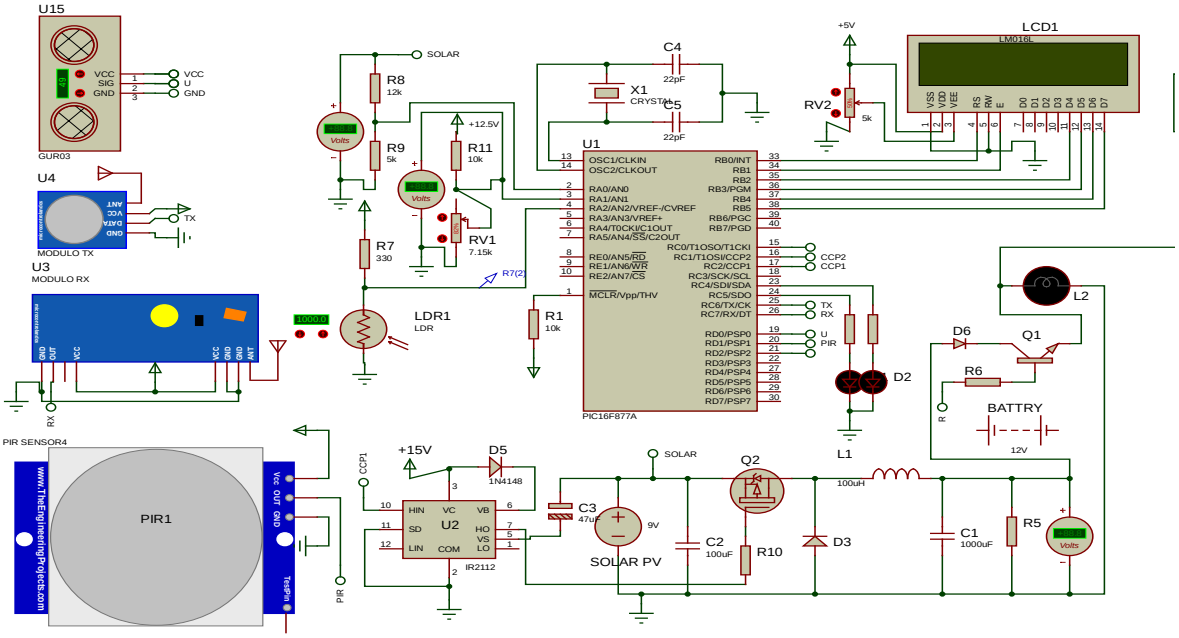
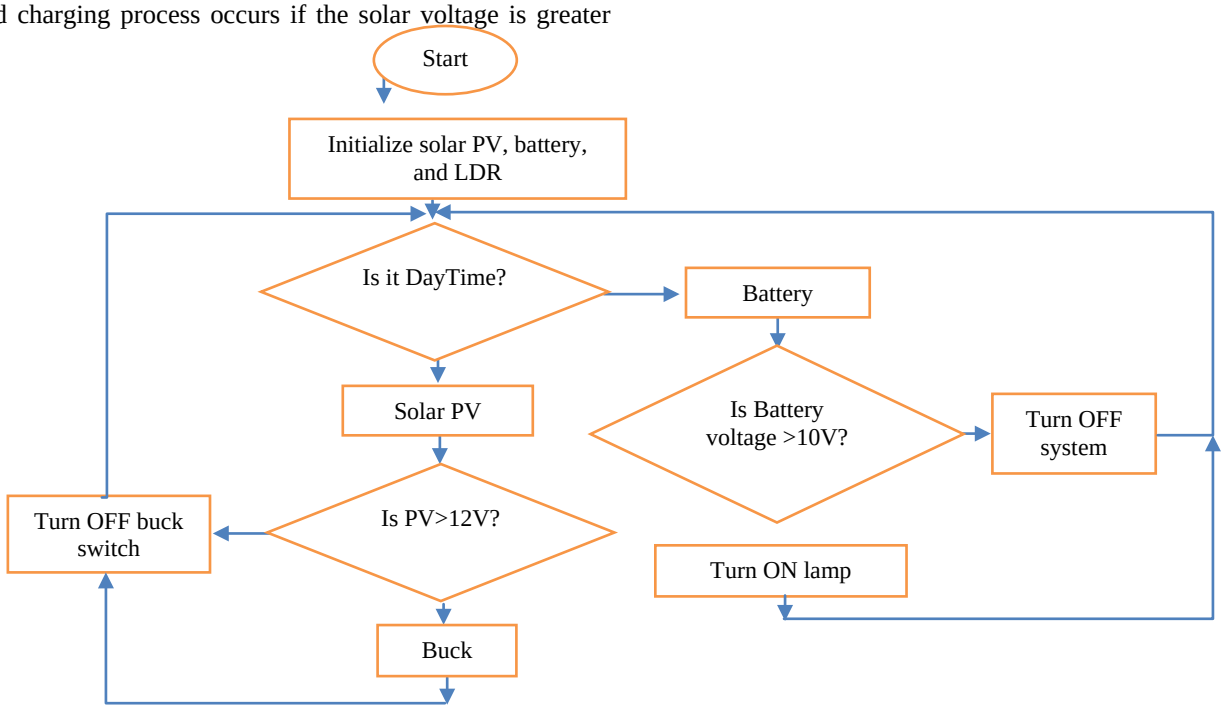


Figure 2: Circuit Diagram of the Intelligent Street Lights system.

The flow chart of the program for the Intelligent Street Lights system is shown in figure 3. Figure 3a shows the flowchart of solar, battery and LDR sensor combined while figure 3b shows the flowchart ultrasonic/PIR sensor

The flowchart of solar, battery and LDR sensor initializes the solar Pv, battery and LDR. The LDR is used to sense day light and charging process occurs if the solar voltage is greater than 12v. When it is night the operation will be ON if the battery voltage is greater than 10V. The ultrasonic/PIR sensor flowchart senses the presence of vehicle/human, if no vehicle/human for 10mins the system dim the lamp. But if vehicle/human is detected the lamp is brightened up and message is sent to the next system to brighten up their lamp and the process continues



(a): LDR, solar Pv and battery Flowchart.
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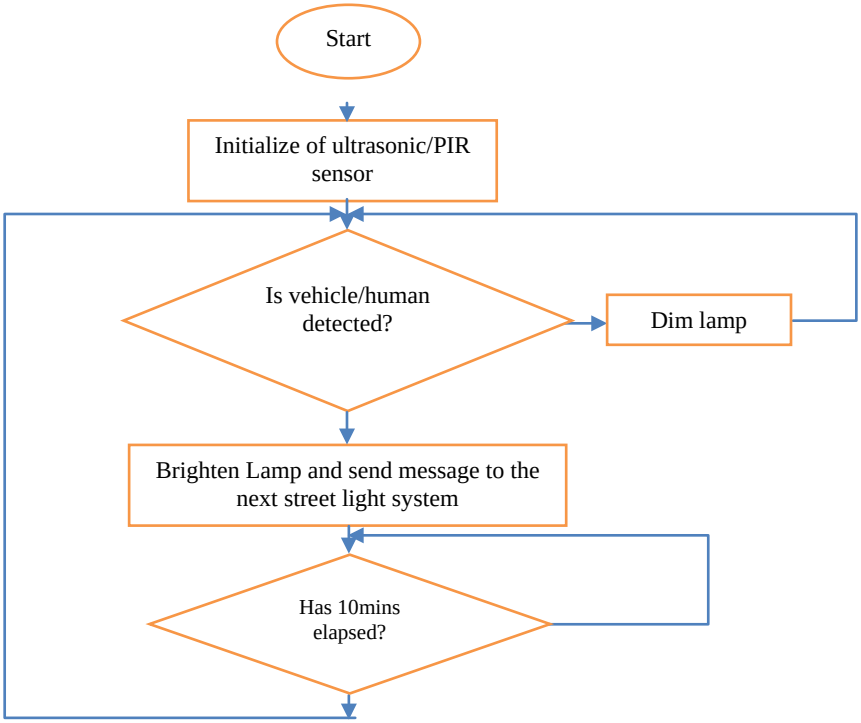
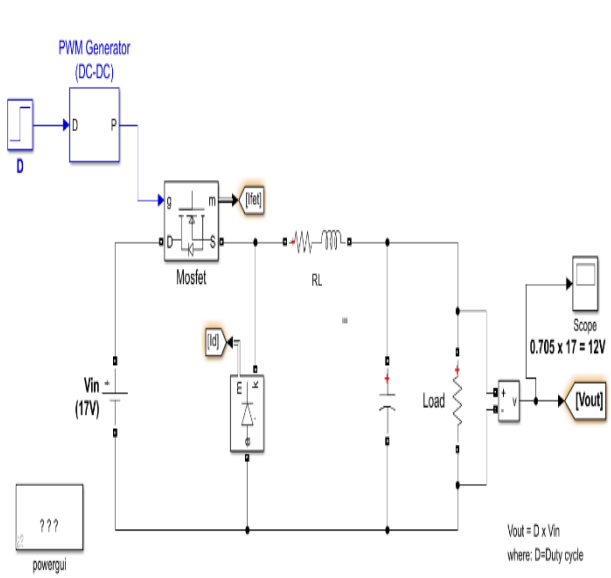
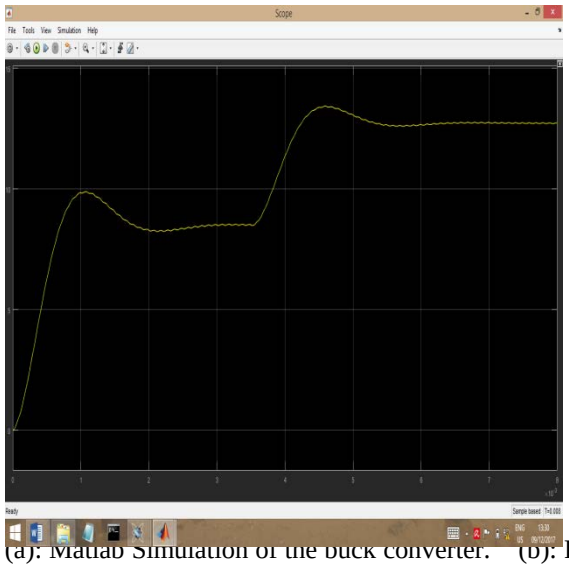


(b) Ultrasonic/PIR Flowchart.
Figure 3: Flow Chart of the Intelligent Street Lights system.

IV. RESULTS AND DISCUSSION

The matlab simulation of the buck converter was done in Matlab IDE [22] to ascertain the response time of the buck as shown in Figure 4(a) and (b). Figure 4a is the simulated circuit while 4b is the result of the simulation.





(a): Matlab Simulation of the buck converter. (b): Results of Simulation of the buck converter.

Figure 4: Buck converter simulation

The program for the microcontroller was written in C language and was then compiled into an executable file using the mickroC IDE [23]. The executable file was next imported into the Proteus Design Suite IDE [24] where the hardware circuit was designed and simulated as shown in Figure 2. Figures 5 to 9 show the proteus simulation results of the Intelligent Street Lights system.

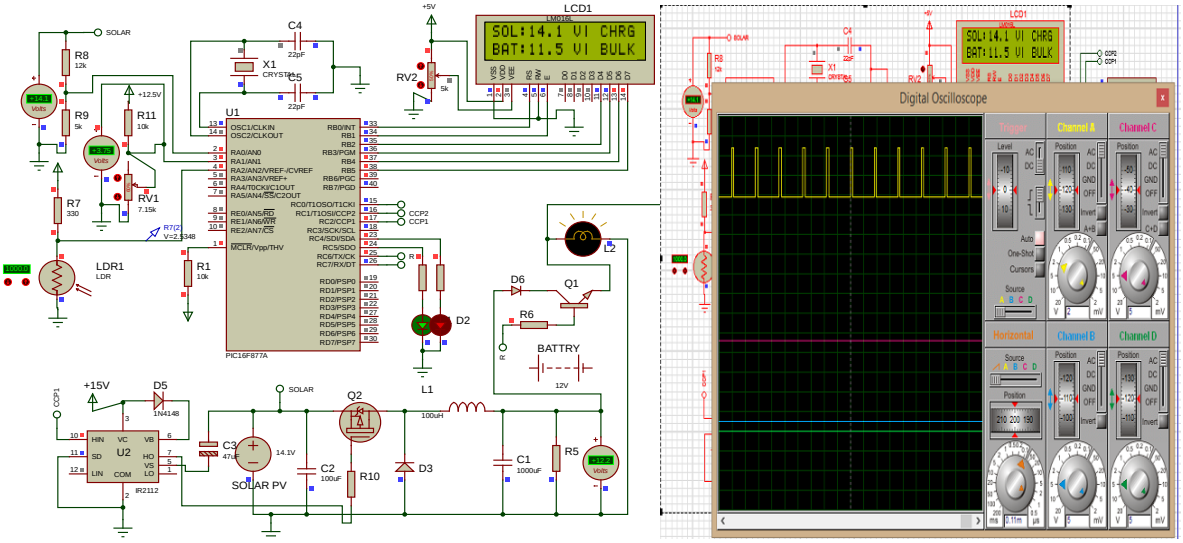


Figure 5: when solar PV voltage is greater than 12V and battery voltage is greater than 10V

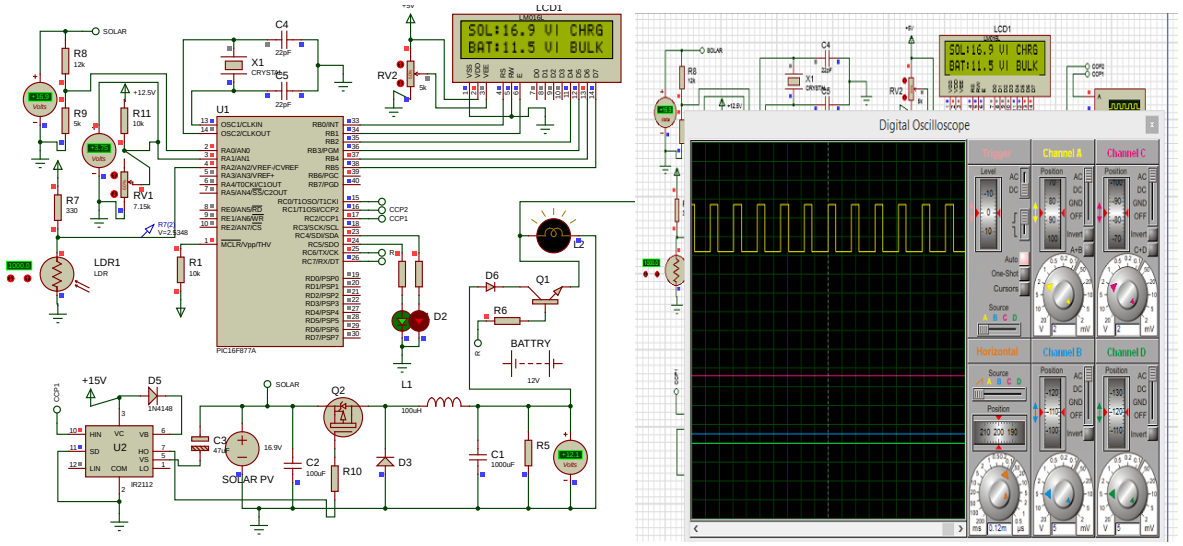


Figure 6: when solar PV voltage is greater than 12V and battery voltage is greater than 10V

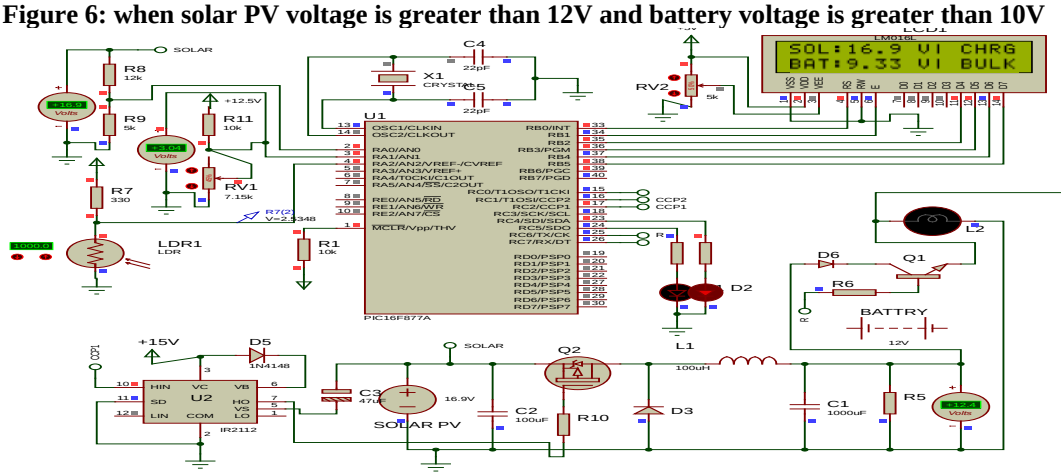


Figure 7: when solar PV voltage is greater than 12V and battery voltage is less than 10V

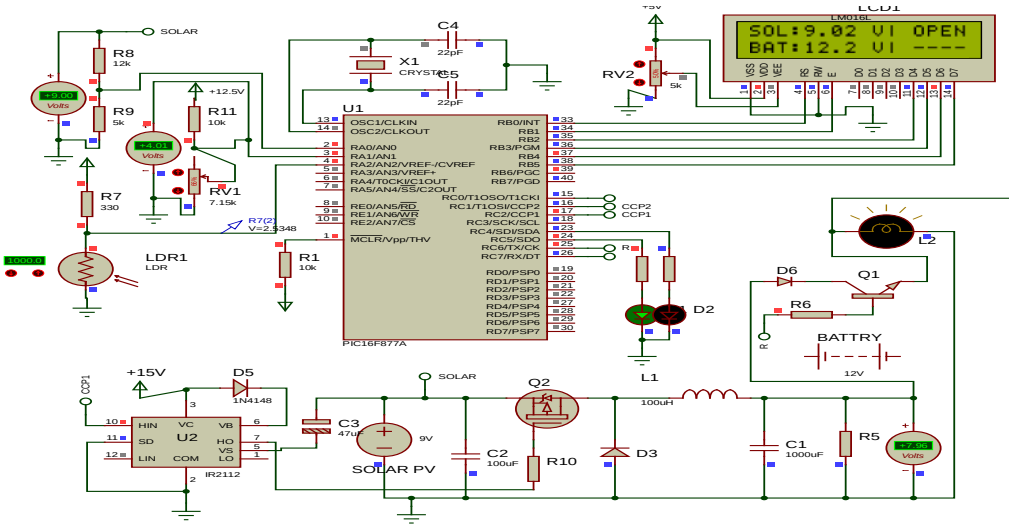


Figure 8: when solar PV voltage is less than 12V and battery voltage is greater than 10V

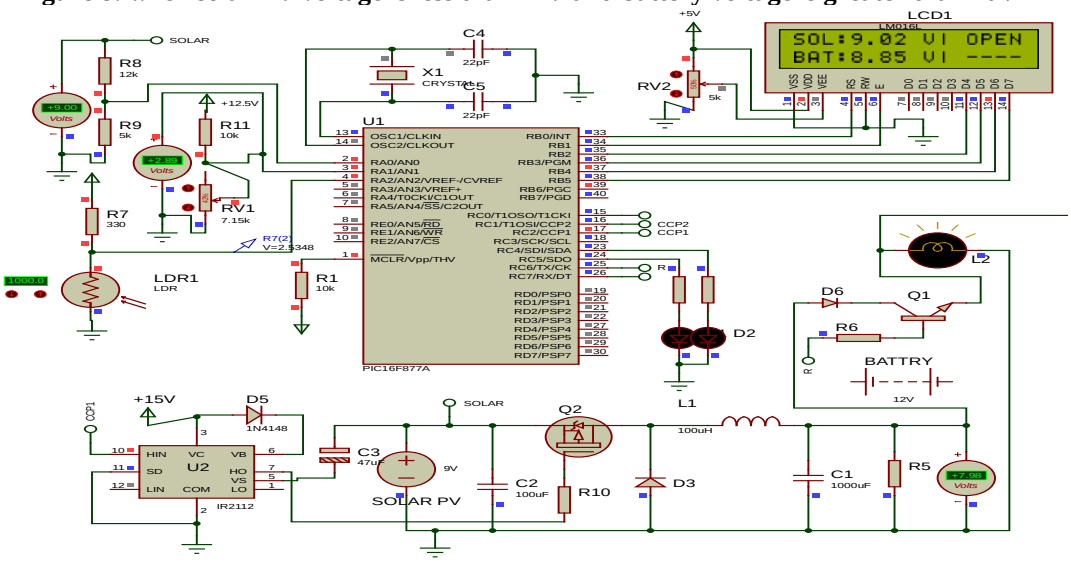


Figure 9: when solar PV voltage is less than 12V and battery voltage is less than 10V

V. CONCLUSION

The design, construction and implementation of intelligent street lights was realized from the basic principles of digital electronics. The basic components used are the PIC16f876a Micro-controller. The entire circuitry and its realization gives an automated control of streets lights based on predefined settings.

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Extraction of Buildings from Satellite Images

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Abstract- Buildings are termed as important components for various applications. Building extraction is defined as a sub-problem of Object Recognition. Though, numerous building extraction techniques have been proposed in the literature. But still they often exhibit limited success in the real scenarios. The main purpose of this research is to develop an algorithm which is able to detect and extract buildings from satellite images. In the proposed approach feature-based extraction process is used to extract buildings from satellite images. The overall system is tested and high performance detection is achieved which shows the effectiveness of proposed approach.

Index Terms – building extraction, artificial neural networks, Hough Transform, LBP.

I. Introduction

Building is an important object that needs to be extracted automatically from satellite images because building affects city land use cover change. Automatic extraction of building becomes a key component in order to assess the existing building resource and help in planning for various purposes. Nowadays, it is an active research topic in remote sensing. Various building extraction techniques utilize non specific models by expecting that all structures take after same example. A great deal of work has been committed to the thought process of building identification on airborne photos, and an extensive number of procedures utilizing different strategies have been created, in order to depict that the flow condition of research isn't a simple assignment. There are various methodologies which are utilized to separate structures or building highlights.

Though, numerous building extraction techniques have been proposed in the literature. But still they often exhibit limited success in the real scenarios. These current procedures of building extraction are not that much compelling in demonstrating brings about various types of pictures. Distinctive systems are required for managing diverse pictures as these pictures may contain some delicate data. The vast majority of the past calculations took a shot at grayscale pictures to separate structures. There are different methods for the structures extraction framework however there are a few restrictions of each approach. Typical methodologies don't achieve satisfactory execution, particularly with high-determination satellite pictures.

As buildings can be of any shape and size so the problem here is to recognize the shape and extract them from satellite images. So we are required to detect buildings from satellite images by considering irregular structures and closeness of buildings. To take care of the issue a few criteria for the structures identification are utilized, where every one of them permits choosing as it were some portion of structures, yet with a little likelihood of blunder of the second kind: nearly does not distinguish false developments where they don't exist.

Among the several approaches, we finalized our approach to set up another general building extraction technique in view of feature extraction. Here, we build a generalised feature extraction procedure which we used to identify different features present in the image which are helpful for our work.

II. PROPOSED APPROACH

First of all we will be collecting the dataset from IKONOS and QUICKBIRD satellite images. Then we will load our input image into the system for further processing. All our processing is done using MATLAB tool.
The proposed automatic system consists of five different parts. Each part having their own functionality which is useful for other parts to do their tasks. In the first part, preprocessing is done in which we will be converting our RGB image into Grayscale and then it will be binarized using adaptive

thresholding method. Moreover, noise will be removed so that the result of further steps could be more efficient. In the next part, we will be segmenting the major portions of the image which is identified as some structures by considering a specific threshold value.

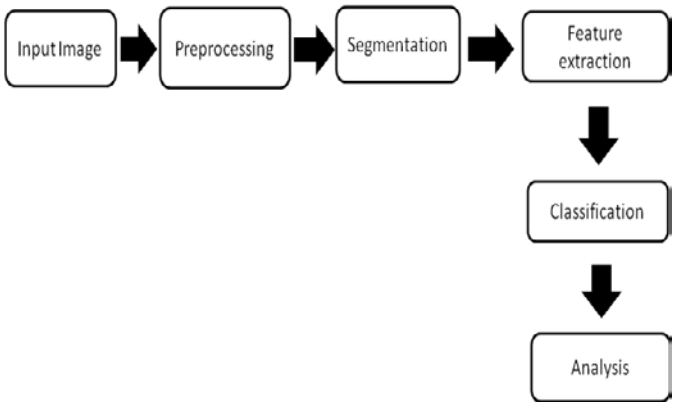


Figure 1: Proposed Approach

After segmenting important regions from the image then we will find out the edges of that image by using a canny edge detector as it will be easy to extract different features like lines, corners, curves and circular shapes. For feature extraction we have used a generalised algorithm which is a combination of LBP and Hough Transform. Before extracting different features from the image we made the size of all images same.

LBP operator essentially is an image operator which changes an image into an array or image of whole number marks depicting little scale appearance or we can state texture of the picture.

Next, by applying the Hough Transformation the geometric properties of the structures (building edges and corners) are isolated. The general thought is to change the data in the image (feature space) into a parameter space and apply there an examination. It is a procedure for secluding features that offer basic qualities. The traditional Hough change is utilized to recognize lines, circles and so on. After extracting the features of all images they are stored in a array. These stored feature vectors are matched with the feature vector of the training set which we get from the dataset. Meanwhile, it is also considering different corners from the image by using Harris corner detector which helps us in defining different lines in our image because only lines have corners.

In the next part, we will be training our dataset in according to the different features which are required for the same. Here, we will be matching the features obtained previously with our trained features. If matching comes out to be correct then it's identified as building structure else not. For training our dataset we used different classifiers named as ANN (artificial neural network), SVM (support vector machine) and K-means as we can see in the below figure 6.

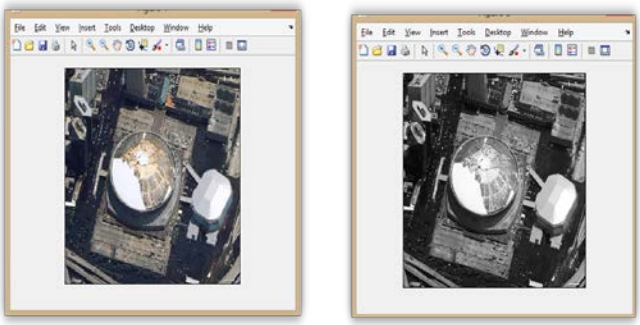
III. RESULTS

A system has been developed which helps in detecting and extracting different buildings present in satellite images. The system takes combination of different features like lines, corners, edges, circular shapes and curves to detect buildings from the satellite images. We have implemented all our system into MATLAB.

Different steps involved in this system are:

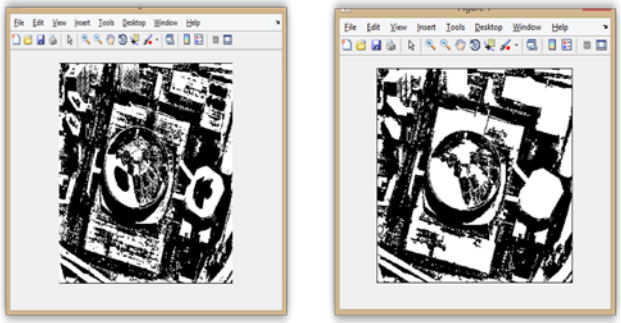
Step 1: First of all we will be giving a colour satellite image as an input to the system. It will be performing some pre-processing tasks into that image.

Firstly, it will be converted into grayscale image and then performed binarization on it. Lastly, it will be cleaning the image by applying different morphological operations.



(a) (b)

Figure 2: (a) RGB Input Image (b) Grayscale Image



(a) (b)

Figure 3: (a) Binarized Image (b) Cleaned Image

Step 2: After performing preprocessing on the image now we will be segmenting important regions from it as shown in figure 4.

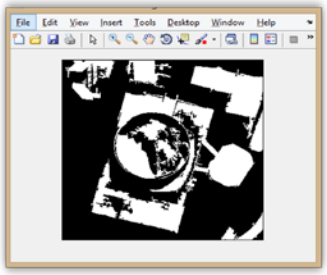


Figure 4: Segmented Image

Step 3: Now its time for the most important task of this approach i.e. feature extraction. Here, we will be extracting different features like edges, lines, corners and shapes.
In the figure 8, we have shown snapshot of few feature vectors which are created.

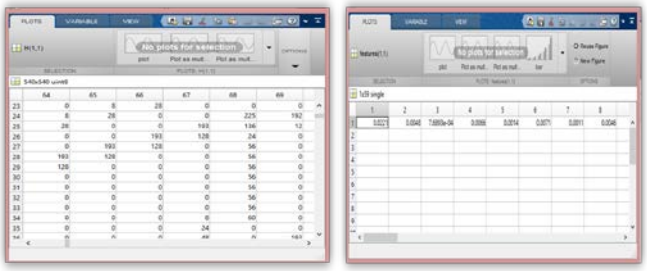


Figure 5: Snapshot of feature vectors

Step 4: Now, we will be training our dataset using any of the classifiers and match with the features which we get in our previous step. Actually, we have used three different classifiers named as ANN, K-means and SVM. We have checked the accuracy of all the above classifiers.

Classifier	**Accuracy**
SVM	80.37%
K-means	83.06%
NN	88.42%

Figure 6: Different Classifiers used

Step 5: Here, we will be analyzing our approach and finally got our result which is showing our extracted buildings.

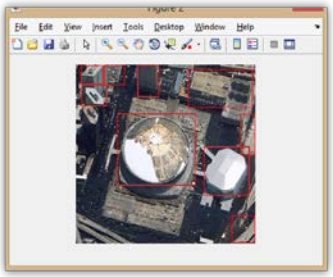


Figure 7: Extracted Buildings

IV. CONCLUSION

The main purpose of this research is to develop an algorithm which is able to detect and extract buildings from satellite images. First of all, we begin by studying the literature. Among the several approaches, we finalized our approach and started to implement it. As the features are key ingredients in image processing framework so it's important to define which features are used and how many are important. So, for this we used a hybrid approach of Hough Transform and LBP for defining our different features. The detection of buildings was also very smooth process by using region props, in which we used the bounding box property of the image and extracted the required part. For the recognition purpose we used NN because when it is practically implemented it proved to give better results than any other classifiers. NNs have the advantage that they are able to learn and model non-linear and complex relationships. Lastly, we found out the accuracy of our system.

V. FUTURE WORK

i. We can also explore the use of unsupervised learning.

ii. By increasing the training set size we can increase the accuracy.

iii. It can be further used to identify types of buildings like how many are rectangular ones and how many are of another shape.

iv. It can also be used to find out heights of different buildings.

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Image of Health house in Indonesia Based on Susenas 2017

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Abstract- Houses are a primary need for humans. The need for houses that meet healthy requirements is very important in order to improve household health status and prevent disease. The parameters of a healthy house have been regulated by a law issued by the Ministry of Health where there are 17 parameters that must be met. The purpose of this paper is to know the overview of healthy houses in Indonesia. The data used is the 2017 Susenas module. The assessment of healthy houses is based on 17 parameters which are divided into three categories, namely good, medium and less. From the results of the analysis it was found that the number of healthy houses in Indonesia was 11.3% good / fulfilling healthy conditions, 75.70% moderate categories, and 13.00% less categories. The results of mapping the number of houses in good condition are mostly in Java, Bali and southern Sumatra.

Index Terms- house, healthy house, mapping

I. Introduction

Houses are a primary need for humans and a place to spend some of their time. The house is also a place to live that must meet the criteria of comfort, security and health to support residents to work productively, therefore it is necessary to meet certain requirements. The Ministry of Public Works and Public Housing, requires that the house be habitable, space needs per person are 9 m2, the activity space gets an even distribution of light, good ventilation, air temperature and room air humidity in accordance with normal human body temperature [1]. A healthy home is one of the means to achieve optimum health status, so that it is not only physically feasible (roof, walls, floors, ventilation, lighting); but must meet the requirements of other supporting facilities such as access to clean water and waste management to be one of the influences on human health that lives in it, aspects of air quality, water quality, and behavior of its inhabitants (smoking, use of biomass fuel / fuel wood, etc.) other).

Housing quality has major implications for human life and this is of particular concern, with the world's urban population predicted to double by 2050 [2].

Provision of good housing is one of the UN agendas, where housing is not just a roof over someone's head. Conversely, housing is defined as privacy which means adequate; adequate space; physical accessibility; structural stability and endurance; lighting; adequate heating and ventilation; adequate basic infrastructure; such as water supply, sanitation and waste management facilities; appropriate environmental quality and health-related factors; and an adequate and easily accessible location [3].

In Indonesia, the procurement of healthy or habitable homes continues to be driven through the Ministry of Public Works and Public Housing (PUPR). Where in 2018 through the Public Housing Stimulant Assistance with a budget of 3.2 trillion rupiah targeting 180 thousand houses can be repaired [4]. Provision of decent housing is also included in the 2019 Government Work Plan, provision of decent housing (2.20 million units) and facilitation for improving the quality of inadequate housing (158,370 units) [5].

Unhealthy or uninhabitable homes certainly affect the health of humans who live in them. This is evidenced through research conducted by Wa Ode Yuslinda et al., That there is a relationship between the physical condition of the house and the incidence of ARI (Upper Respiratory Tract Infection) [6]. Other studies also show a relationship between the physical condition of the house and the incidence of pneumonia in infants [7]. The physical quality of the house also affects the incidence of pulmonary TB [8].

In the Minister of Health Regulation no. 829 of 1999, stated that a healthy house is a house that meets health requirements, that is not only physical requirements of a house, but must meet the location requirements not prone to disasters, ambient air quality in a residential environment must be free from toxic gas disturbances either by nature or human activities and meet air quality standard requirements, have drainage facilities that are not vector vectors, have playgrounds for children, arrangements for electrical installations must meet security, available trees for reforestation [9].

In this paper an analysis will be carried out to see a picture of healthy houses in Indonesia based on 2017 Susenas data.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

The data source to find out the description of healthy homes in Indonesia is the 2017 Susenas data. The unit of analysis is a sample of 300,000 households in all provinces in Indonesia (34 provinces). The limitations of this writing are not all variables for healthy homes are available in 2017 Susenas data such as disease vector variables and psychosocial variables. Besides this we have not yet weighted each variable used in the study.

Variables analyzed to describe healthy houses included 17 variables in the Susenas data, namely occupancy density, type of roof, type of wall, type of toilet, type of toilet, feces disposal, source of drinking water, distance of drinking water source to feces collection , location of drinking water source, physical condition of water, location of hand washing, available water in hand washing, hand washing liquid available, source of lighting, type of fuel for cooking, location of house. For variable ownership of latrines, type of toilet, processing of feces, combined being one becomes a healthy toilet because the type of latrine and fecal processing is only available if it has a toilet. Data analysis was carried out descriptively, using scoring and each variable was given a value of at least 1 and a maximum of 3, so that 13 variables were obtained the highest score 39.

Determination of healthy home category scores as follows:

- Good : score 34-39 (>87%)
- Moderate : score 25 – 33 (64-87%)
- Low : score < 25 (<64%)

Information from the score is:

1. Good : meet the health requirement, if the above percentage are above 87%
2. Moderate : when the parameter percentage is between 64-87 %
3. Low : when the percentage of parameters is less than 64%

Parameters used in the Susenas module for the determination of healthy homes and score, scores as in Table 1.

Tabel 1. Variable and Score

No	Variable	Answer	Score
1	Occupancy density (=r1604/r301)	1. Populous > 9 ~~8~~m2 / org	1
		2. < 9~~8~~ m2 / orang	3
2	Roof (r1607)	1. Beton	3
		2. Roof tile	3
		3. Asbestos	2
		4. Seng	2
		5. Bamboo	1
		6. Wood	1
		7. straw/palm fiber/leaves/rumbia	1
		8. Others	1
3	Wall (r1608)	1. Wall	3
		2. Bamboo / wire plastering	3
		3. wood / board	1
		4. Woven bamboo	1
		5. Logs	1

		6. Bamboo	1
		7. Others	1
4	Floor (r1609)	1. Marble / granite	2
		2. ceramics	2
		3. Wooden / vinyl / carpet	2
		4. Ubin / tegel / terrace	2
		5. Wood / board	3
		6. Cement / red brick	1
		7. Bamboo	1
		8. Soil	1
		9. Others	1
5	Latrines meet healthy requirements (r1610a, r1610b, r1611d)	1. Yes, qualify	3
		2. Yes, it doesn't meet the requirements	2
		3. not qualify	1
6	Source of drinking water (r1611a)	1. Branded bottled water	3
		2. Refill water	3
		3. Piping	3
		4. Drilling well / pump	3
		5. Protected Well	3
		6. Unprotected Well	2
		7. Protected fountain	3
		8. Unprotected fountain	2
		9. Surface water such as (river / lake / reservoir / pond / irrigation)	1
		10. Rainwater	1
		11. Others	1
7	Distance of source to water to feces disposal (1611b)	1. <10 m	1
		2. ≧10 m	3
		3. Unknown	1
8	Location of water source (r1612a)	1. In the house / area in the fence of the house	3
		2. Outside the fence area of the house	1
9	Water conditions (r1613)	1. Muddy	1
		2. Colored	1
		3. Taste	1
		4. foamy	1
		5. Smelly	1
		6. Not one of the above	3
10	Availability of a	1. Yes, in the house, water is available, hand washing liquid	3

	good CTPS place (r1617a,b,c)	is available	
		2. Yes, outside the house, there is water, hand washing liquid (laundry laundry / washing dish) is available	2
		3. No hand washing place	1
11	Source of lighting (r1618a)	1. PLN electricity by meter	3
		2. PLN electricity without meter	2
		3. Non PLN electricity	2
		4. Not electricity	1
12	Cooking fuel (r1619)	1. Electricity	3
		2. Elpiji 5,5 kg/blue gaz	3
		3. Elpiji 12 kg	3
		4. Elpiji 3 kg	3
		5. City gas	3
		6. Biogas	3
		7. Kerosene	2
		8. Briquettes	2
		9. charcoal	1
		10. Firewood	1
		11. Others	1
		12. Not cooking at home	1
13	Ever been flooded (r1620)	1. Yes	1
		2. Never	3

III. WRITE DOWN YOUR STUDIES AND FINDINGS

a. Image of a healthy home based on all variables

From the results of the analysis show that from the aspect of occupancy density, 83.5% of houses in Indonesia fall into the fairly good category. Water conditions, and the condition of houses that are not flooded with good categories are quite high (more than 90%). For physical building houses, roofing materials and floors of houses, no more than 40% are included in the good category, only walls that have reached 65.9%. The availability of latrines that meet new health requirements is around 57.8%. Good hand washing facilities with soap (CTPS) are still very lacking, 37.7%.

Tabel 2. Variable Health Houses Based on Categories

No	Variable	Category		
		Good (%)	Moderate (%)	Low (%)
1	Occupancy density	83,5	-	16,5
2	Roof	38,9	57,0	4,1
3	Wall	65,9	-	34,1
4	Floor	38,6	5,3	56,0

5	Latrines meet healthy requirements	57,8	5,7	36,5
6	Source of drinking water	82,8	10,4	6,8
7	Distance of source to water to feces disposal	62,5	-	37,5
8	Location of water source	62,0	-	38,0
9	Water condition	92,5	-	7,5
10	Source of lighting	81,9	13,7	4,5
11	Cooking fuel	68,2	8,0	23,8
12	Ever been flooded	96,7	-	3,3
13	Availability of a good CTPS place	37,7	30,1	32,2

Drinking water sources that are considered to meet the health requirements have been 82.8%, for water sources that use dug wells and springs the distance to sewage disposal and the location of water sources has been quite good, above 60%. For lighting sources only 4.5% of households are still lacking. The use of fuel that is good in cooking can affect air pollution in the house. From the results of the analysis it was found that only 23.8% of households that cooked with fulfilling fuel did not meet the healthy requirements.

b. An overview of a healthy house by region

From the results of the analysis, the categories of healthy homes in Indonesia are as follows: Good categories of 11.3%, moderate categories 75.70%, and less categories 13.00% (figure 1a). If seen by province (figure 1b), it can be seen that the average house with a good category is in southern Sumatra and Java Island, Bali. And the highest is in Central Java Province (33.90%) and D I Yogyakarta (23.70%). If we analyze the categories of urban and rural areas, the number of houses that meet the health requirements is 12.2% in urban areas and 10.5% in rural areas (figure 2).

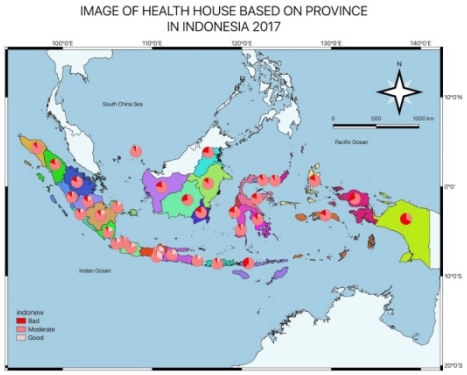

Figure 1a. Image of a healthy home by province in Indonesia in 2017

Figure 1b. Image of health houses in Indonesia in 2017

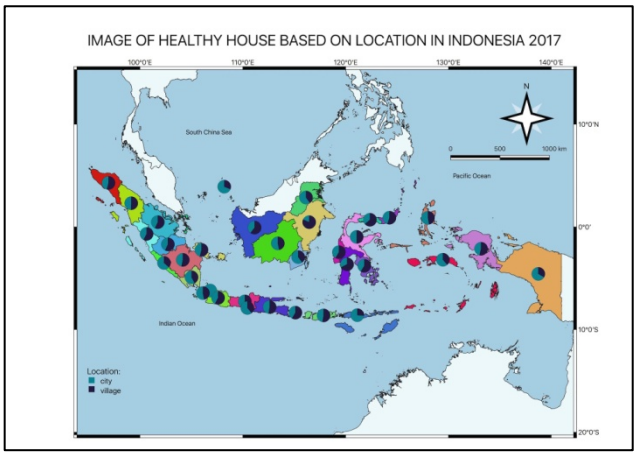

Figure 2. Image of houses that meet healthy requirements based on urban and rural areas

In figure 2 it can be seen that the number of houses that fulfill healthy homes is not only in urban areas but also in rural areas. As in most islands of Java and Sumatra. Even in almost all provinces on the island of Sulawesi the number of houses that meet health requirements is more in rural areas than in urban areas.

Washing hands with soap is included in clean and healthy living behavior and of course affects the health of the households that live in it. From the results of analysis of houses that provide hand washing facilities that meet the requirements in Indonesia, only 37.7%. Seen from the picture 3 houses with good hand washing facilities are located in most of the islands of Sumatra and Java. Whereas in the East the existence of hand washing facilities that meet the requirements is still low.

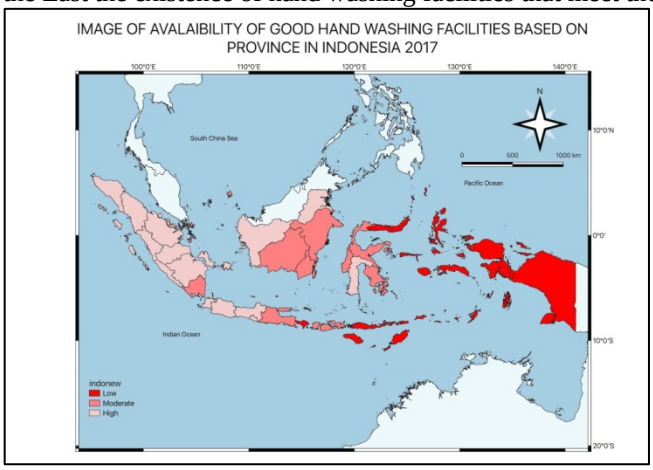

Figure 3. Image of the availability of good hand washing facilities by province

In terms of physical buildings, almost all provinces in Indonesia do not yet have healthy conditions for their inhabitants (figure 4). Whereas for latrines that have not met healthy conditions, only in Papua, East Nusa Tenggara and a small part of Sulawesi island (figure 5).

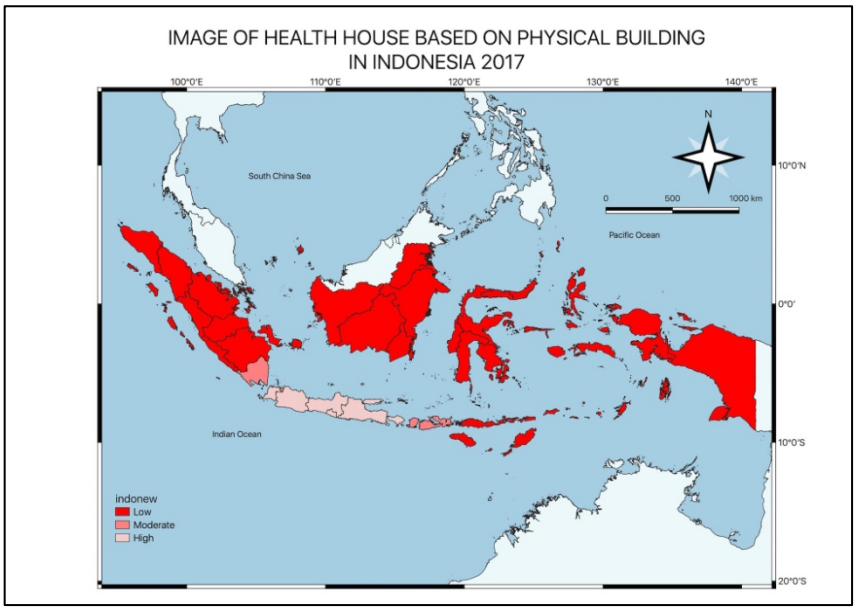

Figure 4. Image of a healthy house based on physical buildings in Indonesia

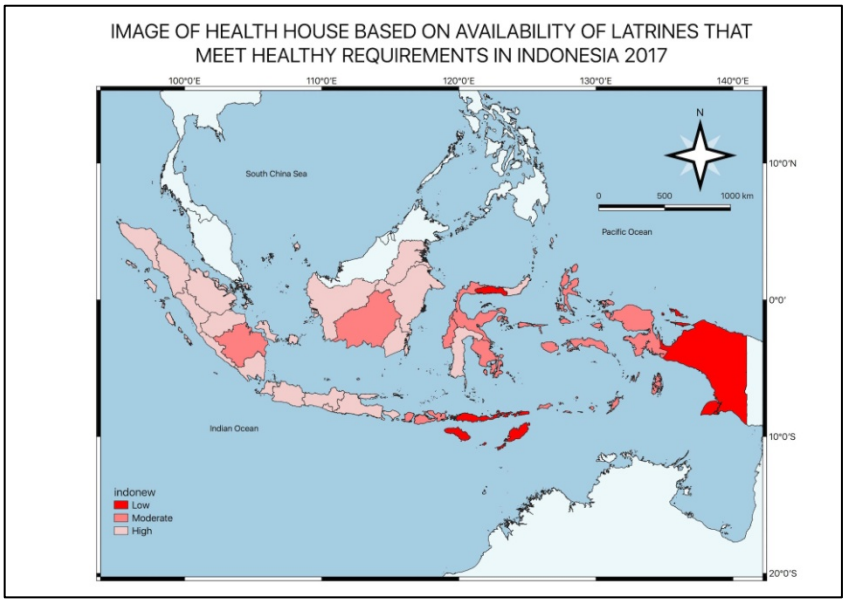

Figure 5. Image of a healthy home based on the availability of latrines that meet the healthy requirements in Indonesia

The air quality in the home can also be affected by the fuel used for cooking. Overall more than 60% of households have used good fuel. If seen by region in eastern Indonesia there are still many who use fuel for cooking which can cause pollution in homes such as kerosene, charcoal and firewood (figure 6).

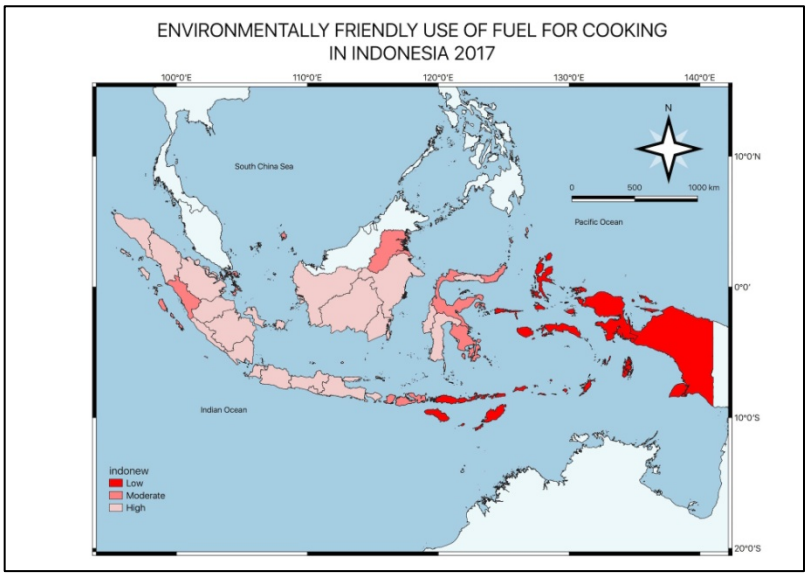

Figure 6. Image of environmentally friendly cooking fuel use by province in Indonesia

Discussion

A good home can save lives, prevent disease, improve quality of life, reduce poverty, and help reduce climate change. In addition, good homes are important for health, given urban growth, increasingly densely populated populations and climate change. The distribution of houses that meet the health requirements in Indonesia turns out to be not much different between urban and rural areas, this proves that many households living in urban areas still do not care about the influence of their homes on their health.

From the 13 variables that have been analyzed, only 6 variables whose value is still lacking are: house roofs, floors, latrines that meet healthy requirements, distance of water sources to feces disposal, location of water sources, and availability of good hand washing places.

Clean and healthy living behavior (PHBS) is still very low, this is evidenced by the availability of hand washing places and the use of soap still in the home, which is only 37%, especially in eastern Indonesia where the percentage is very low.

The physical condition of house building has an effect on health and the incidence of disease [10][11]. Viewed from most regions, Indonesia does not have physical buildings that meet healthy requirements, especially for roofs and floors of houses. For roofs 49.8% roofed zinc and there were still 3.1% roofed straw or palm fiber. As for the floor, there are still 5.3% grounded. This condition certainly affects the air quality and humidity in the house which can cause or spread diseases such as tuberculosis [12] or breathing-related (ARI)[13].

Among the requirements of a healthy home is the availability of human waste disposal that meets healthy requirements, such as the use of latrines, the type of latrines and the distance of the source of water from the landfill [9] [14]. Judging from the analysis of Papua, Gorontalo and NTT are the lowest provinces in the ownership of latrines that meet healthy requirements. Latrines that do not meet health requirements are a factor in diarrheal disease [15] [16][17].

IV. CONCLUSION

Distribution of healthy homes in Indonesia is seen only on the island of Java, Bali and parts of Sumatra. Of course this is a homework from the Ministry of Public Works and Public Housing so that it does not only focus on building houses but must also improve existing home facilities to meet healthy requirements. The Ministry of Health is also responsible for educating households to behave in a clean and healthy manner so that the number of diseases caused by physical conditions and the home environment can be reduced.

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Analysis of Bitumen Drain down Characteristics of Sisal-Plastic Modified Open Graded Asphalt

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Abstract- To investigate the behavior of sisal fibre and waste plastic modified asphalt concrete mixes, a study was done to determine the feasibility of modifying the behaviour of open graded asphalt (OGA) concrete mix through the use of sisal fiber and waste plastics. The main objective of this research was to analyze and study how sisal fibre and waste plastics can be used to reduce bitumen drain down and effectively utilize waste plastics in construction of flexible pavement to improve on strength.

A thorough study was done on the methodology of using locally-available waste plastics and sisal fibre as stabilizer and present the various tests performed on aggregates, bitumen and asphalt concrete. Aggregates sizes 12/6 mm and 2-3 mm size of waste plastics were heated and mixing done until plastics melted and coated aggregates. Thereafter, sodium hydroxide (NaOH) treated sisal fibre, shred into 5 mm long threads was mixed with hot bitumen and coated hot aggregates at specified temperature. The resultant mix was analyzed for bitumen retention properties to assess its suitability for road construction.

Using Marshall procedure, optimum sisal content (OSC) was 0.3% and optimum plastic content (OPC) was 5% for modified asphalt concrete mixes prepared using optimum binder content (OBC) of 5.5%. It was established that bitumen drain down of Sisal-Plastic modified samples was 0% while non-modified samples had bitumen drain down of 6.5%.

The use of this innovative technology will strengthen the road construction industry as well as help to improve the environment. This would further their successful application as construction material in flexible pavement to improve road performance.

Index Terms- Waste plastics, sisal fibre, open graded asphalt (OGA), sisal-plastic modified open graded asphalt (SPMOGA), Marshall test, stability, flow, voids, drain down

I. Introduction

Drain down is considered to be that portion of the mixture (fines and bitumen) that separates itself from the sample as a whole and flows downward through the mixture (NAPA, 1999). Drain down test is more significant for open graded asphalt (OGA) mixtures than for conventional dense-graded mixtures. It can be used to determine whether the amount of drain down measured for a given bituminous mixture is within the specified acceptable levels. This test is primarily used for mixtures with high coarse aggregate content (the internal voids of the uncompacted mix are larger, resulting in more drain down) such as stone matrix asphalt and porous asphalt (open-graded friction course) (Huang et al., 2007).

Potential problems with OGA mixtures are drainage and bleeding. Storage and placement temperatures cannot be lowered to control these problems due to the difficulty in obtaining the required compaction (Bindu and Beena, 2009). Therefore, stabilizing additives has been added to stiffen the mastic and thereby reducing the drainage of the mixture at high temperatures and to obtain even higher binder contents for increased durability (FHA, 1992).

OGA mixtures exhibited a very high bitumen binder film thickness (5-7% by weight of mix). This high binder content and the filler content (compared to that of dense-graded HMA) lead to higher susceptibility for the bitumen binder to drain off the aggregate skeleton (i.e., drain down) in mixtures (Huang et al., 2007). Irregular distribution of bitumen binder due to its drain down can lead to raveling of zones with low bitumen binder content and reduction of permeability in zones with accumulation of bitumen binder (Bindu and Beena, 2009; Mallick et al.,2000).

II. Materials and Methods

2.1 Materials

Materials used in this study are 80/100 penetration grade bitumen, graded aggregate of nominal size 12/6 mm, treated sisal fibre of diameter 0.1 to 0.4 mm and length of 5mm, shredded waste plastics of 2-3 mm. Marshal Test procedure was used in the investigation for study of behaviour of sisal-plastic modified open graded asphalt mix.

2.1.1 Aggregates

The coarse aggregate used was normal weight aggregate with varying sizes of open graded (12-6 mm). Salient properties of the aggregates that were determined by standard tests are given in Table 1.

Table 1: Salient properties of the aggregates.

S/No.	Test	Permissible Value	Test Value	Standard
1	Sieve analysis	See Fig. 1	See Fig. 1	ASTM C136/C136M – 14
2	Impact value (%)	<30%	27%	BS EN 1097-2:2010
3	Crushing value (%)	<30%	26%	BS EN 1097-2:2010
4	Abrasion value (%)	<30%	28%	BS EN 1097-8:2009
5	Specific Gravity	2.72	2.5-3	BS EN 1097-6:2013

It was found to be within the OGA % grading range as shown in Figure 1. From the results, it is expected to have Grain-to-grain contact, high void content and high permeability. These characteristics of OGA make it best suited for road surface layer, thus providing required friction and noise reduction on road surface.

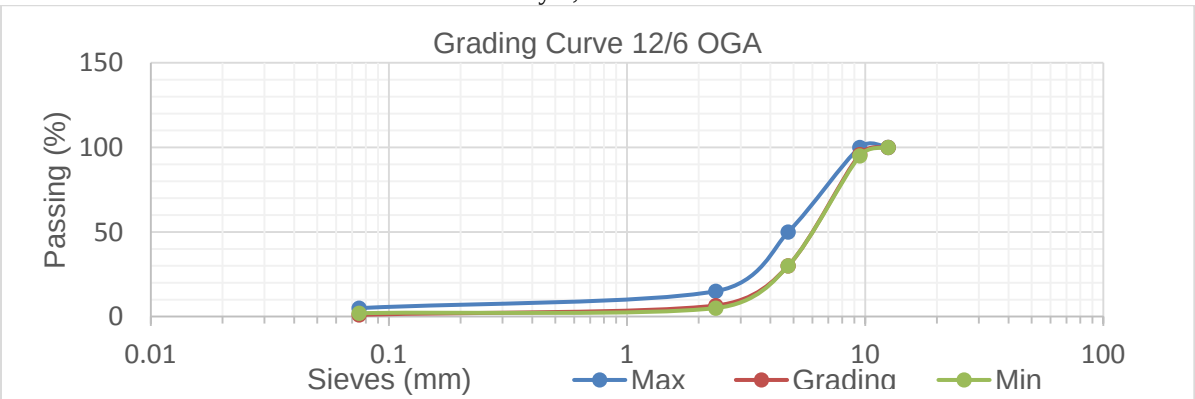

Figure 1: Grading curve for 12/6 mm aggregate for OGA mix.

Figure 1 shows the aggregate size 12/6 mm, whose composition ratio of course aggregates and fines are 70:30. The grading curve lies between the limits for aggregates to be used in preparation of OGA mix.

2.1.2 Bitumen

In this research 80/100 penetration grade bitumen was used as binder for preparation of mixes. Salient properties of the bitumen that were determined by standard tests are given in Table 1.

Table 1: Salient properties of bitumen

S/No.	Test	Permissible Value	Test Value	Standard
1	Penetration in mm at 25°C	89	80-100	BS EN 1426:2015, BS 2000-49:2015
2	Softening Point (°C)	47	42-50	BS EN 1427:2000, BS2000-58:2000
3	Ductility	105	75 min	ASTM D113-17
4	Specific Gravity	1.02	1.01-1.05	ASTM D70-97

From the bitumen properties, it is seen that it is suitable to be used as a binder in the manufacture of asphalt concrete.

2.1.3 Waste Plastics

A mixture of high-density polyethylene (HDPE) and low-density polyethylene (LDPE) were shred to size 2-3 mm. Properties determined by standard tests are given in Table 2.

Table 2: Tests on waste plastics.

S/No.	Test	Permissible Value	Test Value	Standard
1	Specific gravity	1.3-1.4	1.4	ASTM D1505-18
2	Softening point	No gas release	No gas release at 100°-120°C	
3	Binding properties	>10 N/mm^2	14 N/mm^2	

The binding properties of the waste plastics is an indicator that it can be used to bind aggregate particles together without release of gases at melting temperatures.

2.1.4 Sisal Fibre

Sisal fibre was tested for various properties as indicated in Table 3.

Table 3: Properties of sisal fibre.

Properties of Sisal Fibre Tested	Values	Permissible Values
Diameter (mm)	0.11	0.1-0.4
Density (g/cm^3)	1.33	0.67-1.5
Natural moisture content (%)	11.5	11.44-15.85
Tensile strength (MPa)	180.6	108.26-251.9
Water absorption (%)	98	85-135
Strain at failure (%)	23.6	13.7-41.0

From the results of various properties, it was found out that the parameters are within the permissible range indicated in Table 3. The sisal properties of strength and strain implies that sisal fibre can be used as a stabilizing additive in preparation of asphalt concrete, where they can hold aggregates and bitumen into a firm matrix.

III. Laboratory Mix Design and Analysis

Marshall Stability test was conducted on non-modified OGA samples by applying 50 blows on each face. Bituminous mixes were prepared by mixing the graded aggregates with 80/100 penetration grade bitumen and required additives. 5.5% optimum bitumen content of control OGA mix was determined by Marshal methods. 5mm treated sisal fibre and shredded waste plastics, 2-3mm, were used as the modifiers. The fibre content in this research was varied between 0.1%, 0.2%, 0.3% and 0.4% by weight of mix and waste plastics content varied from 1%, 3%, 5% and 7% by weight of mix. The sisal fibre and waste plastics content that gave the optimum marshal mix parameters were used to prepare sisal-plastic modified open graded asphalt (SPMOGA) concrete samples. These SPMOGA samples were analyzed for drain down characteristics as discussed herein. Waste plastics were added in heated aggregate and mixed to obtain homogeneous mixture. Sisal fibre was then treated with sodium hydroxide solution prior to mixing with heated bitumen. The Plastic-coated aggregates are mixed with sisal fibre and bitumen. The mixing and testing temperatures were kept at 165°C and 150°C respectively.

3.1 Determination of Bitumen Content

Three samples of open graded asphalt (OGA) concrete were prepared for each bitumen content. The bitumen content was varied from 4.5% to 6% of total weight of sample. It was observed that Specific gravity increases with increase in percentage of bitumen up to 5.5% of bitumen content and then drops with increase in bitumen content. The corrected Marshall stability increased with increase in bitumen content up to 5.5% when the reduction was noticed as seen in Figure 2(b). Marshall flow values were found to range between 2.98-3.21 mm while percentage of void (V_v) in the total mix ranged between 6.40-4.05%. Figures 2(a), 2(b) and 2(c) show the variation of performance of the mix in varying bitumen content.

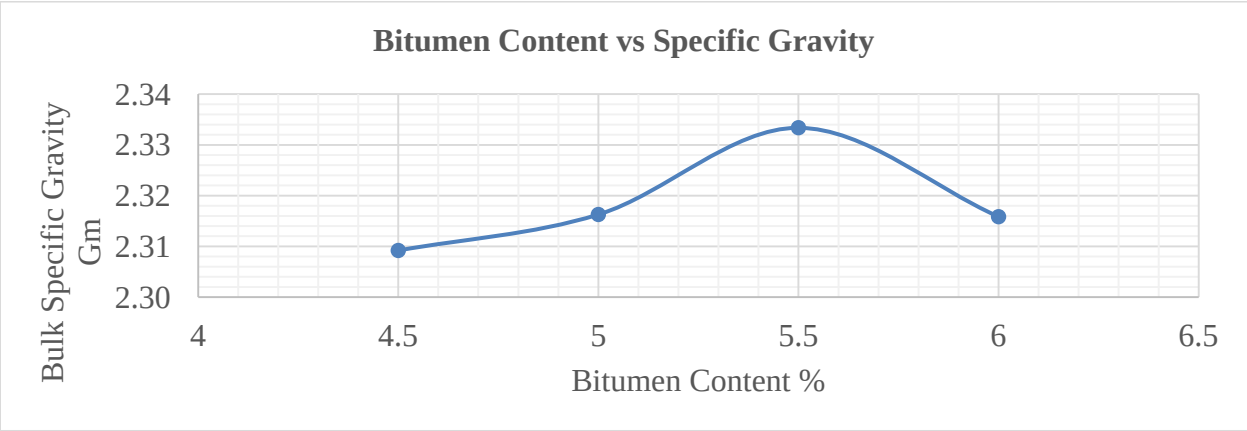

Figure 2(a): Bitumen content vs density of mix.

Figure 2(a) shows the variation in bulk specific gravity of the mix at various bitumen content. It was observed that the maximum specific gravity of 2.333 was achieved at 5.5% of bitumen content. Specific gravity is used to calculate the amount of asphalt absorbed in asphalt mixture, which is then used in determining the effective asphalt content. As more bitumen content is increase from 4.5% to 5.5%, there is increase in specific gravity. This is due to absorption of bitumen by aggregates, thus filling the pores and voids of the aggregates. However, beyond 5.5%, the specific gravity decreases due to excess bitumen content which increases the volume of the mix, with no significant change in mass.

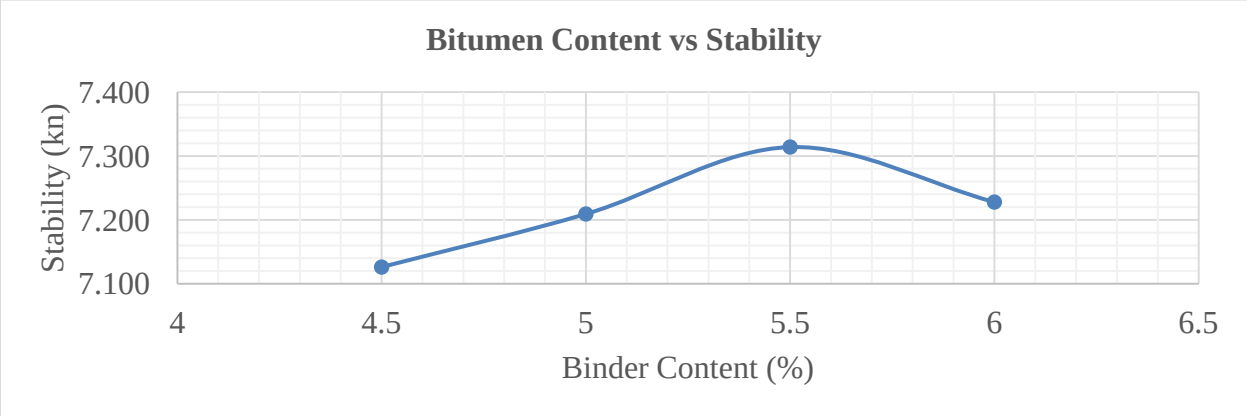

Figure 2(b): Bitumen content vs stability.

Figure 2(b) shows the variation in corrected stability of the mix at various bitumen content. It was observed that the maximum stability of 7.314 kN was achieved at 5.5% of bitumen content. it is observed that the stability of mix increases with bitumen content up to 5.5%. this is attributed to binding properties of bitumen. It binds aggregate particles together as its content is increased. However, beyond 5.5%, bitumen wetting of aggregates sets in. the dispersion of aggregates due to high bitumen content takes place, thus reducing aggregate to aggregate particle contact, thus affecting cohesion. Hence reduction in strength.

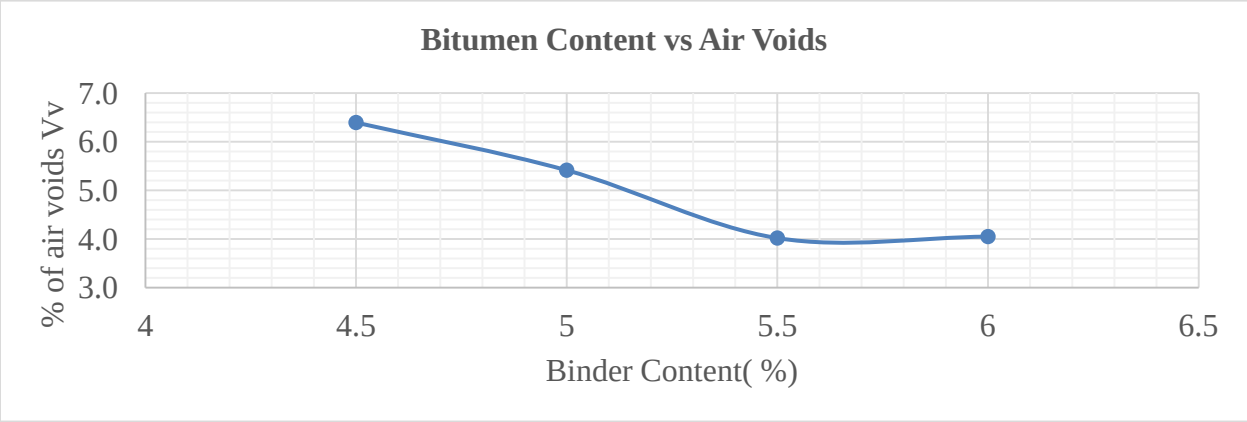

Figure 2(c): Bitumen content vs % Air voids

Figure 2(c) shows the variation in percentage air voids of the mix at various bitumen content. It was observed that the 4.02% air void was achieved at 5.5% of bitumen content. It was observed that air voids reduced with increase in bitumen content. this is associated with filling ofg air spaces and voids by bitumen content. Air voids is the total volume of the small pockets of air between the coated aggregate particles throughout a compacted paving mixture, expressed as a percent of the bulk volume of the compacted paving mixture. Air voids that are either too high or too low can cause a significant reduction in pavement life. air voids between 3 and 5% generally produce the best compromise of pavement strength, fatigue life, durability, raveling, rutting and moisture damage susceptibility.

Optimum bitumen content was calculated using Equation 3.1

$$B_0 = \frac{5.5+5.5+5.5}{3} = 5.5\% \quad \text{.……………………………………………………….. . . . . 3.1}$$

This OGA concrete mix without additives was considered as the control mix for the subsequent studies.

3.2 Drain Down Characteristics of Sisal-Plastic Modified OGA

This test is intended to simulate conditions that the mixture is likely to encounter as it is produced, stored, transported, and placed at high temperatures. The loose mixture was placed in a wire basket which was positioned on a pre-weighed dry paper plate. The entire apparatus was placed in the oven for one hour at 177°C. After one hour, the basket containing the sample was removed from the oven along with paper plate. The paper plate was weighed to determine the amount of occurred drain down. The drain down was calculated as the percentage of binder which drained out of the basket compared to the original weight of the sample. The average of three normal tests was reported as the drain down of the modifier.

Results of drain down at various percentages of additive contents are given in Tables 4(a), 4(b) and Figure 3(a) and 3(b). From Tables 4(a) and 4(b), it can be observed that all additives provide significant stabilization to the mixture as compared to

the control mixture. Drain down of the control mixture is 6.5% which is beyond the specified limits as per AASHTO T305 (not to exceed 0.3% by weight of mix). It is evident that in all stabilized OGA mixtures, the values of drain down decreases considerably with increase in additive content and reaches the acceptable limit at 0.3 % sisal fibre (SF) content and 5% waste plastic (WP) content. This indicates that in all mixtures, each additive is performing its function as a stabilizing additive. The potential effects of the inclusion of additives in OGA mixtures are therefore beneficial in preventing the bleeding phenomenon of the mixtures and the drain down of this gap graded mix having rich binder content.

Either sisal fibre or waste plastics additive can be effectively utilized as the stabilizing agent. Fibre stabilizers are found to be more effective in reducing the drain down than waste plastics stabilizers due to the absorptive nature of fibres.

Table 4(a): Drain down values for different percentages of sisal fibre

Sisal Fibre (%)	Drain Down (%)
0	6.489
0.1	2.340
0.2	0.136
0.3	0.008
0.4	0.000

Table 4(b): Drain down values for different percentages of waste plastics

Waste Plastics (%)	Drain Down (%)
0	6.489
1	3.610
3	1.426
5	0.804
7	0.330

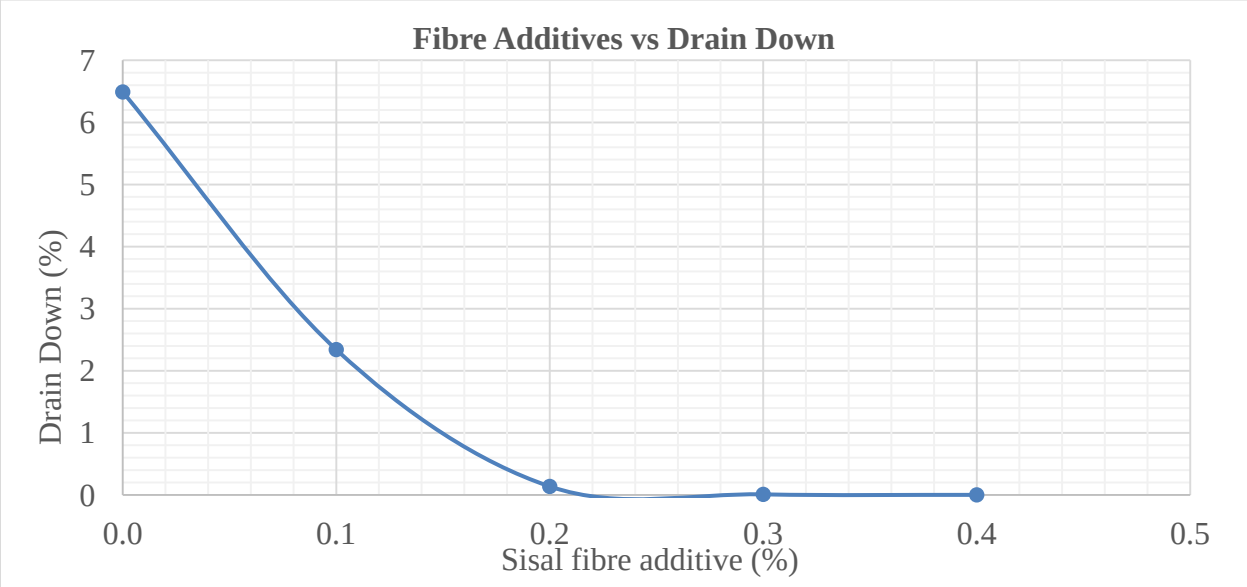

Figure 3(a): Variation of drain down with different percentages of SF.

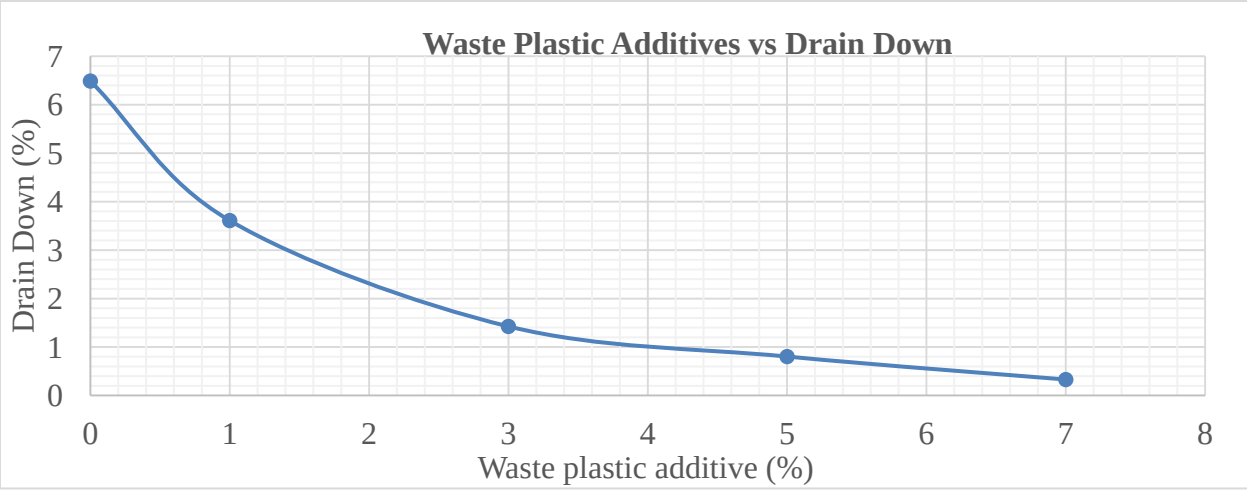

Figure 3(b): Variation of drain down with different percentages of waste plastics.

3.3. Stabilizing Capacity of Sisal-Plastic Compared to Other Additives

There are some differences in the performance of each additive at binder contents greater than the optimum binder content. Drain down is also tested to determine the stabilizing capacity of each additive. The drain down for mix with no additives was more compared to mixtures with additives as shown in Figure 4. It is observed that, when 0.3% of fibre is used together with 5% of waste plastics, the bitumen retention by waste plastics was greatly improved compared to other samples.

The sisal fibre and sisal-plastic additives have a much higher stabilizing effect, which can be attributed to the absorptive nature of the fibres compared to the waste plastics. The fibres firmly bind the aggregate particles inside the matrix and prevent them of movement, which makes the mix stiffer.

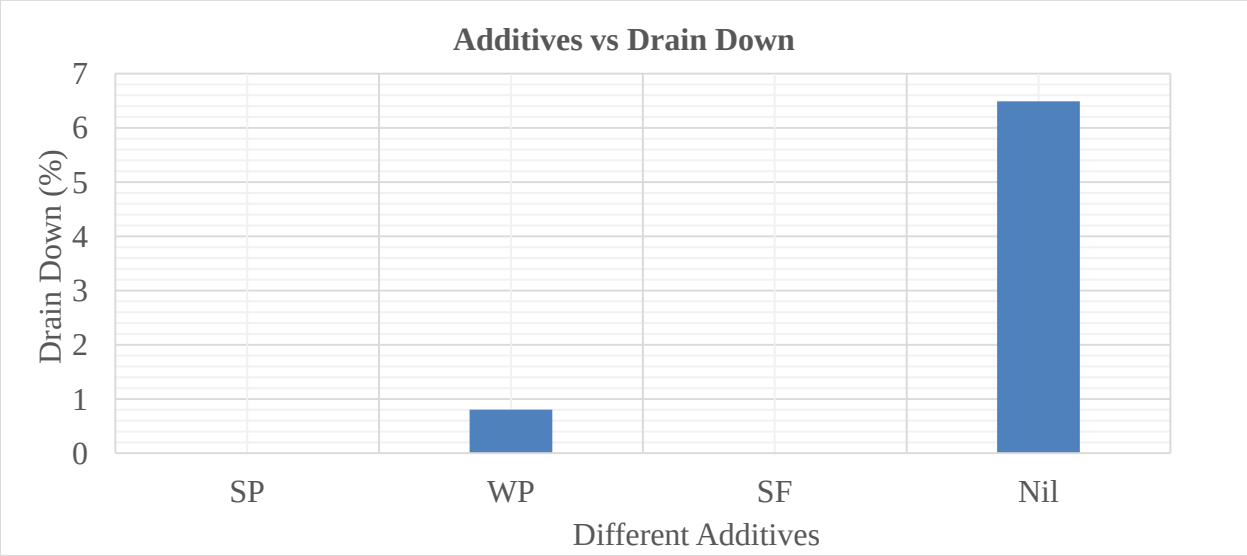

Figure 4: Drain down results for different additives

IV. Conclusion

From the drain down study of the OGA mixtures, it can be concluded that the additives used in the OGA acts as effective stabilizing agents. The combination of Sisal Fibre (SF) and waste plastics (WP) improves the bitumen retention property of OGA stabilized with Waste Plastics. The drain down was found to be 0% for Sisal-Plastic modified samples as compared to 6.5% for control mix and 0.8% for waste plastic modified samples. The role of additive is to stiffen the mastic and thereby reducing the drainage of the mixture at high temperatures during storage, transportation, placement and compaction of OGA mixtures. Sisal-plastic modified open graded asphalt showed the best bitumen retention compared with OGA stabilized with Waste Plastics.

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Bitumen Retention of Modified Open Graded Asphalt Using Sisal Fibre and Waste Plastics

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Abstract- To investigate the behavior of sisal fibre and waste plastic modified asphalt concrete mixes, a study was done to determine the feasibility of modifying the behaviour of open graded asphalt (OGA) concrete mix through the use of sisal fiber and waste plastics. The main objective of this research was to analyze and study how a combination of sisal fibre and waste plastics can be used to reduce bitumen drain down and effectively utilize waste plastics in construction of flexible pavement to improve on strength.

A thorough study was done on the methodology of using locally-available waste plastics and sisal fibre as stabilizer and present the various tests performed on aggregates, bitumen and asphalt concrete. Aggregates sizes 12/6 mm and waste plastics size 2-3mm were heated and mixed until plastics melted and coated aggregates. Thereafter, sodium hydroxide (NaOH) treated sisal fibre, shred into 5 mm long threads was mixed with hot bitumen. The mixture of bitumen and sisal was added to coated hot aggregates at specified temperature. The resultant mix was analyzed for bitumen retention properties to assess sisal-plastic ability to reduce bitumen loss.

Using Marshall procedure, optimum sisal content (OSC) was 0.3% and optimum plastic content (OPC) was 5% for modified asphalt concrete mixes prepared using optimum binder content (OBC) of 5.5%. It was established that bitumen drain down was 0% when a mixture at optimum contents of sisal fibre and waste plastics are used. The non-modified samples had bitumen drain down of 6.5%. this shows that the sisal-plastic additives have high bitumen retention due to the absorptive nature of sisal fibre.

Use of sisal fibre and waste plastics will strengthen the road pavements as well as help to improve the environment.

Index Terms- Waste plastics, sisal fibre, open graded asphalt (OGA), sisal-plastic modified open graded asphalt (SPMOGA), Marshall test, stability, flow, voids, drain down

I. Introduction

Drain down is considered to be that portion of the mixture (fines and bitumen) that separates itself from the sample as a whole and flows downward through the mixture (NAPA, 1999). Drain down test is more significant for open graded asphalt (OGA) mixtures than for conventional dense-graded mixtures because the former tends to lose bitumen during transportation and laying of asphalt concrete. It can be used to determine whether the amount of drain down measured for a given bituminous mixture is within the specified acceptable levels. This test is primarily used for mixtures with high coarse aggregate content where the internal voids of the uncompacted mix are larger, resulting in more drain down such as stone matrix asphalt and open-graded friction course (Huang et al., 2007).

Disadvantages associated with OGA mixtures are drainage and bleeding at high temperatures. However, temperatures cannot be made low during Storage and placement due to difficulty experienced in obtaining the required compaction (Bindu and Beena, 2009). Stabilizing additives can therefore, be added to stiffen the mixture thereby improve the bitumen retention at high temperatures. This ensures that we retain higher bitumen contents for increased strength and durability (FHA, 1992).

OGA concrete mix has higher bitumen binder content of between 5-7% by weight of mix compared with dense graded asphalt. Hence, high bitumen content and filler results into bitumen drain down. This makes the aggregate lose the binder that binds the aggregates together in the mix (Huang et al., 2007). The loss of bitumen and uneven distribution of bitumen as a result of drain down can result into top sections of mixture have less bitumen content. this can also result into mix with less of permeability in sections with higher concentrations of binder content (Bindu and Beena, 2014; Mallick et al.,2000).

II. Materials and Methods

2.1 Materials

Materials used in this study are 80/100 penetration grade bitumen, graded aggregate of nominal size 12/6 mm, treated sisal fibre of diameter 0.1 to 0.4 mm and length of 5mm, shredded waste plastics of 2-3 mm. Marshal Test procedure was used in the investigation for study of behaviour of sisal-plastic modified open graded asphalt mix.

2.1.1 Aggregates

The coarse aggregate used was sizes 12/6mm. properties that were determined by standard tests are as given in Table 1.

Table 1: properties of the aggregates

S/No.	Test	Permissible Value	Test Value	Standard
1	Sieve analysis	See Fig. 1	See Fig. 1	ASTM C136/C136M – 14
2	Impact value (%)	<30%	27%	BS EN 1097-2:2010
3	Crushing value (%)	<30%	26%	BS EN 1097-2:2010
4	Abrasion value (%)	<30%	28%	BS EN 1097-8:2009
5	Specific Gravity	2.72	2.5-3	BS EN 1097-6:2013

The grading was done in accordance to ASTM C136/C136M – 14. The aggregate sizes were found to be within the grading range as shown in Figure 1. From the results, OGA is expected to have high cohesion due to grain-to-grain contact, high void content due to less fines and high permeability as a result of high coarse aggregates of 70%. The results obtained for impact value, crushing value and abrasion values indicates that the aggregates are able to bear the require loads without undergoing further disintegration. Breakdown of aggregates produces further fines, weakens the road pavements, thus resulting into cracks and pothole development. The specific gravity results found indicated that aggregates are less porous. Bitumen absorption would low and therefore much of it will go into binding the aggregate particles together. These characteristics of OGA make it best suited for road surface layer which provide required friction and noise reduction.

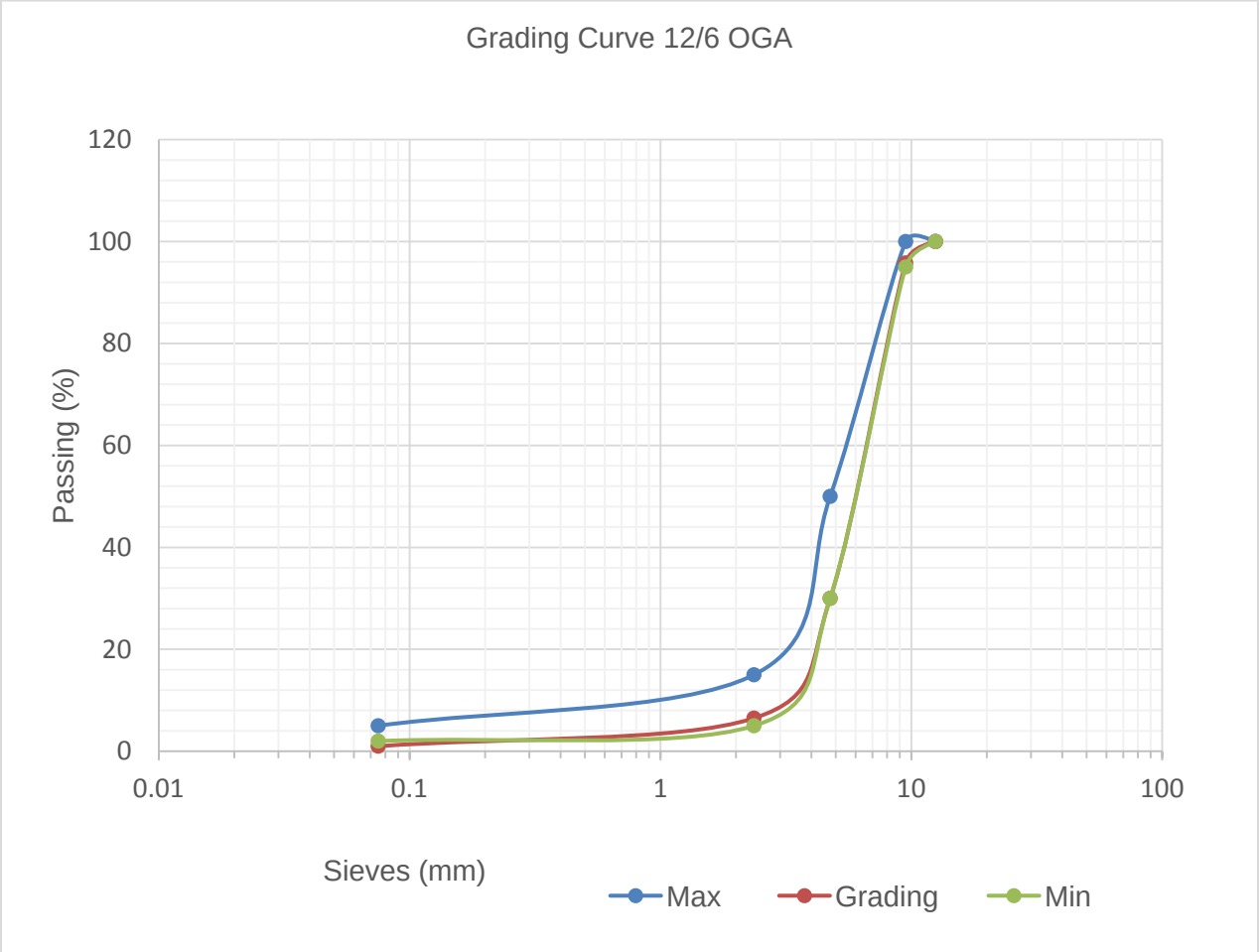

Figure 1: Grading curve for 12/6 mm aggregate for OGA mix.

Figure 1 shows the aggregate size 12/6 mm, whose composition ratio of course aggregates and fines are 70:30. The grading curve lies between the limits for aggregates to be used in preparation of OGA mix. The coarse aggregates are more compared to fines. This results into a strong asphalt mix with due to stone to stone grain contact.

2.1.2 Bitumen

In this research 80/100 penetration grade bitumen was used as binder for preparation of mixes. The resultant properties of the bitumen that were determined by standard tests are given in Table 2.

Table 2: Properties of bitumen

S/No.	Test	Permissible Value	Test Value	Standard
1	Penetration in mm at 25°C	89	80-100	BS EN 1426:2015, BS 2000-49:2015
2	Softening Point (°C)	47	42-50	BS EN 1427:2000, BS2000-58:2000
3	Ductility	105	75 min	ASTM D113-17
4	Specific Gravity	1.02	1.01-1.05	ASTM D70-97

From table 2, it is observed that Bitumen class 800/100 properties are within the permissible values. Penetration is a measure the consistency of bitumen. This shows that this bitumen grade can be used in cold climate and hot climate areas. Softening point is the tendency of the material to flow at increased temperature. The result indicate that the bitumen can be properly mixed with aggregates at when heated. Ductility results indicates that this grade of bitumen can be used to prepare asphalt that can withstand elongation within the ASTM D113-17standard requirements without breakage. Hence compaction can be done to required level and pavement can withstand the traffic load without cracking.

From the bitumen properties, it is seen that it is suitable to be used as a binder in the manufacture of asphalt concrete.

2.1.3 Waste Plastics

A mixture of high-density polyethylene (HDPE) and low-density polyethylene (LDPE) were shred to size 2-3 mm. Properties determined by standard tests are given in Table 3.

Table 3: Properties of waste plastics.

S/No.	Test	Permissible Value	Test Value	Standard
1	Specific gravity	1.3-1.4	1.4	ASTM D1505-18
2	Softening point	No gas release	No gas release at 100°-120°C	
3	Binding properties	>10 N/mm^2	14 N/mm^2	

From table 3, the specific gravity of the waste plastics indicates that the material is relatively dense and within the standard ASTM D1505-18. this shows that the introduction of this material in asphalt concrete can strengthen it by binding the aggregate grains together. The softening point indicates that the waste plastics can be used to increase the softening point of asphalt concrete for use in hot climatic conditions. The non-release of gases at high temperature shows that the materials can be heated up and mixed with aggregates without release of gases that impact negatively on the environment. The binding properties of the waste plastics is an indicator that it can be used to bind aggregate particles together to produce a mixture with high stability. This wound product a strong pavement that can resist cracking and rutting

2.1.4 Sisal Fibre

Sisal fibre was tested for various properties as indicated in Table 4.

Table 4: Properties of sisal fibre.

Properties of Sisal Fibre Tested	Values	Permissible Range
Diameter (mm)	0.11	0.1-0.4
Density (g/cm^3)	1.33	0.67-1.5
Natural moisture content (%)	11.5	11.44-15.85
Tensile strength (MPa)	180.6	108.26-251.9
Water absorption (%)	98	85-135
Strain at failure (%)	23.6	13.7-41.0

From the results of various properties, it was found out that the parameters are within the permissible range indicated in Table 4. The results of diameter, strength and strain shows that sisal fibres can be used as stabilizers for open graded asphalt. They can hold aggregates particles and bitumen into a firm matrix mixture.

III. Laboratory Mix Design and Analysis

Marshall Stability test was conducted on non-modified OGA samples by applying 50 blows on each face. Bituminous mixes were prepared by mixing the graded aggregates with 80/100 penetration grade bitumen and required additives. 5.5% optimum bitumen content of control OGA mix was determined by Marshal methods. 5mm sisal fibre, treated with weak sodium hydroxide (NaOH) and shredded waste plastics, 2-3mm, were used as the modifiers. The fibre content in this research was varied between 0.1%, 0.2%, 0.3% and 0.4% by weight of mix and waste plastics content varied from 1%, 3%, 5% and 7% by weight of mix. The sisal fibre and waste plastics content that gave the optimum marshal mix parameters were used to prepare sisal-plastic modified open graded asphalt (SPMOGA) concrete samples. These SPMOGA samples were analyzed for drain down characteristics as discussed herein. Waste plastics were added in heated aggregate and mixed to obtain homogeneous mixture. Sisal fibre was then treated with sodium hydroxide solution prior to mixing with heated bitumen. The Plastic-coated aggregates are mixed with sisal fibre and bitumen. The mixing and testing temperatures were kept at 165°C and 150°C respectively.

3.1 Determination of Bitumen Content

Three samples of open graded asphalt (OGA) concrete were prepared for each bitumen content. The bitumen content was varied from 4.5% to 6% of total weight of sample. It was observed that Specific gravity increases with increase in percentage of bitumen up to 5.5% of bitumen content and then

drops with increase in bitumen content. The corrected Marshall stability increased with increase in bitumen content up to 5.5% when the reduction was noticed as seen in Figure 2(b). Marshall flow values were found to range between 2.98-3.21 mm while percentage of void (V_v) in the total mix ranged between 6.40-4.05%. Figures 2(a), 2(b) and 2(c) show the variation of performance of the mix in varying bitumen content.

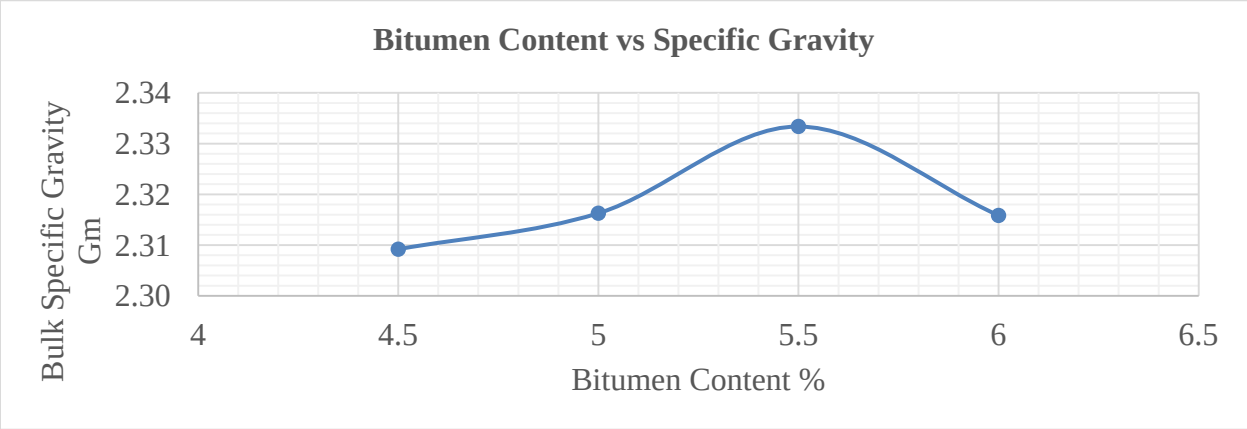

Figure 2(a): Bitumen content vs density of mix.

Figure 2(a) shows the variation in bulk specific gravity of the mix at various bitumen content. It was observed that the maximum specific gravity of 2.333 was achieved at 5.5% of bitumen content. Specific gravity is used to calculate the amount of asphalt absorbed in asphalt mixture, which is then used in determining the effective asphalt content. As more bitumen content is increase from 4.5% to 5.5%, there is increase in specific gravity. This is due to absorption of bitumen by aggregates, thus filling the pores and voids of the aggregates. However, beyond 5.5%, the specific gravity decreases due to excess bitumen content which increases the volume of the mix, with no significant change in mass.

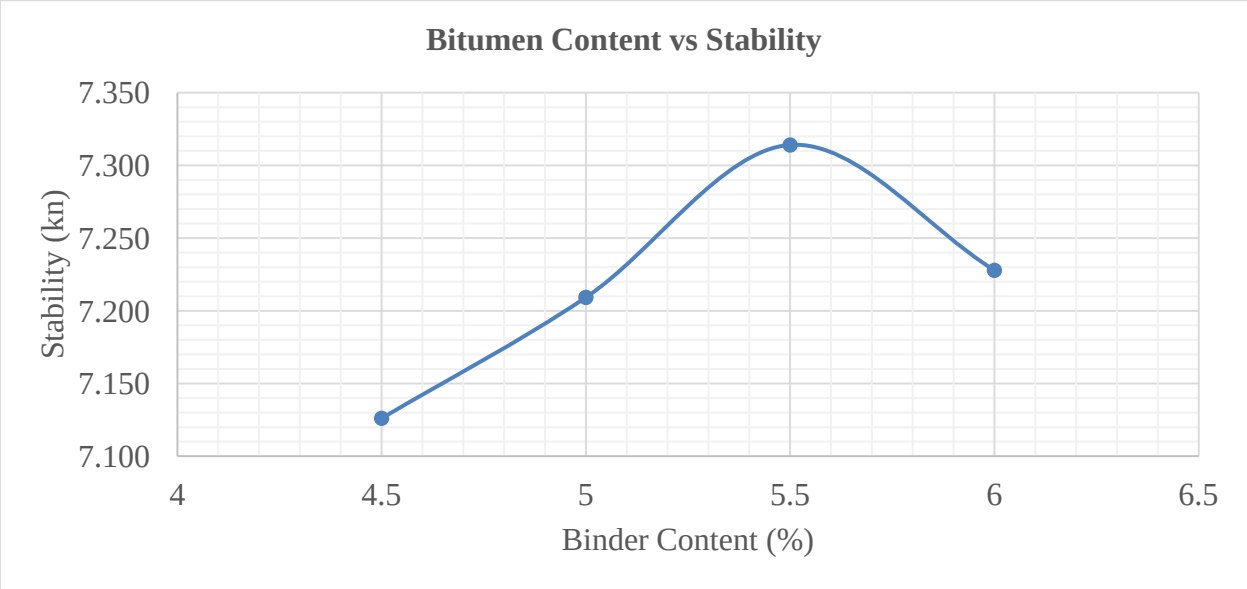

Figure 2(b): Bitumen content vs stability.

Figure 2(b) shows the variation in corrected stability of the mix at various bitumen content. It was observed that the maximum stability of 7.314 kN was achieved at 5.5% of bitumen content. it is observed that the stability of mix increases with bitumen content up to 5.5%. this is attributed to binding properties of bitumen. It binds aggregate particles together as its content is increased. However, beyond 5.5%, bitumen wetting of aggregates sets in. the dispersion of aggregates due to high bitumen content takes place, thus reducing aggregate to aggregate particle contact, thus affecting cohesion. Hence reduction in strength.

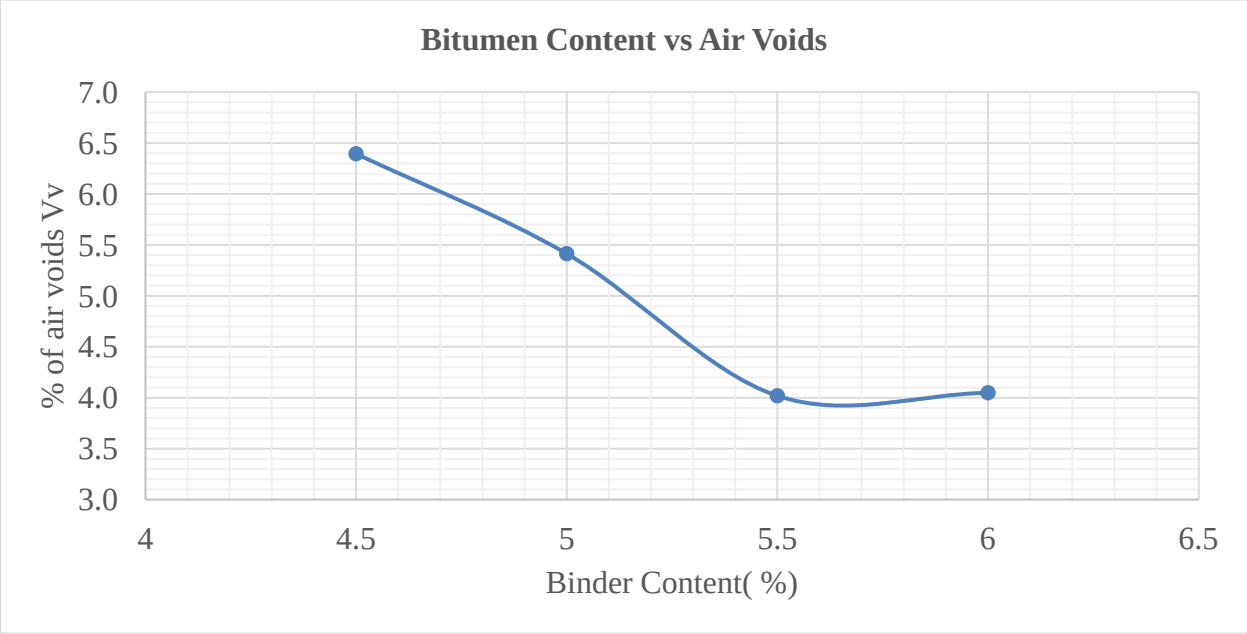

Figure 2(c): Bitumen content vs % Air voids

Figure 2(c) shows the variation in percentage air voids of the mix at various bitumen content. It was observed that the 4.02% air void was achieved at 5.5% of bitumen content. It was observed that air voids reduced with increase in bitumen content. this is associated with filling of air spaces and voids by bitumen content. Air voids is the total volume of the small pockets of air between the coated aggregate particles throughout a compacted paving mixture, expressed as a percent of the bulk volume of the compacted paving mixture. Air voids that are either too high or too low can cause a significant reduction in pavement life. air voids between 3 and 5% generally produce the best compromise of pavement strength, fatigue life, durability, raveling, rutting and moisture damage susceptibility.

Optimum bitumen content was calculated using Equation 3.1

$$B_0 = \frac{5.5+5.5+5.5}{3} = 5.5\% \quad \ldots\ldots 3.1$$

This OGA concrete mix without additives was considered as the control mix for the subsequent studies.

3.2 Drain Down Characteristics of Sisal-Plastic Modified OGA

This test is intended to simulate conditions that the mixture is likely to encounter as it is produced, stored, transported, and placed at high temperatures. The loose mixture was placed in a wire basket which was positioned on a pre-weighed dry paper plate. The entire apparatus was placed in the oven for one hour at 177°C. After one hour, the basket containing the sample was removed from the oven along with paper plate. The paper plate was weighed to determine the amount of occurred drain down. The drain down was calculated as the percentage of binder which drained out of the basket compared to the original weight of the sample. The average of three normal tests was reported as the drain down.

Results of drain down at various percentages of additive contents are given in Tables 5, 6 and Figure 3 and 4. From Tables 5 and 6, it can be observed that the additives provide higher stabilization to the mixture in comparison to the control mixture without additives. Drain down of the control mixture is 6.5% which is beyond the specified limits 0.3% as per AASHTO T305. It is seen that in the modified OGA mixtures, of drain down reduces with increase in modifier content and up to sisal fibre optimum value of 0.3 % and 5% waste plastic content. Effects of the inclusion of sisal fibre and waste plastics in OGA mixtures are prevent the bleeding phenomenon of the mixtures and bitumen drain down. From the results, it can be concluded that sisal fibre and waste plastics can be used as the OGA modifiers improve its bitumen retention properties.

Table 5: Drain down values for different percentages of sisal fibre

Sisal Fibre (%)	Drain Down (%)
0	6.489
0.1	2.340
0.2	0.136
0.3	0.008
0.4	0.000

Table 6: Drain down values for different percentages of waste plastics

Waste Plastics (%)	Drain Down (%)
0	6.489
1	3.610
3	1.426
5	0.804
7	0.330

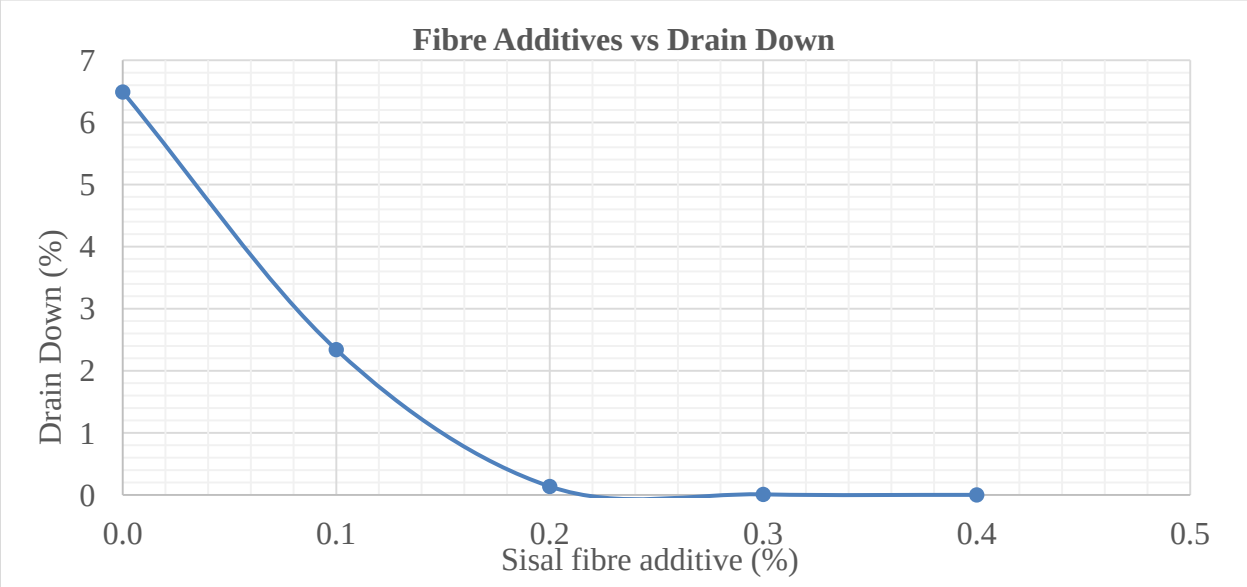

Figure 3: Variation of drain down with different percentages of SF.

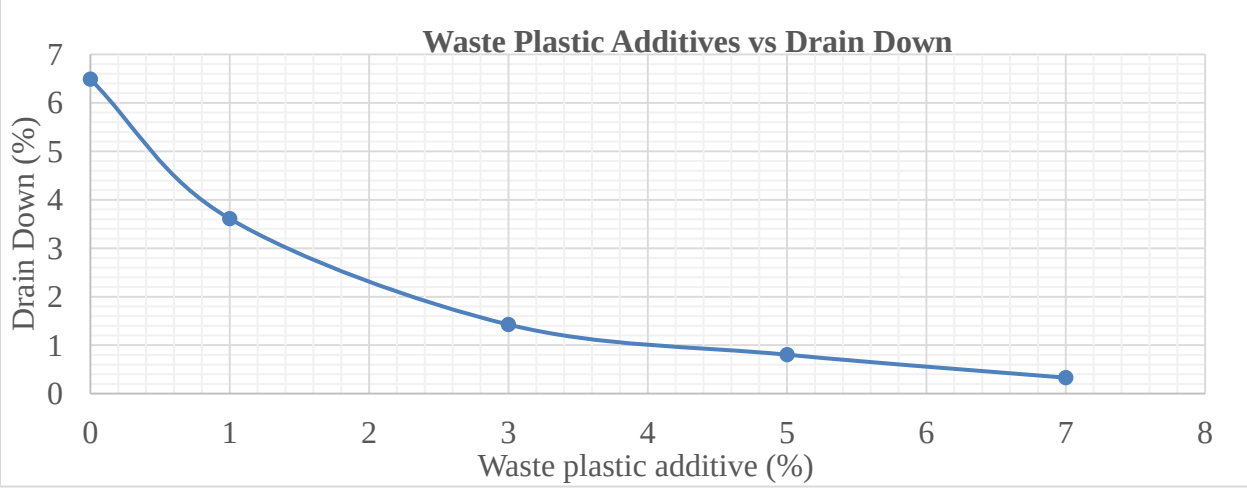

Figure 4: Variation of drain down with different percentages of waste plastics.

3.3. Bitumen retention of combination of Sisal fibre and waste plastic

Figure 5 shows the results of bitumen drain down when sisal fibre and waste plastics have been used together as OGA modifiers. The bitumen drain down for control mix was 6.5% while for that of 5% waste plastic modified samples was 0.8%. However, the drain down for samples modified with 0.3% sisal fibre alone and samples with sisal fibre together with waste plastics at optimum contents was 0%. It can therefore be concluded that the drain down for mix without modifiers was high as compared to samples with additives as shown in Figure 5.

Sisal fibre has strong stabilizing ability as compared to waste plastics. This is associated to the absorption ability of sisal fibres. Sisal fibres and waste plastics bind the aggregates to make a firm and stiff. This enhances bitumen retention and reduces bleeding. This makes the mix produce strong asphalt that can withstand traffic load without cracking or rutting.

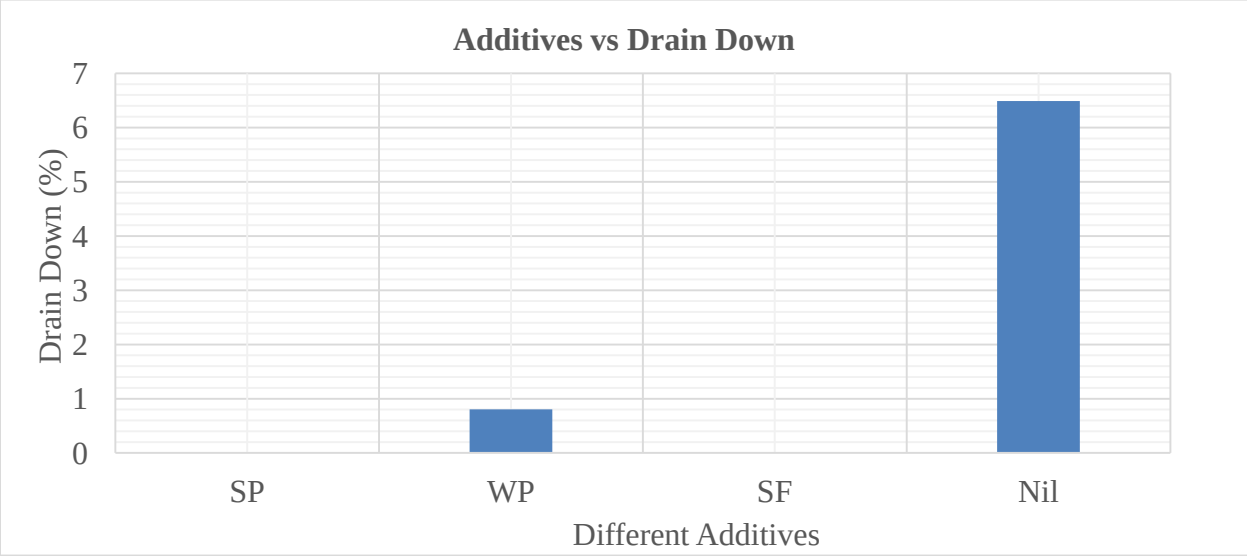

Figure 4: Drain down results for different additives

IV. Conclusion

This experimental work shows that sisal fibre and waste plastics can be used in the modification of open graded asphalt (OGA) to improve on bitumen retention. The drain down was found to be 0% for combination of sisal fibre and waste plastic modified samples as compared to 6.5% for control mix and 0.8% for waste plastic modified samples. The work of modifiers was to hold the aggregates and bitumen together in stiff matrix form. This increases bitumen retention at high temperatures during storage, transportation, placement and compaction of OGA mixtures.

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Stakeholders' Perceptions On Influence Of Pupils' Cultural Background On Pupils' Access To Primary Education In Masimba Division-Masaba South Sub-County, Kisii County, Kenya.

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Abstract- Kenya has not yet achieved full access to Universal Primary Education (UPE) for school going-age children. This study sought to establish stakeholders' perceptions on pupils' cultural background on access to primary education (PE) in Masimba Disivion, Masaba south Sub-County, Kisii County of Kenya. The study adopted the descriptive survey design. The target population was 405 teachers and 16059 pupils in all public primary schools in Masimba Disivion, Masaba South Sub-County. Stratified random sampling was used to select the subjects for the study who comprised of 150 teachers and 361 pupils from 36 selected public primary schools. Two instruments namely; Teacher's Questionnaire (TQ) and pupil's Questionnaire (PQ) developed by the researcher were used to collect data. The research instruments were pilot tested in two randomly selected public primary schools. Pre-testing the instruments was meant to validate and estimate their reliability in collecting the anticipated data. The reliability indices for the instruments, these are teachers' and pupils' questionnaires were 0.81 and 0.76 respectively. The data collected was analyzed using descriptive statistics which include frequencies, Percentages and Means. The findings of the study indicated that pupils' cultural background influence access to primary education.

Index Terms- STAKEHOLDERS, PERCEPTIONS, PUPILS' CULTURAL BACKGROUND, ACCESS, PRIMARY EDUCATION, MASABA SOUTH SUB-COUNTY, KISII

I. Background of the Study

The World Conference on Education For All (EFA) held in 1990 is the basis of current discussions on Universal Primary Education (UPE). Article I of the World Declaration on EFA adopted at the conference clearly states that every person (child, youth and adult) shall be able to benefit from educational opportunities designed to meet their basic learning needs, focusing on value, significance, and effects of education for individuals. The Dakar Framework for Action of 2000 set the goal with the statement that by 2015 all children in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality. This was further reflected in the Millennium Development Goals (MDGs). Kenya has been trying to achieve UPE as a national goal since its independence. Reintroduction of free primary education in 2003 dramatically increased the number of children attending school.

United Nations Educational, Scientific and Cultural Organization (UNESCO,2010) indicates that the major milestone in primary education was abolition of fees in 2003 and subsequent introduction of free primary education, which increased the number of children enrolled in schools from 5.9 million in 2002 to 7.6 million in 2006 and 8.6 million in 2008. The report further highlights that Net Enrolment Rate (NER) was 77.3 percent in 2002, rising to 92.5% in 2008 implying that about 7.5% of the primary school going-age pupils are not in school. There was also growth in the number of Kenya Certificate of Primary Education (KCPE) candidates, from 540,069 in 2002 to 704,520 in 2007, followed by a slight decline to 695,701 in 2008. Table 1 shows Net enrolment trends in Kenya by sex in primary schools between 2002 and 2008.

Table 1:
Primary Net **Enrolment Rate by sex and Province, 2002-08**

Province		Coast	Central	Eastern	Nairobi	R valley	Western	Nyanza	N. Eastern	Total	G. Total
2002	M	58.2	83.5	87.7	25.5	81.1	95.4	88.9	19.6	76.5	77.3
	F	53.2	87.8	91.6	29.5	81.5	91.7	89.6	14.1	78.0	

2003	M	66.9	83.6	90.4	35.5	84.1	97.5	96.2	26.1	80.0	80.4
	F	60.1	84.2	90.3	40.3	82.0	93.2	95.4	16.2	82.2	
2004	M	72.8	81.4	91.4	35.9	87.8	99.3	96.9	23.6	82.2	82.1
	F	67.7	81.8	91.5	41.1	85.4	97.2	96.2	14.9	80.0	
2005	M	75.1	87.9	94.9	39.2	87.9	99.1	98.4	26.6	83.8	83.2
	F	73.3	87.0	93.8	40.9	85.3	94.6	97.2	18.8	82.6	
2006	M	72.3	83.0	96.9	38.8	91.8	99.1	98.4	25.9	86.5	86.5
	F	71.2	83.0	95.8	41.6	89.8	94.6	97.2	18.8	86.5	
2007	M	84.6	84.4	98.7	49.5	98.3	99.1	98.4	33.1	94.1	91.6
	F	77.0	80.7	97.8	51.8	94.0	98.9	98.2	20.8	98.0	
2008	M	85.7	85.6	98.9	61.8	98.9	99.5	98.7	39.3	94.6	92.5
	F	79.2	81.5	97.9	59.7	97.2	99.1	98.4	24.5	90.5	

Source: Education Facts and Figures, MoE (2002-2008)

The report above on NER in 2008 indicates that 595 095 number of children are out of school.

This represents 7.5 percent of primary school going-age population.

Table 2 reveals the primary school dropout rate by sex and their respective totals by province in

Kenya.

Table 2:
Distribution of Primary Schools Dropout Rate by sex and Province, 2004-2008

Province		Coast	Central	Eastern	Nairobi.		Western Valley	Nyanza	Rift Valley	National Eastern
2004	M	1.9	1.0	1.0	1.9	2.3	2.4	2.8	2.3	2.1
	F	1.8	0.8	0.8	1.4	2.2	2.4	3.1	3.1	2.0
	T	1.8	0.9	0.9	1.6	2.2	2.4	2.9	2.6	2.0
2005	M	5.6	5.2	5.2	5.7	6.5	6.6	6.5	12.2	6.1
	F	8.5	3.9	3.9	5.6	7.2	7.8	9.2	21.4	6.9
	T	6.9	4.5	4.5	5.6	6.9	7.2	7.8	15.3	6.5
2006	M	7.7	3.5	3.5	6.3	4.7	5.6	3.9	6.4	5.0
	F	6.7	3.2	3.2	6.7	4.3	4.4	5.3	8.1	4.9
	T	7.3	3.4	3.4	6.5	4.5	5.0	4.6	7.0	4.9
2007	M	7.3	4.9	4.6	7.5	6.0	9.9	6.4	8.7	6.8
	F	8.5	2.2	2.2	5.6	5.2	9.6	5.7	15.9	5.9
	T	7.9	3.4	3.4	6.6	5.6	9.7	6.1	11.1	6.4
2008	M	5.4	2.2	2.2	4.2	3.5	1.1	2.3	4.0	3.2
	F	5.9	1.6	1.6	4.0	3.6	2.2	4.4	6.1	3.7
	T	5.6	1.9	1.9	4.1	3.6	1.6	3.5	4.7	3.5

Source: Education Facts and Figures, MOE (2007-2008)

In the year 2003, primary schools registered a dropout rate of 2.0 percent rising to 6.5 percent in

2004. However the trend changed from 4.9 percent in the year 2005 to 3.5 percent in 2007. In the

year 2008, 3.7 percent of the girls dropped out as compared to 3.2 percent for boys. The results

in table 3 reveal that some pupils drop out of school every year. Kenya is a signatory to numerous international commitments on the provision of education for all such as the Universal Declaration of Human Rights adopted in 1948, World Declaration on Education for all adopted

in 1990 and the Dakar Conference of 2000. Despite these commitments, access to education for

all children in Kenya remains a problem. It is therefore indicative that education stakeholders'

efforts since independence including the recent introduction of the free primary education programme, have not sufficiently addressed the key issues of primary access to education.

Table 3 shows primary school percentage dropout rate by gender in Masimba Division between the years 2005 and 2008.

Table 3:
Primary School Percentage Dropout Rate by Sex in Masimba Division, 2005-2008

2005	**2006**		**2007**		**2008**			
Zone	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls (%
Masimba	11.5	12.8	12.4	11.6	12.1	14.1	13.3	14.3
Gesusu	12.7	13.6	12.8	14.2	14.3	15.3	15.5	15.0
Nyamasibi	8.6	11.2	11.8	12.3	12.5	13.2	13.9	13.6
Ramasha	10.5	12.2	13.5	14.2	13.8	14.3	14.2	14.6
Totals	10.83	12.85	12.63	13.08	13.18	14.23	14.23	14.38

Source: Ministry of Education, Statistical Office, Masaba South District (2009)

Table 3 reveals that from the year 2005 to 2008 there has been an increase in percentage dropout rate among boys and girls within the Division. This indicates that some pupils do not have access to PE. The percentage in dropout rate for girls is higher than that of boys for all the years. This shows that fewer girls than boys are in access to PE within the Division.

Table 4 below shows primary school completion rates by sex in Masimba Division between the years 2004 and 2008.

Table 4
Primary School Completion Rates by Sex in Masimba Division, 2004-2008

YRS in STD *I*	**YRS in STD 8**	**Enrol, in STD *I***			**Enrol, in STD 8**			**% completing STD 8**		
		Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total
1997	2004	201	248	449	159	197	356	79.2	80.4	79.3
1998	2005	212	272	484	159	222	381	75.4	81.6	78.8
1999	2006	210	259	467	164	231	395	78.1	89.2	84.5

2000	2007	238	285	523	161	241	402	67.6	84.6	1	76.8
2001	2008	221	257	478	158	258	416	71.5	76.1		87.1

Source: Ministry of Education, Statistical Office, Masaba South District (2009)

Results in Table 4 shows that from the year 2004 to 2008, there is a decline in primary school completion rate within the division. According to Ministry of Education, Statistical Office, Masaba South District (2009), completion rate for the years 2004,2005, 2006,2007 and 2008 cohort decreased by 20.7%, 21.2%, 15.5%, 23.2% and 12.9% respectively. This trend shows that out of a total number enrolling in standard one, some drop along the way. From the results in table 5, the gender difference in all the years in dropout is significance where a higher percentage of girls are unable to complete than boys. As Kenya seeks to increase education participation, in addition to higher enrolments it also seeks to ensure pupils progress through the education system smoothly and that they achieve higher levels of education rather than repeating classes or dropping out of school. Progression from one class to another at the set years of schooling at each class reflects the internal efficiency of the system, graduating from that level often signifies that students have met a certain set of standards, whether stated formally or held as a general belief in the minds of people.

Statement of the Problem

The overall policy goal for the government is to achieve EFA in order to give every Kenyan the right to education and training no matter his or her socio-cultural status. This will be achieved through the provision of an all-inclusive quality education that is accessible and relevant to all Kenyans. Recent policy initiatives have focused on the attainment of EFA and UPE. The key concerns of the Ministry of Education (MOE) include relevance and access. Despite the government's efforts to enhance access to free primary education among school-going pupils, it is apparent that some children of school going- age in Masimba Division do not have access to PE. Records available at the DEO's office indicate that 14.23 percent and 14.37 percent of school going-age boys and girls respectively do not have access to PE. Primary education seems to be experiencing challenges relating to access such as pupil's community culture and pupils' parental level of education. Most parents are under the impression that it is the government's exclusive responsibility to provide all the necessary resources to support the primary education sub-sector. This study, therefore, sought to investigate the influence of pupils' community culture on access to Primary Education (PE) among pupils at Masimba Division.

Objectives of the study

The study attempted to achieve the following specific objective:

To establish the influence of pupils' cultural background on access to PE at Masimba Division, Masaba Sub-County, Kisii County.

Research Design

The study adopted descriptive survey design which involved collecting data from selected individuals at one point in time. In this study qualitative approach was used to give an insight into how the cultural background on pupils' access to PE. The information obtained was descriptive in nature. This design helped penetrate the subjects and the environment under which they operate.

Study Population

The target population for this study was 405 primary school teachers and 16059 pupils in all public primary schools in Masimba Division, Kisii County of Kenya. Accessible population was 361 class teachers and 6021 pupils of standard six to eight within the Division. Table 6 shows the study population.

Table 5

Distribution of Population of Teachers and Pupils by Zones .

Zone	No. of Schs.	No. of class Tchers (Class 6-8)	No. of pupils (Class 6- 8)
Masimba	13	43	1592
Gesusu	9	34	1509
Nyamasibi	10	32	1339

Ramasha	12	41	1581
Total	44	150	6021

Source: District Education Office, Masaba, 2008

Sampling Procedure and Sample Size

Krescie and Morgan's formula shown below was used to obtain the sample for research study.

$$S = \frac{X^2NP(l-P)}{d^2(N-l) + X^2P(1-P)}$$ Where

S=required sample size N=the given population size

P^population proportion that yields maximum possible sample size required (assumed to be 0.5)

d= the degree of accuracy as reflected by amount of error that can be tolerated (taken as 0.05)

X^2=1able value of chi-square equal to one degree of freedom relative to the desired level of

confidence which is 3.841 for the 0.95.

There are 44 public primary schools in Masimba division. They were sub-divided into strata of zones. Each stratum represents a specific population characteristic which when put together representative of the population. This way it was hoped that the final sample which was obtained contained the important characteristics of the parent population in the right proportion. The sub-groups refer to teachers and pupils in the selected schools. The summary of the population and sample size is as shown in table 6.

Table 6:

Distribution of Sample Size by Zones

Zone	**NO. of Schools.**	**No. of Class Teachers**	**No. of Pupils (class 6-8)**
	S	S	S
Masimba	10	43	94
Gesusu	8	34	87
Nyamasibi	8	32	89
Ramasha	10	41	91
Total	36	150	361

Research Instruments

The purpose of this study was to investigate the influence of selected factors on pupils' access to PL. Most techniques for measuring attitudes rely heavily on verbal information which can be generated by interviews and questions (Gay 2003). Data was collected using two questionnaires developed by the researcher, that is, teachers and pupil's questionnaire. Each questionnaire was divided into pail A and B. Teachers' and pupils' questionnaires contained 29 closed-ended items drawn from the three selected factors. The items elicited data on the influence of pupils' cultural background on access to PH. The closed-ended test items in the two questionnaires were measured on a -1-point Liken Scale. For questions with a positive stem Strongly Agree (SA) scored highest (4) while Strongly Disagree (SD) scored lowest (1). For those questions with a negative stem Strongly Agree (SA) scored lowest (1) while Strongly Disagree (SD) scored highest (4). The test item with mean score of between 2.5 and 4.0 indicates the respondents agree with the perception. The test item with mean score of between 1.0 and 2.4 indicates that the respondents disagree with the perception.

Data Analysis

Data was analyzed quantitatively. Data sheet was prepared. Data collected was entered into the code sheet. Analysis was done using descriptive statistics that is frequencies, percentages, means and standard deviation for the data from teachers' and pupils' questionnaires for analysis. Frequencies, means and standard deviation were used to analyze data based on the objective. The mean score and standard deviation of each test item was determined. This depended on the cummulative responses of each respondent for each of the test items in the Likert scale provided. The mean score summarized the responses of the respondents and enabled data comparison. Since the mean is unduly affected by the extreme items, standard deviation was used to show the dispersion. The smaller the value of standard deviation the greater the uniformity in the population, while the larger the standard deviation the further that individual values of the random valuables tends to be the mean on average. The mean of means in every table indicted the population of respondent, its means and standard deviation.

RESULTS AND DISCUSSION

The Influence of Pupil's Cultural Background on Pupils' Access to PE.

The study attempted to establish the influence of pupil's community's culture on pupils' access to

PE. Their views were as shown in Table 7.

Table 7:

Responses of Pupils on the Influence of Cultural Background on pupils' Access to PE

Statement on Community's Culture	N	Mean	Std. Deviation
The division does not have enough number of schools because the local communities believe its the work of the government	361	2.5042	1.1597
There are a high number of school age children in the division because of the traditional practice by local communities of having as many children as possible	359	2.1811	1.2894
The division has recorded high enrolment rates because of the value attached to education by local communities	358	2.9302	1.2583
Families prefer investing in education of male children because they are expected to assist their parents in old age unlike their female counterparts who get married elsewhere	361	1.9169	1.0922
The cultural practice of marrying off teenage girls after they have undergone circumcision or when they get pregnant is a major cause of high school dropout rates	361	3.3269	1.2620
The traditional practice of children participating in generation of family income interfere with their school attendance	359	3.2953	1.1920 4
Many cases of absenteeism and low transition rates among girl pupils is due to allocation of more domestic responsibilities in a	358	3.1453	1.5846

			3
typical family setting			
Most parents support their children throughout the 8 years primary			
			1.2657
school cycle because they have discarded the tradition of assisting	357	2.3417	
			0
their teenage children get married once they are circumcised			
Mean of means	357	2.7052	.5408

The data tabulated in Table 7 indicate that pupils denied (2.5042) that the division does not have enough number of schools because the local communities believe it is the work of the government to construct schools. They also disagreed (2.1811) that there is high number of school age children in the division because of the traditional practice by local communities of having as many children as possible. The results of the study showed that pupils (2.9302) accepted the view that the division has recorded high enrolment rates because of the value attached to education by local communities. Majority of the pupils (1,9169) denied that families prefer investing in education of male children because they are expected to assist Lheir parents in old age unlike their female counterparts who get married elsewhere. However, majority of the pupils (3.3269) acknowledged that the cultural practice of marrying off teenage girls after they have undergone circumcision or when they get pregnant is a major cause of high school dropout rates. The results of the study indicated a mean score of 3.2953 implying that the traditional practice of children participating in generation of family income interfere with their school attendance. The pupils(3.1453) felt that many cases of absenteeism and low completion rates among girl pupils is due to allocation of more domestic responsibilities in a typical family setting. Pupils (2.3417) denied that most parents support their children throughout the 8 years primary school cycle because they have discarded the tradition of assisting their teenage children get married once they are circumcised. Standard deviation for each of the test items was between 1.1597 and 1.5846. These values were above 1.0 which implied that the items are spread away from the average. Standard deviation for the mean of means was 0.540 which means that the items are clustered around the average.

II. CONCLUSION

The findings of the study could be summarized that pupils' community's culture influence pupils' access to PE.. The findings of the study indicate that despite the government's commitment to provide UPE and EFA to all primary school-going age children, the combination of factors including cultural practices and parental illiteracy constrain the education opportunities available to Kenyans. Kenyan parents place a high premium on quality education as this is seen as the only opportunity to break away from culture. This has further been reinforced by the governments adoption of the FPE policy aimed at the provision of education and training for all Kenyan children as fundamental to the success of the government overall development strategy. While a lot has been written by the government on the success of the PE in Kenya, implementation problems continue to be experienced at the grassroots level at Masimba Division

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Spatial Characteristics of *Almajiri* Schools in Kano Metropolitan Area: Physical Planning Implications

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Abstract: This paper examines the spatial characteristics of *Almajiri* Schools with a view to assessing the physical planning implications. Geographic coordinates of *Almajiri* Schools was obtained with the aid of GPS (Garmin GPSMAP 78S). Features related to space considered include site and situation of *Almajiri* schools, living area per *Almajiri*, floor area, site coverage. Building and environmental physiognomies like building type, building use, building facilities, environmental sanitation, and waste disposal methods. Additional data was obtained through structured interview with *Almajirai* (pupils) and with heads of the schools. 252 schools were a sampled representing 5% of the population of the schools in the area. One *Almajiri* from each of the sampled schools was administered structured interview. Teachers (Malams) of the sampled schools provided useful information about the '*Almajiri*' system. Findings of the study revealed that *Almajiri* school system are spatially unorganized, siting is not based on planning standards and activity points within the school premises are haphazardly located without any informed decision. Space use, structures as well as environmental and sanitary characteristics are below the minimum requirement, consequent on which far reaching physical planning implications are evident. It is therefore, recommended that an effective integration of the system cannot be achieved without understanding the physical planning effects of the spatial dimensions of the system and the development of space standards to address its peculiarities. This could be achieved by developing a synergy between the operators of the system and policy makers.

Keywords: locational characteristics, spatial dimensions, environment, sanitation, education.

1.0 Introduction

Formal and informal educational systems are essential elements of the socio-cultural fabric that find expression as an institutional activity area in the spatial settings of urban centers in Northern Nigeria. *Almajiri School* is an informal educational system characterized and located in mixed use activities in the towns and cities in all parts of Northern Nigeria. *Almajiri* is a Hausa word meaning pupil or student. The word is derived from 'al-muhajir' an Arabic word for migrant, used to portray a person who journeys for a treasurable resolve (see earlier works of Adamu, 2003; Shehu, 2004; Yahaya, 2005).

The origin of *Almajiri* system dates back to the pre-colonial period (Bano, 2009; Iliyas and Olanipekun, 2017). During the early period, it was established as an organized and comprehensive system of education for learning Islamic principles, values, jurisprudence and theology (Gomment, 2017). Traditionally the *Almajiri* were located on the outskirts of cities close to farmlands, they also do not engage in any activity in the dry months of the year, during which learning is conducive, but, today, *Almajiri* schools are located in the interior of urban areas and are engaged in scavenging for food and begging (Odumosu, *et al*, 2013). Their location at the outskirts of the city with extensive vacant land enables cultivation and provision for adequate shelter. The system therefore prepares for its food

requirements for the year by cultivating the vacant farmland nearby or that on which the school is located. The federal government of Nigeria drafted and instituted a National Policy on Education in 2004 which integrated Qur'anic Schools in to western (modern) school system. A year earlier (2003) the then Kano state government inaugurated a plan for improving the legal and operational activities of the system. This was borne out of the fact that Kano metropolitan has for ages been an area for the proliferation of *Almajiri* schools owing to its Islamic disposition, historical attachment to the Arab city states and empires of the Northern Africa, Morocco, Libya, Egypt and Sudan from where the system was believed to have been borrowed. Presently, in Kano Metropolitan area there are about 5,000 (Kano State Ministry of Education, 2010) *Almajiri* schools. The large number of 'A*lmajiri'* schools and pupils made the government to initiate programme to intergrate the system with western type schools. However, the *Almajiri* integration policy is facing many challenges (Isiaka, 2015; Yusha'u, *et-al*, 2013) such as lack of spatial input, absence of synergy with existing frameworks, and locational issues of the schools (Aliyu, 2015). The physical planning implications of the spatial characteristics of the *Almajiri* schools are yet to be addressed. Similarly, empirical and practical evidence attest to the inability of the *Almajiri* schools system to respond positively to the intervention. Academic as well as policy concerns on *Almajiri* schools focused on socio-cultural implications of *Almajiri* schools (Okugbemi, 2012; Zakir, *et al*, 2014; Sebastine & Obeta, 2015; Ammani, 2016; Iliyas, Kurfi and Adio 2016; Gomment, 2017; Abbo, Zain, & Njidda, 2017). Other studies examine the integration of the schools with western type education and development of curricular (Momudu, 1982; El-Yaaqub 1998; Kabir 2004; Daman, 1993; Sulaiman, 1994; Sanusi, 2007 and Dahiru, 2008; Susan 2010; and Onitada, 2015). While a study investigated the techniques of teaching in the schools (Baba and Okam, 2015). Similarly, research has been done on the integration of the *Almajiri* into economic activities (Iliyas and oanipekun, 2017; Rigasa, *et al*, 2015; and Magashi, 2015) and the improvement of the *Almajiri* school system (Shehu, 2006, Shittu, 2015). Another studies focus on the assessment of intervention in to the *Almajiri* school systems (Sagagi and Udoji, 2018). In spite of the important insight drawn from these studies, the issues of the spatial dimensions of *Almajiri* schools have not been addressed by the studies thus the need for an examination of the spatial characteristics of the system. This will help in assessing planning implications so as to improve the system.

2.0 Materials and Methods

Data on *Almajiri* schools were collected from field observations and survey carried out in Kano metropolitan area, so as to determine the spatial and location characteristics, environmental and sanitary conditions. Data on building materials, facilities, building use and building types in which *Almajiri* schools conduct their activities were also collected with roof type, walls, floor and facia being some of the building indices collected. The amenities dimension considered in the study are bathroom, toilet, power and water supply, room illumination and sewer. Data were sourced from the *Almajiri* on their socio-economic profile like age, household size, and economic status of parents. The sample frame for the study was based on samples from the eight metropolitan Local Government areas (Municipal,

Nassarawa, Gwale, Dala, Fagge, Tarauni, Kumbotso and Ungogo) in varying proportions based on the number of *Almajiri* School in the area. 5% of the *Almajiri* schools was the sample size considered, which translate in to 252 samples (Table 1). Purposive sampling was adopted for the study. At each of the sampled school one pupil was randomly selected based on the age class he belongs (i.e. 4-13years, 14-17years, and 18-24years). If age group 4-13year, for instance, was selected in school X, the next age group, that is 14-17years would be selected in the next school and 18-24year age group in subsequent school until all the samples to be collected are exhausted. In instances where the age group that was supposed to be sampled could not be obtained the next age group was sampled, for example, in a sampled school in which the age group 18-24 are not available the next age group, i.e. 4-13years was sampled. The age groups considered were age 4-13years (*Titibiri)*; age 14-17years (*Kolo)* and age 18-24years (*Gardi)*. The sampled respondents were administered structured interview and their responses recorded. 10% of the sampled *Almajiri* schools were further sampled for floor area, space density measurements. Descriptive statistical techniques of frequency and percentages were used to present collected data in tables.

Table 1: Number of *Almajiri* schools by Local Government in Kano Metropolitan Area

Local Governments	*No. of *Almajiri* schools	**5% of each local Government	**No. of questionnaire administered to schools
Municipal	461	25.1	25
Gwale	608	30.4	30
Nasarawa	721	36.1	36
Dala	932	46.6	47
Kumbotso	853	42.7	43
Ungogo	625	31.3	31
Tarauni	313	15.7	16
Fagge	487	24.4	24
TOTAL	**5000**		**252**

Source: **Field survey, 2018
*State Ministry of Education

3.0 Results and Discussion

3.1 Spatial Characteristics of *Almajiri S*chool in Kano Metropolitan Area

Figure 1 shows the pattern of *Almajiri* schools in Kano Metropolitan. From the figure there are more schools within the high density build-up areas of the traditional city then there are at the outskirts of the metropolitan area. This may be due to the age old link of the Tsangaya school in the old city with Arabs of Northern Africa, like Makarantar Malam Sheik Manzo Arzai, Malam Sani Makwarari, Malam Sheik Halilu 'Yan' Tabarmi, Malam Sheik Maigari Kwanar Dala, Malam Sheik Dauda 'Yan'Doya, to mention a few, with the Arabs of North Africa. Another reason could be the spontaneous growth outwards and sprawl of the urban area engulfing the vast agricultural land of the fringes and the difficulty of getting cheap/free land at the fringes. It could as well be due to the gradual transformation of the *Almajiri* system from its traditional attributes and location at the outskirts of the urban area to the interior of cities where scavenging and begging for food and other necessities of life characterize the system. Essentially, majority of *Almajiri* schools are located in high and medium density areas of low and medium income class and few in the low density and high income residential areas. They are almost completely absent in the colonial new area of non-indigenes located outside the city, referred to as, Sabon Gari and the planned Government Reserve Area (GRA).

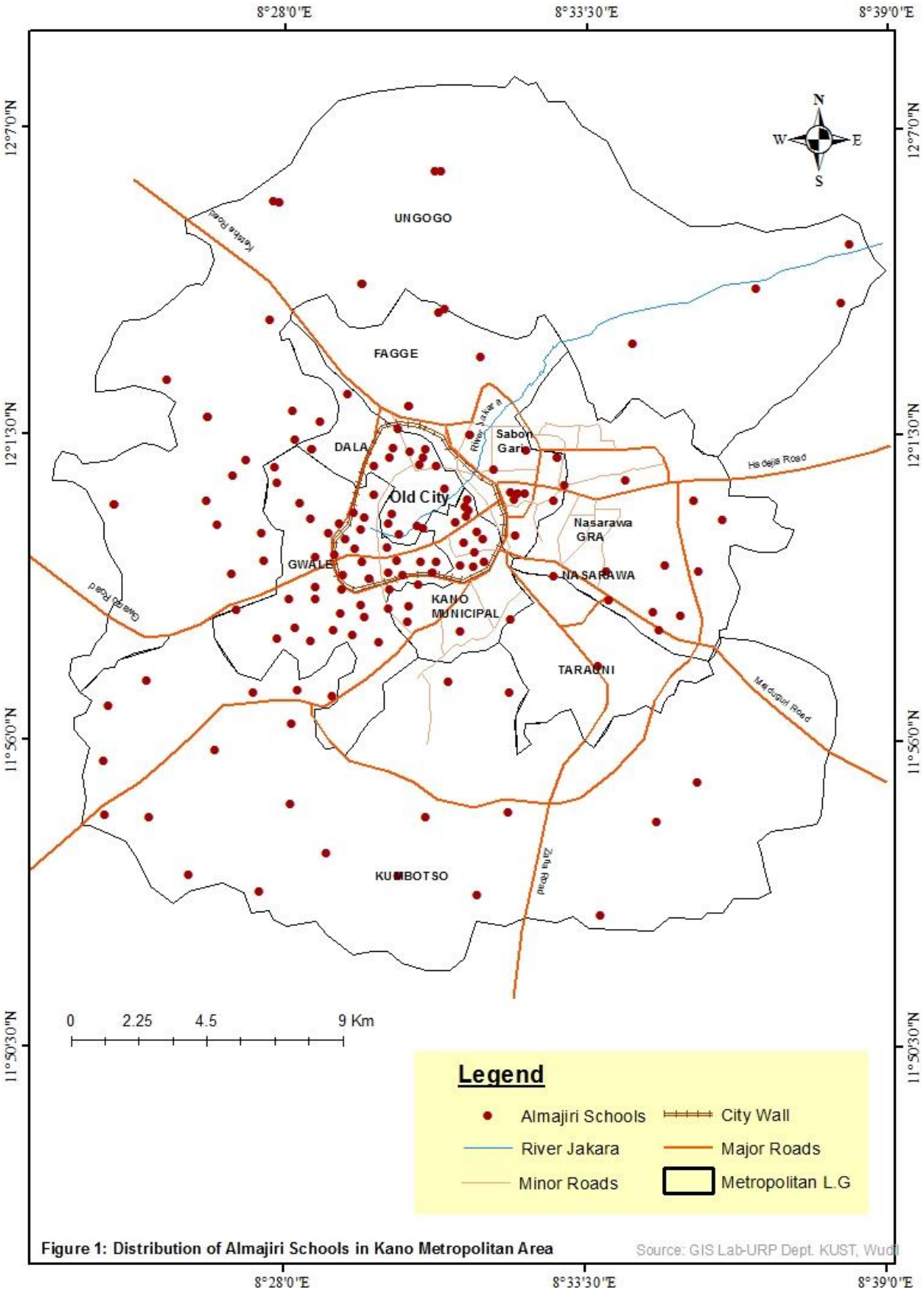

Figure 1: Distribution of Almajiri Schools in Kano Metropolitan Area

Source: GIS Lab-URP Dept. KUST, Wudil

3.1.1 Site Characteristics**:** Table 2 shows the plot size of *Almajiri* schools in the study area.

Table 2: Plot Size of *Almajiri* School in Kano Metropolitan Area

Plot size of *Almajiri* Schools (in Meters)	**Frequency**	**Percentage (%)**
Not standard	172	68.3
15x20	54	21.4
15x30	17	6.7
20x30	9	3.6
Total	**252**	**100**

Source; Field Survey 2018.

From table 2, 6.7% of *Almajiri* schools are located on an approximate plot size 15 x 30 meters and 3.6% are on plot that are 20 x 30 meters in size. 68.3% of the sampled *Almajiri* schools are located on plots with size other than the conventional 15 x 30 meters and 20 x 30 meters. The reason for this may not be unconnected to the role of the informal land delivery system currently dominating land administration in towns and cities of Nigeria. The 15x20 meters plot is a creation of informal land delivery sector which accounted for about 21.4% generally found in the unplanned parts of the metropolitan area.

10% of the sampled *Almajiri* schools (e.g. 10% of 25.1 for Kano Municipal, i.e. four schools) in each local government area was used for floor area measurement. The total floor area of the sampled schools for each local government was divided with the average number of *Almajiri* for the sampled school to obtain the average living area per person per local government. The result is presented in Table 3.

The sites on which the *Almajiri* schools are found in Kano metropolitan area are the plain residential areas or they squat within the already high density residences where any available space exists or in uncompleted structures. Others are sited on designated spaces provided for by the goodwill of the community. The *Almajiri* schools within Kano old city are accessed through very narrow alleys with a Right of Way (ROW) of less than 2 meters characteristic of the old settlements in Nigeria that existed before modern planning and therefore were traditionally conceived and planned based on the level of technology of that period. The majority of *Almajiri* schools in Dala, Municipal, and Gwale, which form a large part of the old city, as well as some parts of Kumbotso and Ungogo are located off the main roads and are thus accessed through the unplanned narrow and winding alleys of the residential neighbourhood.

The buildings in which *Almajiri* Schools conduct their activities are traditional Hausa compound, consisting of the *Zaure* which provides entrance into the compound with a spacious courtyard and few bedrooms. Other spaces used as *Almajiri* School include, uncompleted buildings of traditional design, frontage of houses, makeshift structures on house frontages and service area of residential neighbourhoods. These spaces are also used as shelter or sleeping places for the *Almajiri*. From the survey conducted, it was discovered that most (68.3%) of the activities of *Almajiri* school are conducted in such unconventional spaces (Table 2).

Table 3 shows the floor area used in the '*Almajiri* School. From table 3, the highest living area per *Almajiri* is in Tarauni local government area (0.60m^2) and the least is found in Municipal local government (0.29m^2). The result obtained in table 3 fall short of the

standard floor of 0.8m2 per pupil based on Universal Basic Education (UBE) standard, 2010. One peculiar characteristics of the *Almajiri* space use is the use of the space for sleeping as well as for learning especially in schools located in the high density areas where competition for the limited space is very high. However, *Almajiri* schools at the outside of the metropolitan area where low demand for space exists, the frontage of the house is used as space for learning activities and the interior of the building as compound for accommodation or as sleeping space, which is usually highly overcrowded.

Table 3. Floor Area Use in *Almajiri* Schools by Local Government

S/N	Local Government	Number of Schools sampled for floor area measurement	Average *Almajiri* Population	Average Floor Area (m^2)	Average living area per person (m^2)
1	Dala	5	108	40	0.33
2	Fagge	2	46	24	0.52
3	Gwale	3	80	36	0.45
4	Kumbotso	4	60	34	0.57
5	Municipal	3	98	28	0.29
6	Nassarawa	4	80	45	0.56
7	Tarauni	2	70	30	0.60
8	Ungogo	3	60	45	0.50

Source: Field survey, 2018

It was also observed that most of the *Almajiri* (pupils) do not get accommodation within the school premises but use the *zaure* or any nearby available structure, such as uncompleted building, frontage of residencies and other building and even markets to sleep at night mostly located within a minimum radius to the school.

Learning Space for most of *Almajiri* Schools sampled serve dual purpose, for reading/learning and a space for sleeping. The learning space in few *Almajiri* schools that have enough space to conduct learning activities and a separate space to serve as residence for bed rest is about 1.0m^2. This falls short of the standard for western schools. With respect to bed Space or living area for *Almajiri*, depicted on Table 3, negative variations away from the UBE standards of 0.8m^2 per pupil range from -0.51m^2 per pupil in Municipal local government to –0.2m^2 per pupil in Tarauni local government.

3.2 Building and Environmental Characteristics of *Almajiri* Schools in Kano Metropolitan Area

3.2.1 Building Characteristics.

Four variables were considered in examining the building characteristics of *Almajiri* schools. The variables are building materials, building types, building use, and building facilities. Building materials are; concrete blocks, mud blocks, and thatch or corrugated roofing sheets. Building types were categorize as Bungalow, Duplex, Corrugated iron sheets structures, and open shades at the frontage of houses. Building use, that is, whether the building is residential or institutional or for mixed use. Building facilities such as availability and number of bathrooms, types and number of toilets, water and electricity, and ventilation.

According to Onibokun (1973 p.470), the concept of 'a habitable home' or 'an ideal home' "is related in addition to the 'physical, architectural, and engineering component of the home, to the social, behavioural, cultural, and personal characteristics of the inhabitants; the component of the environment of which the home is a part; and the nature of the institutional arrangement under which the house is managed".

3.2.1.1 Building Types in Kano Metropolitan Area

From Table 4, 0.8% *Almajiri* Schools are single storey buildings, 15.1% are bungalow or flat structured houses, while 22.2% of the houses are traditional compounds with *Zaure* as the entrance to a large courtyard and a couple of single isolated bedrooms. Most of the sampled building type for *Almajiri* schools are uncompleted residential buildings (25.4%) and 19.8% of the schools do not have a permanent structure but they conduct their activities in a makeshift structure made from used corrugated iron sheets or from thatch or grass straw or some other unconventional building materials lastly, 16.7% comprise schools that conduct their schooling activities in the open, as well as open shades in the frontage of the houses.

Table 4: *Almajiri* Schools Building Types

Building Type	**Frequency**	**Percentage (%)**
One Storey building or Duplex	2	0.8
Bungalow or flat house	38	15.1
Traditional Compound	51	22.2
Uncompleted Building	64	25.4
Corrugated Iron Structure	55	19.8
Open Shade in House Frontage	42	16.7
Total	252	100

Field survey, 2018

3.2.1.2: Building Use for *Almajiri* Schools in Kano Metropolitan Area

Table 5: Building Use for *Almajiri* Schools in Kano Metropolitan Area

Items	Dala	Fagge	Gwale	Kumbotso	Municipal	Nassarawa	Tarauni	Ungogo	Total	Percentage (%)
Building Use										
Institutional	5	3	4	8	4	3	1	5	33	13.1
Residential	10	4	6	9	6	7	3	4	49	19.4
Uncompleted Building	13	7	8	10	6	9	5	6	64	25.4
Frontage of Building	17	9	10	12	8	15	6	11	88	35.0
Open Farm Land	2	1	2	4	1	2	1	5	18	7.1
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**

Table 5 shows the building use of *Almajiri* Schools, in which, 13.1% of the schools are conducting their schooling activities on lands originally allocated for that purpose. 19.4% are sharing the same plot of land used as mixed use (residential and institutional). 25.4% are located in uncompleted building mostly of residential traditional compound type. The majority (35%) of the schools conduct their learning activities in the frontage of buildings residential, and uncompleted buildings. However, there are differences between local governments as shown on Table 5.

3.2.1.3: Building Materials for *Almajiri* Schools in Kano Metropolitan Area

Table 6 shows the building materials used for the construction of *Almajiri* schools sampled. From table 6, 18.7% of the wall of *Almajiri* schools are made up of wood/straw/corn stalks/thatch/used corrugated iron sheets and 31.3% cement and mud walls unplastered. Unplaster mud wall are 20.2% and plastered cement block 29.8% of the sampled schools. The roofing materials are – grass/mat, concrete decking, corrugated iron sheet, and asbestos and aluminum sheets. Similarly, walls can be of wood/mats, mud, mud plastered with cement, unplastered cement block/brick, cement block plastered with cement and cement block with tile finishing. The quality of building facilities is influenced by perceived value of users which depends on user's perception, the value of any building amenity falls progressively as the size of its user's increases. For instance, a toilet exclusively used by one person is greater in value than the one used by many people. Further, Onokerhoraye (1982 p.19) posits that "the convenience for accessing building amenities is an important index in assessment of building liveability" which all building infrastructure seeks to achieve.

Differences abound between local governments in building materials used. In Kumbotso local government building materials used are cornstalk or grass straw or wood with 27.7%, Tarauni (6.4%); Ungogo, Municipal and Nassarawa 10.6% each; Gwale and Dala local

government each use 12.8% and Fagge (8.5%). There are variations amongst the local governments in the materials used in the construction of walls, for instance, cement block/plastered and unplastered wall in Tarauni (5.2%) is the least and the highest (18.7%) is Nassarawa local government.

The materials used for flooring of *Almajiri* schools range from cement (65.5%) to tiles (5.7%). There are no schools (0%) with terrazzo floor. 28.6% of the schools do not have floors thus they conduct their activities on bare ground. There are also variations amongst local governments. 18.8% of the *Almajiri* schools in Dala local government have cement floor whereas it is, 6.7%, in Tarauni local government. In Kumbotso local government, 25%, of the *Almajiri* schools conduct activities on bare ground whereas in Tarauni local government 5.6% of the schools conduct their activities on bare ground. This falls short of the minimum standard for basic education in Nigeria as shown in Table 7.

Table 6: Materials for Construction of *Almajiri* Schools in each Local Government Area

Items	Dala	Fagge	Gwale	Kumbotso	Municipal	Nassarawa	Tarauni	Ungogo	Total	Percentage (%)
Materials used for wall										
Wood/Straws/Corn Stalks/Thatch/ Used Corrugated Iron Sheets	6	4	6	13	5	5	3	5	47	18.7
Mud wall	10	2	4	10	8	4	5	8	51	20.2
Cement & Mud wall Unplaster	20	8	11	8	5	13	4	10	79	31.3
Cement Block plastered	11	10	9	12	7	14	4	8	75	29.8
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**
Material used for floor										
No Floor	15	5	8	18	5	9	4	8	72	28.6
Cement Floor	31	17	19	24	18	23	11	22	165	65.5
Tiles Floor	1	2	3	1	2	4	1	1	15	5.9
Terrazzo Floor	-	-	-	-	-	-	-	-	-	-
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**
Materials used for Roofing										
No Roofing	2	1	3	6	3	3	3	4	25	9.9
Wood/Straws/Corn Stalks	6	2	2	6	1	4	2	3	26	10.3
Corrugated Iron Sheets	36	15	24	27	19	27	11	24	183	72.6
Aluminum Sheets	1	2	-	1	-	-	-	-	4	1.6
Concrete Decking	2	4	1	3	2	2	-	-	14	5.6
Asbestos Sheets	-	-	-	-	-	-	-	-	-	
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**

Source: Field Survey, 2018

With respect to the roofing of the *Almajiri* Schools, incomplete buildings without roofing and open spaces accounted for 9.9%, while corrugated iron sheets accounted for 72.6%. Other roofing materials are wood or straw or corn stalks, aluminum, cement decking, asbestos with, 10.3%; 6%; 5,6%; and 0%, respectively. There are differences between local governments. Kumbotso local government

has the highest percentage of schools without roofing (24%) while Fagge local government has 4% schools without roofing. Corrugated iron roofing sheets are used more in Dala Local government (19.7%) and in Tarauni local government the least (6%). Concrete decking and aluminum roofing for *Almajiri* Schools are more in Fagge local government (28.6%; and 50% respectively) and the lowes local governmebt with 0% concrete decking are Tarauni and Ungogo. Similarly, none of the schools use aluminum or asbestos material for roofing in Gwale, Municipal, Tarauni, Nassarawa and Ungogo.

3.2.1.4. Building Facilities

Table 7 shows the distribution of building facilities in the *Almajiri S*chools sampled. The facilities covered by the study are, toilet, bathroom, light, ventilation, and drinking water. The study found that 67% of the schools have a single toilet which also serves as a bathroom.

Table 7: Facilities of Sampled *Almajiri* Schools of Kano Metropolitan Area

Items	Dala	Fagge	Gwale	Kumbotso	Municipal	Nassarawa	Tarauni	Ungogo	Total	Percentage (%)
Source of water										
Streams and ponds	0	0	0	2	0	0	0	1	3	1.2
Hand dug well	35	15	21	36	14	25	11	27	184	73
Borehole	6	4	4	2	5	4	2	1	28	11
Municipal water supply	6	5	5	3	6	7	3	2	37	14.8
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**
Source of light										
Local lamp or lantern	**7**	**6**	**8**	**21**	**7**	**5**	**4**	**18**	**76**	**31**
National electricity source	**38**	**17**	**21**	**22**	**18**	**30**	**12**	**13**	**171**	**68**
Generator	**1**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**4**	**1.6**
Solar source	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0.4**
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**
Toilet										
No toilet use the bush	6	5	7	18	7	6	3	11	63	25
1 Toilet/ bathroom	37	17	21	33	15	27	11	18	169	67
2-4 Toilets/bathroom	4	2	2	2	3	3	2	2	20	8
More than 4 Toilet/bathroom	0	0	0	0	0	0	0	0	0	0

Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**
Toilet type										
Defecation in the open	6	5	6	18	7	7	3	11	63	25
Pit latrine	40	18	23	25	17	28	13	20	184	73
W/C toilet	1	1	1	0	1	1	0	0	5	2
Total	**47**	**24**	**30**	**43**	**25**	**36**	**16**	**31**	**252**	**100**

Source: Field survey, 2018

Only 8% of the sampled schools have more than 1 toilet facility, that is, 2-3 toilet/bathroom. Most of the schools have no designated defecation area rather, pupils use the open fields or any available space (open defecation). This constitutes a high health risk and an unpleasant looking environment 73% of the sampled toilets are pit latrine and only 2% are water closet. In 25% of the schools pupils defecate in the open spaces. With respect to the source of lightening the *Almajiri* School, the result reveals heavy dependence on electricity from the national grid (68%) of *Almajiri* Schools. Other sources of lightening include lantern or local lamps (31%), generators (1.6%) and solar source (1%). The high dependence on light from the national may be due to the location of the schools, that is, in high density residential areas which have the national grid as their main source of supply. *Almajiri* Schools most important source of water supply is the hand dug well (73%) which is mostly sited within the school premises or at some walking distance from the schools. Municipal water supply (14.8%) as well as boreholes (11%) and streams and ponds (1.2%) constitute the other sources of water to the *Almajiri* schools. See Table 7. In terms of ventilation, most of the *Almajiri* Schools do not have good ventilation. The *Almajirai* bedrooms do not have adequate ventilation windows and are overcrowded.

Table 8 provides the minimum standards for basic education facilities.

Table 8: Minimum Standard for Basic Education in Nigeria

S/N	Item	Standards
1.	Number of classes and pupil population per class	12 streams of 40 pupils
2.	Distance between a pair of schools	2kms apart
3.	Pupil area in classroom	$1.4m^2$
4.	Classroom dimension	7m x 8m = $56m^2$
5.	Pupil's floor area (dormitory)	$0.8m^2$
6.	Toilet area per pupil	$1.2m^2$
7.	Floor type and dimensions	-Hard-core of 300mm -25mm terrazzo -1.3screed -Compact area fixed to maximum level of foundation -150mm reinforced (BRC) mesh slab
8.	Roofing	0.55 long span Aluminum sheets
9.	Drinking water fountain	1:50 pupils

Source: adopted from minimum standards for Basic Education in Nigeria, 2010 pp. 9-40

A comparison of the findings of the study in Kano metropolitan area with the standard shown in Table 8 reveals gross inadequacy, for instance, 70.2% of the walls are below the minimum standard. None of the *Almajiri* School satisfy the minimum standard of terrazzo floor. And for roofing only 1.6% satisfies the minimum Aluminum sheets standard roofing as prescribed by the standard, posing serious physical planning concern.

3.2.2 Environmental Characteristics of *Almajiri* Schools in Kano Metropolitan Area

Table 9 shows the environmental and sanitation condition of the *Almajiri* schools in Kano metropolitan area. From the table 40.9% of the schools sampled are characteristically environmentally filthy and dirty and therefore poor in sanitation. The level of environmental health vary from one local government to another. Dala local government having the highest 23% and Tarauni and Municipal local governments the lowest (6.8%). 11.5% of the sampled *Almajiri* schools exhibit neat and good looking environmental thus above the minimum level of sanitation. The local government variation are; Dala, Fagge, Ungogo (26.1%) each, Nassarawa and Municipal the have the highest (52.2%) schools in this category, and Tarauni recorded the lowest (8.7%) in environmental cleanliness.

Table 9: Cleanliness of *Almajiri* School Environment in Kano Metropolitan Area

Condition of the Environment	Dala	Fagge	Gwale	Kumbotso	Municipal	Nassarawa	Tarauni	Ungogo	Total	Percentage (%)
Dirty & Filthy	24	11	13	17	7	12	7	12	103	40.9
Not Spacious & Rumbles of Structures/unpleasing to the eye	12	6	6	15	4	9	3	9	64	25.4
Fairly Neat	8	4	6	9	8	9	5	7	56	22.2
Neat & Good looking	3	3	5	2	6	6	1	3	29	11.5
Very Neat & Aesthetically Pleasing	-	-	-	-	-	-	-	-	0	0
Total	47	24	30	43	25	36	16	31	252	100

Source: Field Survey, 2018

From table 9, none of the sampled schools visited have beautiful and well-kept ground probably arising from the high density of pupils which exerts pressure on the available facilities as well as environmental resources. Other reasons can be the apathy on the part of the schools and pupils on personal hygiene and environmental sanitation. This development poses a great challenge on physical planning.

3.2.2.1. Sewage Disposal

Table 10 shows the sewer conditions in the study area. The sampled *Almajiri* schools sewer or storm/sewage water drains were examined and categorized as follows: a well-drained sewer, in which, there is free flow of the sewage generated to the main sewer line of the neighbourhood; a fairly drained sewer in which the free flow of waste water is inhibited by the clogging of refuse in the drains and there isn't linkage with the main sewer of the neighbourhood; and a poorly drained sewer in which the *Almajiri* school lacks a sewer to drain its liquid waste into the neighbourhood's main sewer. Thus waste water freely flows on the ground or into ditches dug in front of the schools to collect the waste water and empty it on to its surroundings at odd hours of the day. Table 10 shows the categorization of the sewers in the sampled schools.

Table 10: Sewer Facility and Condition of *Almajiri* Schools in Kano Metropolitan Area

Condition	Frequency	Percentage
Well drained	13	5.2
Fairly drained	176	69.8
Poorly drained	63	25.0
Total	252	100

Source: Field survey, 2018

From the table, 94.8% of the drains are dirty and congested with solid waste preventing free flow of waste water and consequently stagnation of solid and liquid waste which constitutes unpleasant site and breeding ground for mosquitoes and rodents.

3.2.2.2: Solid Waste dDsposal. Solid waste generated from '*Almajiri*' schools are disposed within the vicinity of the school at any available space littering the school environment and the adjoining area. No disposal pints such as bins was observed in any of the schools sampled.

3.3. Socio-economic Profile of *Almajiri* in Kano Metropolitan Area

3.3.1 Age Distribution

Table 11 shows the age categories and frequency of occurrence in the sampled '*Almajiri*' schools

Table 11: Age distribution of *Almajiri* in Kano Metropolitan Area

Age group (In Years)	**Frequency**	**Percentage (%)**
4-13	150	59.5
14-17	70	27.8
18-24	32	12.7
Total	**252**	**100**

Source; Field Survey 2018.

Based on data obtained from the sampled population of *Almajiri,* the pupil's age range from 4 – 24 years. This age range is classified into three groups according to level of qur'anic knowledge as adopted from Adetoro (2012), Okugbeni, (2013); Onitada, (2015); and Iliyas and Olanipekun, (2017). The first category are *Kolo* age 4- 13 years; followed by *Titibiri* (14-17 years); and lastly *Gardi* (18-24

years). Drawing from interaction across age-based stages, Iliyas and Olanipekun, (2017) argued that experience and interaction between the *Almajiri* developed in him the *Almajiri* outlook, enthusiasms and ambitions at the *Kolo* phase. The *Gardi* phase symbolizes the characterization of life pattern anchored on the socialization process of earlier phase, i.e. based on 'his context, contact and exposure' (ibid, 2017), whereas the T*itibiri* phase is a transition stage. Not all of the *Almajiri* reach the third phase of the system because they drop out of the school. Table 11 shows the age categories and frequency of occurrence. From table 11, the age group 4-13 years, i. e. the *Kolo* are the highest number (59.5%) of *Almajiri* in all the schools sampled, while the least are the *Gardi* 18-24 years. This may be because most of the *Almajiri* may have dropped out of the system before attaining *Gardi* age category. The implication is that 87.3% of the *Almajiri* falls within the basic education category. In other words the nation is losing a significant number of its young population to an unorganized system which hatches teenagers that constitute an additional burden to the society.

3.3.2: Income Distribution of the Parents of *Almajiri*

Table 12 shows the income distribution of the parents or father of the *Almajiri*. Over 80% of the parents earn barely above 2 US Dollars per day. Over 50% earn about 1.7 US Dollars per day. Less than 1% earn above 50,000 naira per month, that is, about 4.6 US Dollars per day at the current exchange rate. The result portrays the level of poverty of the parental background of the *Almajiri* household (see the work of Gamment, 2017 on poverty and behavior traits of *Almajiri* which he ascribed to parental neglect and poor background).

Table 12: Income Distribution of Parents of *Almajiri* in Kano Metropolitan Area

Amount per Month (in Naira)	**Frequency**	**Percentage (%)**
Less than 18,000	135	53.6
18,001 – 25,000	70	27.8
25,001 – 30,000	32	12.7
30,001 – 40,000	9	3.6
40,001 – 50,000	4	1.6
Greater than 50,001	2	0.8
Total	**252**	**100**

Source; Field Survey 2018.

3.3.3: Size of '*Almajiri'* Household

Table 13 shows the distribution of the household size of the *Almajiri*. Over 85% of the *Almajiri* household are more than 6 in number. Low income coupled with a large household to feed compel the parents to send out their children to *Almajiri* school system to seek for knowledge which reduces the burden of having to feed a large household. Verbal confession from some of the *Almajiri* interviewed revealed that they have their brother in some other *Almajiri* schools or that their siblings have passed through the same system or have attended the some *Almajiri* schools elsewhere.

Table 13: Household size of *Almajiri* in Kano Metropolitan

Number of persons in *Almajiri* Household	**Frequency**	**Percentage (%)**
1-3	10	3.9
4-6	23	9.2
7-9	37	14.7
10-12	69	27.4
13-15	82	32.5
Greater than 15	31	12.3
Total	**252**	**100**

Source; Field Survey 2018.

3.3.4: Educational Level of Sampled *Almijiri* Parents

Table 14 shows the level of education of the parents of the *Almajiri*. Over 79% of the sampled respondents have not had any western education. Only 15% have gone to a formal western type school at primary or elementary level, 5.6% at secondary level and 0.4% at tertiary level.

Table 14: Educational level of *Almajiri* parent (Father) in Kano Metropolitan

Educational level of *Almajiri* Parent (Father)	**Frequency**	**Percentage (%)**
Neither *Almajiri* nor formal education	77	30.5
Almajiri School only	121	48.0
Almajiri and Formal school (Primary level)	39	15.5
Almajiri and Formal school (Secondary level)	14	5.6
Almajiri and Formal school (Tertiary level)	1	0.4
Formal school only (Primary-Tertiary level)	0	0
Total	**252**	**100**

Source; Field Survey 2018.

4.0. Physical Planning Implications of *Almajiri* Schools in Kano Metropolitan Area

Physical planning entails rational space organization to achieve a functional, aesthetic and liveable environment. It ensures that land uses is zoned in accordance with the prescribed standards and zoning regulations clearly detailing the sizes, bulkiness, and placement of building are strictly adhered to. Physical planning ensures a functional relationship between work, leisure and residence. The study finds that *Almajiri* schools are haphazardly located. The spatial distribution of the schools is skewed towards high and medium residential areas, with high density residential areas on the higher positive side. Fundamentally, the locational characteristics of the schools did not exhibit the slightest physical planning input. The physical planning implications are; firstly, the *Almajiri* schools are not sited on institutional but residential land use converted without approval, the result is non-conforming use juxtaposed and with blatant disregard to zoning regulations. Secondly, majority of *Almajiri* schools conduct their activities on public space earmarked for provision of facilities and services for the neighbourhood, i.e., the front, side and rear of residential and institutional buildings, thus encroaching

on public space demarcated for public good. Thirdly, the creation of squatter settlement emanating from the use of unconventional building materials for the schools structures and complete disregard to planning standards and building by-laws and regulations. This fact is fueled further by the poor personal and environmental hygiene and standards characteristic of *Almajiri* schools which accentuate the already chaotic and filthy environment. The environmental sanitary condition of the '*Almajiri* space appears so disgusting which devalues the properties of adjoining *Almajiri* schools. Such adjoining properties have drastically lower value compared with those neighbourhoods devoid of *Almajiri* schools. Fourthly, the learning area/space and bed space are highly overcrowded. Overcrowded spaces are detrimental to personal hygiene and environmental sanitation. It is also unpleasant to the eyes and poses great health risk during an epidemic. Fifthly, is the manner in which the *Almajiri* conducts his activities, that is, he is left to the dictates of the environment without decent accommodation, food, health care, clothing. He is left on the streets begging at a tender age. This is not only a source of serious concern for physical planning but also for urban management. Lastly, the '*Almajiri* are characteristically from poor, extended, illiterate families of the rural undeveloped sections of the city-region that has suffered from planning neglect and government developmental programmes becoming push nodes, unattractive and unproductive centers of perpetual unemployment and underemployment.

5.0 Recommendations

(1) *Almajiri* schools is a major constituent of the institutional learning system with over 5,000 schools and 600,000 pupils in the metropolitan area. It is recommended that the zoning regulation or land use division should capture *Almajiri* schools system either as a separate land use zone, or form a component of institutional land use or a mix-use zone of, for instance, residential cum institutional.

(2) Space standards for *Almajiri* Schools should be developed for a healthy, aesthetic and functional system. This is because *Almajiri* schools differ from conventional western type school in the way learning activities are conducted and there is currently planning standards are not developed for *Almajiri* school system.

(3) Integration of the system failed using the current strategy. One of the criticism labelled is the inability of the system to respond to input injected to the system. It is recommended that flexibility be introduced into the system to enable accommodation of new inputs.

(4) It is recommended that the head teachers or *Malams* should as a matter of fact be fully involved in any programme that concerns them, and their views fully incorporated in the conception, design and implementation of the programme. That is, there should be synergy between the head teachers and policy makers on all issues concerning *Almajiri* schools. It is believed that the

current strategy of integrating *Almajiri* schools with modern western type education system failed due to lack of synergy between the operators of the systems and policy makers.

(5) There should be strict adherence to zoning regulation and building by-laws to prevent the emergence of the *Almajiri* in places not legally provided for them. Contravention to the regulations and by-laws attracts appropriate punishment.

(6) Policies and programmes should be put in place that will address the lopsidedness in development between urban centres and the rural areas. The rural areas being the source regional of majority of the *Almajiri* who move to the urban centres under the pretext of seeking for knowledge far from home.

6.0. Conclusion

The study has been able to examine the space features of *Almajiri* school system in Kano metropolitan area. The spatial characteristics of the location, building type, and plot type were examined. Site dimensions of the floor area and space use assessed. The results reveals that *Almajiri* Schools are highly localized to the high and medium density old city and indigenous neighbourhoods of the metropolitan area. Environmental and building features assessed reveals lower values that the standards for basic education in Nigeria, 2010. Similarly, there is no standard for *Almajiri* space use as well as land use contextualization resulting in haphazard location and chaotic space use, sanitation challenges of the spatial receptacles of the schools. The peculiarity of the *Almajiri* School system space use should be appreciated and space standards developed for a meaningful improvement of the system. It is argued that significant improvement can be achieved in the integration of '*Almajiri*' schools with western type educations when planning implications of the system have been well understood, adequately considered and catered for. Furthermore, for a proper understanding of the *Almajiri* system there is the need to develop synergy between the operators of the system and policy makers.

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Environmental Effects of Solar PV, Diesel and the Corresponding Hybrids in Kenya: Case Study of Turkana County

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Abstract: Renewable Energy (RE) is perceived to play an increasingly important role in fast-tracking accessibility to affordable electricity as an alternative to the nonconventional sources. The role of such REs in mitigating negative environmental effects has been given much emphasis. Developing isolated mini-grids has been one of the potential projects in scaling up RE to achieve rural electrification in line with Kenya's energy solar PV-Diesel Hybrid minigrids systems are discussed. Further, the proposed Simulation Software policies. In this paper, the environmental effects of solar PV Minigrid, Diesel minigrid and the corresponding (Homer) and the Case Study (Turkana County) are discussed.

Key Words: Environmental Effects, Renewable Energy, Solar, Diesel, Hybrid and Homer

I: INTRODUCTION

World statistics currently indicate that over 1.5 billion people mainly in the rural areas and informal settlement of - lack access to electricity in most developing countries. Governments mostly in the developing countries must accelerate the universal access to electricity by investing heavily in the energy sector. As such, adoption of renewable energy is inevitable where through centralized mini-grids at the local level using village distribution network. Solar, wind and geothermal are the most common renewable energy sources. Hybrid systems where one or more renewable sources, a battery system or a diesel generator are integrated together to increase access to uninterrupted electricity that is environmentally friendly (Solar Power Awards, 2018).

Designing grid extension is costly in isolated rural communities and may not be feasible in implementation. However, renewable energy generation sources can be integrated together to come up with an affordable hybrid system that can impact the end users. Even though the nature of rural economies pushes for low-cost energy programs, quality has affected the system's lifespan, and thus the superiority of the system components can guarantee a long-lasting program with lowest generation costs. Appropriate sizing of the system increases the efficiency gains and cost savings, thus energy efficiency. The load and the power generated by a system is affected by the energy efficiency and raises the cost of the project. As a result, energy policies in developing Countries should be established by supply and demand-side management. In designing household and community energy systems many designers advice on the consumers on how to reduce short-term investment costs, thus the need for creating awareness on energy-efficient appliances (Alliance for Rural Electrification, 2017).

In sub-Saharan Africa, energy sources such as diesel are used to distribute energy in arid and semi-arid communities. However, a system that is served entirely by diesel gen sets is more expensive than hybrid ones. Hybrid mini-grids, on the other hand, exploit several local renewable resources combined with the gen-sets to complement one another (ARE n.d.).
Turkana County is one of the counties that is powered by off-grid mini-grids powered by diesel generators and with the highest poverty index in Kenya. According to Turkana County Government (n.d.), nearly 92 percent of the population -earns less than two US dollars per day (Turkana County Integrated Development, 2013-2017). Being a solar energy potential zone, with an average potential of around 4-6 kWh/m2, solar PV modules can be used to convert the solar radiation into electricity (RECP, 2018). Solar PV system is a form of

clean energy that can be a great substitute of diesel gen set or a fuel saver for a hybrid (Solar-Diesel) system mini-grid. Hybrid power systems have recently attained a lot of attention worldwide owing to their ability to combine several renewable energy sources and also include a backup generator as well as reducing emissions from the petroleum energy sources (WIT Press n.d.).

II: ENVIROMENTAL EFFECTS

A: Solar PV Mini-grid

Ideally, solar PV energy adoption is viewed to have environmental benefits over the conventional diesel mini-grid (Boateng, 2016; Tsoutsos et al., 2005). These benefits link the low carbon/greenhouse gas emissions of solar PV generation and utilization. Olatomiwa, Mikhilef, Huda, & Sanusi (2015) in their study stated that adoption of the conventional DG hybrided with renewable enery - would not only reduce diesel consuption and operating cost ,it would also signifiantly decrease the operating hours of the DG leading to reduction in greenhouse gas emissons. .

A study carried out by Anayochukwu & Nnene (2013) on measuring the environmental impact of power generation at GSM Base station sites, concluded that "it is important to quantify the environmental impact of using DG in GSM base stations. l Greenhouse gases (GHG) pollute the environmentand adversely affect the life of human beings.Indirect impacts generated by GHGs affect the quality of health.. Jade (2011) carried out a study comparing the environmental impacts of DG with hybrid diesel-wind electricity for off-grid communities in Ontario incorporating a Life Cycle Approach. The study evaluation determined that "although designers cannot entirely avoid diesel generated energy, hybrid diesel-wind does have the potential to provide reductions in environmental impacts between 12-46% when comparing it to the diesel generator system. The LCA indicated that the seven First Nations off-grid communities analyzed have the potential to reduce their environmental impacts caused by diesel generated electricity production through the implementation of hybrid-diesel wind" (Jade, 2011). The reduction was determined to be dependent on the renewable energy sources penetration level.

a) Positive Environmental Impact

Green Technology: Solar PV mini-grid is considered a green technology because it offers no pollution to the environment, the air remains fresh. It replaces the tradition and conventional energy sources from coal power plants that increase the content of Sulphur in the atmosphere thus causing acid rain, and petrochemicals such as gasoline, where carbon (I1) oxide is released, and other toxic substance of public health concerns.

Reduction in Green House Effect: Global warming is an international concern to different governments around the world. There have been summits of various world leaders to make the earth habitable, and hence global warming is a threat to humanity. Solar energy is a promising technology that offers no emission of greenhouse gases and carbon dioxide (Akyuz *et al.*,2018).

b) Negative Environmental Impact

Solar PV Mini-Grid plants have the potency to cause environmental degradation and the loss of habitat. The degree of damage depends on the scalability of the technology, the land topography and the resources available for construction of the site. The materials to be used are proportional to the type of technology, like photovoltaic (PV) solar cells. For PV it requires about 3.5 to 10 acres per megawatt. Another factor to be considered is that it is unlikely for the solar system to share the land with agricultural uses (scientist, 2013).

Solar systems design materials require maintenance and cleaning. Cleaning of these surfaces makes use of chemicals which are relatively toxic to humans. These chemicals include , hydrochloric acid, sulfuric acid, nitric acid, hydrogen fluoride, 1, 1, 1-trichloroethane and acetone which are similar to chemicals used in the semiconductor industry. The amount of these substances used depends on the type of solar system as iterated.

There were health complications when the storage units used to store heat energy is not ideal. Consequently, this may provide the perfect environment for the growth of molds and fungi that causes a different allergic reaction. It is also worth noting that the need for renewable energy is inexhaustible, but comes with its challenges. Thus, it might cause a shift in the ecological balance, owing to the facts that the surfaces of these panels reflect light because of silicon-based materials in their structure. When birds and insect fly around this region, they may die, hence affecting ecological patterns in the environment.

B: Diesel Mini-Grid

a) Positive Environmental Impact

The environmental impacts of diesel mini-grids are quite severe. So far there are no direct positive environmental impacts of diesel engines. However, the emission of CO2 has adverse effects on the environment as well as in the maintenance of life on earth. Ideally, human civilization should prevent carbon dioxide from trending down to ranks that impend the survival of living things that depend on it.

All life in the universe is carbon based and that the source of this carbon is CO2, which sequences through the global atmosphere by either natural or human processes. According to GREENIE WATCH. (n.d.) and Moore (2016), "as a minor gas at 0.04%, CO2 infiltrates the entire atmosphere and has been absorbed by the oceans and other water bodies (the hydrosphere), where it provides the food for photosynthetic species. If there were no CO2 or an insufficient level of CO2 in the atmosphere and hydrosphere, there would be no life as we know it on our planet" (GREENIE WATCH. (n.d.)).

b) Negative Environmental

Diesel is made up of carbon elements and thus discharges a mass of harmful materials together with direct emissions as Universiti Tenaga Nasional. (n.d.) posits that diesel contains "organic and elemental carbon (soot), toxic metals, nitrogen oxides that form ozone and nitrate particulate matter, volatile organic compounds, carbon monoxide (CO), carbon dioxide (CO2), and a variety of toxic metals and gases such as formaldehyde, acrolein and polycyclic aromatic hydrocarbons" (Universiti Tenaga Nasional. (n.d.); Anayochukwu and Nnene, 2013).

Inhalation of these toxic substances can cause cancers, cardiovascular diseases, respiratory diseases, and others. These substances include carbon (II) oxide and other toxic gasses. Diesel combustion discharges fine particles and toxic gases that can enter the body circulation system through the lungs once inhaled. It additionally can accumulate in lungs over time, hindering oxygen exchange to the blood and causing numerous health problems. Such as chronic respiratory symptoms such as shortness of breath and painful breathing; asthma; bronchitis; cancer; and premature deaths (NJDEP - StopTheSoot.org. (n.d.)).

One significant effect of these gases is the ability to cause greenhouse effect, and global warming, which in turn leads to deforestation, and degradation of agricultural lands, coupled with air and water pollution, the accumulation of solid waste, formation of smog and finally the extinction of some flora and fauna of various water bodies (Oisamoje & Eguono, 2013). Diesel machines produce so much noise that can irritate the ears, and cause noise pollution, repeated exposure of sound of a specific frequency can increase the chances of losing hearing.

C Solar PV Diesel- Hybrid Mini-Grid

a) Positive Environmental Impacts

An intelligent system optimizes the hybrid system that autoregulates itself depending on the energy demand per time. This optimization helps in the reduction of emissions from carbon, and toxic waste, hence a modification of the greenhouse effect and global warming gearing towards a smart environmental friendly system.With the development of a hybrid system, it compensates for the noise produced by diesel generators, hence controlling noise pollution while achieving the same purpose of energy satisfaction (Othman, 2005).

b) *Negative Environmental Impact*

One primary adverse environmental effect of a hybrid power system is that it's not emission free. There are still some quantities of toxic substances that are emitted to the environment, though minimal. These toxic substances can still bio-accumulate in the human system and cause public health issues. The emission of greenhouse gases always accompanies hybrid systems. Hence the earth is still not entirely free from the dangers it brings (Usman et al., 2017).

III: HOMER SOFTWARE

HOMER means Hybrid optimization Model for Electric Renewable. It is a software that is used for the designing, modelling and analysis of renewable energy systems. Renewable Energy Laboratory of the US developed it with an aim of coming up with more efficient renewable energy micro grid and has over time evolved to be a tool to design smart, more environmentally friendly energy micro grids.

The Homer software utilizes inputs as load demand and the available energy resources as well as the components of the power system in its calculations to design an optimal system. It reviews all available energy sources in all possible combinations. The design and analysis process is at times tasking due to uncertainties such as cost of fuel and power as well as future load size. To determine the hybrid system size using the software, an optimum system statement is formulated that minimizes the construction and operation costs with the maximum possible allowed risk determined. To do this, parameters such as wind speed, solar irradiation and load profile are determined.

System optimization is done after considering several combinations of hybrid renewable energy solutions based on the total net present cost (TNPC). The optimal system is the one with the lowest TNPC. The content and the weakness for the software is as shown in Table 1.

Table 1: HOMER SOFTWARE

Content	Deficiency/Weakness
• Designing, modelling and analysis of renewable energy systems by considering wind speed, solar irradiation and load profile. • Optimization of renewable energy system based on the lowest TNPC	• Only considers CO_2 emissions in its analysis of RE systems • Does not consider social impacts directly • Does not consider health impacts directly

IV: PROPOSED CASE STUDY

This research seeks to establish the economic and environmental impacts of solar PV integration into the existing diesel mini-grid in Turkana County. According to Turkana County Government (2013), "Turkana County is situated in North Western Kenya. It borders West Pokot and Baringo Counties to the South, Samburu County to the South East, and Marsabit County to the East. Internationally it borders South Sudan to the North, Uganda to the West and Ethiopia to the Northeast. The County shares Lake Turkana with Marsabit County. The total area of the county is 77,000 KM2 and lies between Longitudes 340 30' and 360 40' East and between Latitudes 10 30' and 50 30' North". The map of the county plus the daily solar irradiance is shown n Figure 1.

The County population stood at 855, 399 according to the Kenya Population and Housing Census (KPHC) results. The population is projected to be 1,036, 586 in 2012 and 1,427,797 in 2017 based on a population growth rate of 6.4 percent assuming constant mortality and fertility rates (Turkana County Government CIDP. (2013)".

The research study is focusing on Turkana County, one of the regions powered by off-grid connection (diesel mini-grids) located in 4 town centers namely Lodwar, Lokichoggio, Lokori and Lokitaung with two more (Kakuma and Lokiriama) under construction. The Population densities in these towns are low with a population of 146,275 people, and the lifestyle is predominantly pastoral. These towns are deficient regarding access to electricity supply.

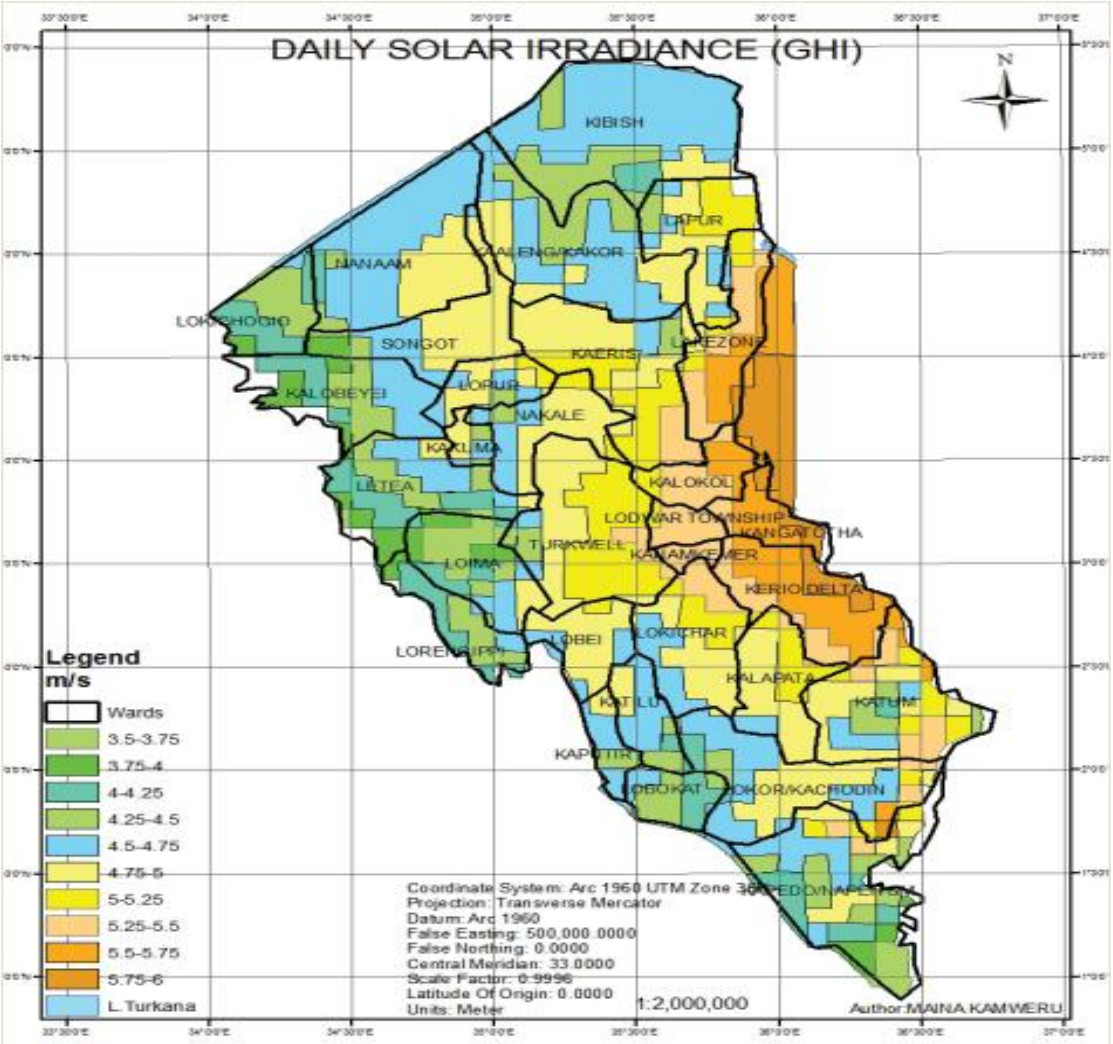

Figure 1: Daily solar Irradiance of Turkana County:
Source :*(Turkana County Resource Maps, 2016)*

V: CONCLUSION

In this paper, environmental impacts of solar, diesel and the corresponding hybrid system are presented. It is apparent that the Hybrid methods are more environmental friendly as compared to the individual sources. Further, the proposed simulation method; Homer is introduced and its capability to handle environmental issues illustrated. Lastly, Turkana County in Kenya, which is the Case Study; have been described. The proposed research study will present a hybrid power system of a standalone PV system and diesel generator and thus investigate the economic and environmental impacts of Solar PV integrated into a diesel mini-grid in Turkana County. Further work shall include the formulation of the Hybrid System and the environmental effects and analysis of the simulated results.

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Survival Analysis of HIV/AIDs Patients under Antiretroviral Treatment at Central Hospital, Agbor, Delta State, Nigeria

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Abstract- This study is designed to relate the Cox Proportional Hazard model to evaluate the determinant factors of survival time, predict the clinical progression of HIV/AIDs ailment by means of secondary data obtained from the Antiretroviral Rehabilitation Unit of Central Hospital, Agbor, Delta State, Nigeria. The statistics were extracted from Regular Patient Medical Registration. A study was undertaken on a sample of 1000 HIV/AIDs patients who were followed for a minimum predetermined period of 11 years and 3 months. From the sample, 64.2 per cent were female and 35.8 per cent were male, 8.6 per cent of the patients were report dead; while 91.4 per cent patients were censored. The Cox regression result indicated that the survival time of the HIV/AIDs patient is significantly related to gender, on ART, enrolment date, and current age.

Index Terms- Survival analysis, Antiretroviral, Hazard rate, Proportional model

I. Introduction

Survival analysis is a collection of statistical procedures for data analysis for which the outcome variable of interest is time until an event occur Liu (2102). By time, we mean years, months, weeks, or days from the beginning of follow-up of an individual until an event occurs; on the other hand, time can refer to the age of an individual when an event occurs. By event, we mean death, disease incidence, relapse from remission, recovery (return to work) or any designated experience of interest that may happen to an individual Klembaum (1996). Survival analysis is a statistical method for data analysis where the product variable of concern is the time to the incidence of an event. Klembaum (1996). Survival modeling or methods of analysis are generally used in experimental, biostatistics and epidemiology research to model time until event data. According to Nakhaee & Law (2011), Survival analysis can also be described as a statistical procedures premeditated to take into account the quantity of time an investigational unit contributes to a study period, that is, the time between entry into study and occurrence of event of interest Survival analysis deal with methods that measure the risk of death or progression of a disease and provide predictions that can help clinicians to estimate trends in the patient outcomes. Monitoring the duration of survival after diagnosis is therefore, an important component of the surveillance of HIV/AIDs as it provides the basis for evaluating individual prognostic factors as described in Assefa and Wencheko, (2012). As noted in Nakhaee & Law (2011), these techniques also allow health planners to predict the Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDs) burden on the health system and to allocate health services resources appropriately. Health care planning relies on a good understanding of disease incidence which requires an precise information of survival patterns Heller et.al., (1998). The survival of HIV/AIDs patients depends on a variety of factors including but not limited to the individual patient's demographic factors, serological baseline factors and presence of co-morbidities. The most widely used survival modelling techniques include the Cox's proportional hazards models and the accelerated failure time (AFT) models. In the last two to three decades, quantile regression (QR) models as introduced by Koenker & Bassett Jr, (1978) have become an alternative technique to describe and contextualize the distribution of a response variable given a set of explanatory variables. Quantile regression models are very flexible in assessing covariate effects on event times, thereby attracting huge interest in their application to survival modelling. Survival data is frequently skewed and the marginal distribution of response variable is characterized by marked skewness. Quantile regression methods are robust in characterizing and exploring the distribution of skewed data (for example duration or survival data) hence, emerging as popular techniques in survival modelling. According to Fitzenberger and Wilke (2005). Whilst the Cox's proportional hazards models estimators show that the survival times or failure times recognize the presence of some risk factors quantile regression analysis adds a new dimension to the literature Jonas et.al., (2000). It was further suggested by Hosmer et.et., (2008) that the influence of the risk factor on the survival times varies across the survival time distribution and for patients with higher duration (survival) times, the survival function will barely recognize some risk factors whilst for patients with the lowest survival times; their survivor function is particularly sensitive to the presence of some risk factors. Thus, quintiles regression techniques can help us get a more complete picture of the underlying connection connecting risk factors and the survival time. In Hogan et.all.,(2004) noted that; Censored quantile regression (CQR) like proportional hazards models

tackled the issue of right censoring of the response variable, which is frequent in survival study by modeling. the distribution of the survival time in a flexible semi-parametric way Ider and Kasl (1991) quantile regression does not entail modelling suppositions that may not be pragmatically valid like in the case of the proportional hazards postulation for the Cox's proportional hazards regression models. Censored quantile regression models are flexible than the AFT models or the Cox's proportional hazard model because they do not restrict the variation of estimated coefficients over the quantiles (Fitzenberger& Wilke, 2005).

1.1 Acronyms and Abbreviations

AIDs	Acquired Immunodeficiency Syndrome
HIV	Human Immunodeficiency Virus
CQR	Censored Quantile Regression
PHM	Proportional Hazards Model
LTFU	Loss to Follow-Up
MIS	Management Information Systems
UNAIDS	United Nations Programme on HIV/AIDS
AFT	Accelerated Failure Time models
ART	Anti-Retroviral Therapy
ARD	Antiretroviral drugs
WHO	World Health Organization
OR	Odds Ratio
RR	Relative Risk
HR	Hazard Ratio
ANC	Anti-Natal Care clinics
OLS	Ordinary Least Squares
IQR	Interquartile Range
CD4	Cluster of Differentiation 4
CI	Confidence Interval
(OIs)	Opportunistic infections

II. LITERATURE REVIEW

Antiretroviral medications are designed to prevent the replica of HIV in the human. The main effect of antiretroviral treatment is to restrain viral reproduction, allowing the individual's immune system to recuperate and protect a patient from increasing AIDs. The clinical benefit of ART for AIDs patients, in terms of mortality reduction and improved quality of life, is well established but shows regional differences, with higher case fatality rates in poor countries Braitstein *et al.*, (2006).With the dawn of antiretroviral therapy (ART), the morbidity and mortality of HIV disease are decreasing considerably in Europe and the USA Crimmins *et al*., (1996). 10 Million People living with HIV and who are eligible for treatment under the new WHO guidelines are still in need (UNAIDS, 2010). The examination of the survival likelihood of AIDs patients using socio-demographic factors and the idea that all demographic, socioeconomic, health and risky behavioral factors may perhaps have momentous relationship through survival of patients is supported by many researchers such as; Marie *et al*., 2001; Monica 2006; Holmes *et al*., 2003; Monica *et al*., 2006; and Cawley 2006.

According to the report of Sieleunou *et al*. (2009) age, is the significant predicator of survival of HIV/AIDs patients. According to Sandra *et al*., (2009) showed that, HIV sero-prevalence (regulating for such factors as age and gender) was 2.7 times higher among married than single patient, 5.5 times higher among the divorced and separated, and 7.9 times higher among the widowed. Antiretroviral therapy (ART) has reduced the incidence of opportunistic infections for certain patients with access to care. However, opportunistic infections may continue to cause substantial morbidity and mortality in patients with HIV infection (Holmes et al., 2003). In a related study in Kisesa, Tanzania, four rounds of village-based HIV testing and twenty rounds of household-based demographic examination on three hundred and sixty-nine HIV patients were conducted between 1994 and 2006. The dates of infection were roughly ascertain for individual sero-converters by allocation of a date between the last negative and first positive test, (Gregson *et al*., 2001). Person-years lived post-infections were computed, allowing for left truncation and right censoring, and Kaplan-Meier survival functions were constructed, truncating the analysis at the start of 2005 when ART first became available in the community Weibull models were fitted to estimate median survival time and parametric regression methods were used to investigate the control of sex and age at infection. The Kaplan-Meier function showed 67% surviving 9 years' post-infection, and the overall predicted median survival was 11.5 years. Survival was strongly related to age at infection (hazard ratio 1.06 for each additional year of age, and weakly to sex. A strong effect of age was evident even after allowing for mortality from non-HIV-related causes using cause deletion methods to estimate net mortality. The researchers are therefore of the view that, the survival of HIV-infected individuals was comparable to that reported in developed country studies before the beginning of HAART and that Survival patterns in Kisesa are marginally more favorable than those reported in cohort studies in Uganda with tha application of Kaplan-Meier survival estimate showed that patients with weight loss <10% of usual body weight survived 12 months, that is 2.5 times longer than patients with >20% weight loss (Chaisson et al. 1995). In Cawless (1998) The Cox proportional hazards model was use to study factors linked with evolution of AIDs and death and the result showed that lower CD4 cell count and adult age were associated with an bigger risk of death but there was no association between disease succession and sex Maria (2001) assessed AIDs patients' survival on 12 years' study of 486 adult patients using Kaplan-Meier survival analysis models to examine the impact of variables on patient survival, the log rank test to evaluate possible statistical differences between sub-groups and multivariate analysis using Cox proportional hazards model for assessing the performance of prognostic factors. The result demonstrated that there was no statistically significant difference between mean survival of male and female patients, among different age groups but CD4 count and antiretroviral drugs had a significant impact on increased survival of AIDs patients. Horsburgh (1991) also illustrated that age was not a significant predictor of survival in HIV infection. According to Endale et al. (2006), the identification prognostic markers where time to death is the main outcome variable, the Kaplan-Meier and Cox regression survival analysis is better for application as this was carried out in Ethiopia using data from 162 patients treated with HAART and the result confirm the highest death rate occurred in the first month of the treatment.

Weight loss is also shown to have connection with increased death among the 259 HIV/AIDs patients because as noted in Nuredin (2007) who carried out a retrospective study in Adama Hospital ART clinic with 259 HIV/AIDs patients.

In the literature as discussed, sharp out the use of survival analysis in the studies of time-to-event data such as; patients living with HIV/AIDs disease, in particular the use of Kaplan-Meier analysis and proportional hazards models for the detection of clinical and socio demographic variables with the assumption that the variables influences the survival of AIDs patients.

III. METHODLOGY

3.1. Method of Data Collection

A secondary data collection method was employed to extract a sample of 1000 out of the total registered 2000 HIV/AIDs cases that have been followed up for 12 years (January 2006 to December 2018) at Central hospital, Agbor, Delta State, Nigeria.

3.2 Proportional Hazards Modelling (PHM)

Cox's Proportional Hazards Modelling (PHM) is a partial likelihood perspective in which the baseline hazard rate is an unspecified nuisance function Liu (2102). it can also be described as the basic modeling or technique used in exploring the relationship between the survival experiments and potential risk factors in survival data analysis. This model was proposed by Cox in the year 1972; (Cox and Oakes, 1984) and it has come to be identified as the Cox Proportional Hazards Regression Models (CPHRM). Although, the model is based on the theory of hazards proportionality as such, no particular form of likelihood distribution is assumed for the survival times. The model is thus semi-parametric in nature and very flexible.

3.3 Model Specification for the PHM

Examining the bond between survival time and illustrative variables (risk factors) entails the condition of a linear-model for the log-hazard. For instance, each surveillance under examination is presume to be subject to an instantaneous hazard rate $h(t)$ of experiencing a unique invent. Where$1 \leq t \leq \infty$. Analogous to the parametric proportional hazard model, the effect of covariate in the Cox model is specified by a multiplicative effect term $exp(x'\beta)$, given the nonnegative of the Hazard function. The basic equation for the Cox model is given by

$$h(t/x) = h_0(\mathrm{t})\exp(x'\beta) \tag{3.1}$$

Given the hazard function, the survival probability is

$$S(t;x) = [S_0(t)]^{\exp(x'\beta)} \tag{3.2}$$

Where,

$$S_0(t) = \exp[-H_0(t)] \tag{3.3}$$

From equation (2.1) and (2.2) above, the density function is

$$f(t;x) = h_0(\mathrm{t})\exp(x'\beta)exp\left[-\exp(x'\beta)\int_0^{\mathrm{t}} \mathrm{h}_0\,(\mathrm{u})\mathrm{du}\right]$$

3.3 Fitting the Proportional Hazards Model

To fit a proportional hazards model given in equation 3.5 to an observed set of survival data, requires estimating the unknown coefficients of the illustrative variables $(X_i,)$ in the linear component of the model β_i and the baseline hazard $h_0(t)$, may also need to be estimated. The estimation of this parameters can be done independently. After estimating the β_i , the result we then be used to construct the baseline hazard function. This aspect is important of paramount to make inferences about the effects of p-explanatory variable $(X_i,)$ on the relative hazard, $\frac{h_1(t)}{h_0\,(t)}$, as noted in collett, (2015) and Allison, (2010) we do not need an estimate of $h_0(t)$.

According to Cox 1972, the conditional probability that an individual experience a particular event at time t_i given that he or she is among the k individual at risk $R(t_i)$ of experiencing the event. This conditioner probability can be transform to a continuous hazard function as

$$\frac{harzad\ at\ t_i\ for\ individual\ i\ with\ covariate\ x_i}{\sum_{l\epsilon R(t_i)} hazard\ rate\ at\ t_i\ for\ individual\ l}$$

This equation can be represented as

$$\frac{h(t_i;x_i)}{\sum_{l\epsilon R(t_i)} h(t_i;x_i)} = \frac{h_0(t_i)\exp(x'\beta)}{\sum_{l\epsilon R(t_i)} h_0(t_i)\exp(x'\beta)} \tag{3.6}$$

Eliminating the common term, it provided an incomplete hazard function without specifying the distribution of the baseline h_0. Hence, the only parameter to be estimated in the Cox model is simply specified as the log of the likelihood of equation…

$$logL_p(\beta) = \sum_{i=1}^{d}\left\{x_i'\beta - \sum_{i-1}^{d}\log\left[\sum_{l\epsilon R(t_i)}\exp\,(x_i'\beta)\right]\right\} \tag{3.7}$$

IV. ANALYSIS OF RESULT

In this section, we consider the descriptive analysis of the data and concluded the section with the survival analysis. Basically, we first examine the bio-data of HIV/AIDs patients and we consider the stay time of the patient on treatment and cross tab with the final status of the patient whether dead (status =0), active (status =1), LFTU (status =2) or Transferred out (status =3)

4.1.Exploratory Data Analysis (EDA) on Gender, Current Age, ART and Enrolment date

Table 4.11; Distribution of Cases by Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	358	35.8	35.8	35.8
	Female	642	64.2	64.2	100.0
	Total	**1000**	**100.0**	**100.0**	

Table 4.13; Gender Outcome Cross Tabulation

		OUTCOME		Total
		DEAD	ACTIVE, LTFU, TRANSFERRED OUT	
GENDER	Male	38	320	**358**
	Female	48	594	**642**
Total		**86**	**914**	**1000**

Table 4.13; Categorical Variable Codings[a,c]

		Frequency	(1)
GENDER[b]	0=Male	358	1
	1=Female	642	0
CRNT_STA[b]	0=NOT ON ART	628	1
	1=ON ART	372	0

(a) Category variable: GENDER (GENDER)
(b) Indicator Parameter Coding
(c) Category variable: CRNT_STA (CRNT ART STATE)

Table 4.14; Current Age Outcome Cross Tabulation count

		OUTCOME		Total
		DEAD	ACTIVE, LTFU, TRANSFERRED OUT	
CURRENT AGE	11-20yrs	4	40	**44**
	21-30yrs	6	57	**63**
	31-40yrs	34	271	**305**
	41-50yrs	28	319	**347**
	51-60yrs	9	138	**147**
	60yrs above	5	89	**94**
Total		**86**	**914**	**1000**

Table 4.15; Case Processing Summary

		N	Percent
Cases available in analysis	Event[a]	86	8.6%
	Censored	895	89.5%
	Total	981	98.1%
Cases dropped	Cases with missing values	0	0.0%
	Cases with negative time	0	0.0%
	Censored cases before the earliest event in a stratum	19	1.9%
	Total	19	1.9%
Total		**1000**	**100.0%**

Block 0: Beginning Block

Omnibus Tests of Model Coefficients

-2Log Likelihood
1042.208

Table 4.16; Omnibus Tests of Model Coefficients[a]

-2 Log Likelihood	Overall (score)			Change From preceding Step			Change From preceding Block		
	Chi-square	df	Sig.	Chi-square	df	Sig.	Chi-square	df	Sig.
730.811	287.554	4	.000	311.397	4	.000	311.397	4	.000

Table 4.16; Variables in the Equation

	Parameter estimate	Standard error	Wald	df	Mean	Sig.	Hazard ratio	95.0% CI	
								Lower	Upper
GENDER	.347	.225	2.390	1	.357	.122	1.415	.911	2.197
AGE	-.233	.094	6.194	1	3.779	.013	.792	.659	.952
CRNT_STA	-.799	.227	12.420	1	.635	.000	.450	.289	.702
ENROL_DAT	.000	.000	77.552	1	13392364447.706	.000	1.000	1.000	1.000

V. DISSCUSION OF FINDINGS

From table 4.14 above, the minimum age recorded is eleven (11) years and the maximum age is eighty-nine (89) years also, age groups between 31 and 50 years has the higher numbers of the HIV infection for both sexes at Central hospital, Agbor. In the programme outcome of the information, the dependent variable, the censoring status variable and censoring values is reported first. Given a long period of observation (12 years) 86 out of 1000 individuals are deceased (actual event) and the remaining 914 HIV/AIDs patients are right censored the Model Fit Statistics (MFS) Section display three indicators of model fitness, with their values being very close and obviously generating the same conclusion about model fitting. All three test in the "Testing Global Null Hypothesis Beta = 0" section demonstrate that the null hypothesis $\hat{\beta} = 0$ should be rejected. For example the chi-square of likelihood ratio test is 287.554 with 4 degree of freedom which is very strongly significant ($P < 0.0001$).

In the table of "Analysis of Maximum likelihood Estimate" the regression coefficient of gender is 0.347 (standard error =0.225) statistically significant at 0.05 ($x^2 = 2.390$; $P < 0.0001$). (It should be noted however, that the Wald statistical test is use to test the maximum likelihood estimate of the parameters of interest is compared with the proposed value with

the assumption that the difference between distributed, hypothetically the significance of the difference is compared to chi-square distribution as such, it is also known as the Wald chi-square test) by exponentiation, the regression coefficient generates the hazard ratio between the males and the females HIV/AIDs infected persons taking antiretroviral drugs at Central Hospital, Agbor, Delta State. As presented in the seventh table in conclusion, the estimate of this hazard ratio is 1.415 suggesting that the mortality of female is 42% higher than the males of other covariates being equal. The regression coefficients of the three control variables are statistically significant. Age is negatively associated with the hazard rate of 0.792 ($\hat{\beta}_2 = -0.233, x^2 = 6.194; P < 0.0139$) as expected likewise, CRNT ART state the patient on Anti-Retroviral Therapy is having 45% hazard rate which is less than those that are not on art with hazard rate of about 65% so, mortality is higher among those who are not on ART. ($\hat{\beta}_3 = -0.799, x^2 = 12.420; P < 0.001$) in other words additional increase in the Anti-Retroviral Therapy would however the mortality rate of HIV/AIDs patients. Also, the enrolment date, is also very significant with hazard rate of 1.000. The primary goal of ART is to improve health, prolong the life of the HIV-infected persons and reduction in HIV-related mortality, Delta State Government should make improvement towards the provision of safe, effective, equitable and sustainable ART services to those infected by HIV/AIDs.

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Guillain-Barré syndrome with hyperreflexia precipitated by Lyme's disease

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Abstract: Guillain-Barré syndrome (GBS), though associated with progressive motor weakness and areflexia, there have been case reports of GBS presenting as hyperreflexia and maintained reflexes. Early detection and treatment is of paramount importance as delay in diagnosis portends a poor prognosis to the patient. There is clear evidence of an association of an antecedent infectious disease associated with the development of GBS, therefore if proper diagnostic studies are not considered early in the course of treatment, the potential antecedent etiology may remain elusive. Here we report an atypical case of GBS with hyperreflexia precipitated by Lyme's disease.

Keywords: Autoimmune response; Hyperreflexia; Molecular mimicry; Neuroborreliosis

Introduction:

Guillain-Barré syndrome (GBS) is an acute autoimmune polyradiculoneuropathy, presenting as areflexic, flaccid paralysis with variable sensory disturbances, and elevated cerebrospinal fluid (CSF) protein without pleocytosis.[1] The 2 features essential for a diagnosis of GBS are progressive motor weakness and areflexia. There are 2 distinctive pathologic subtypes of GBS: demyelinating and axonal. Recently, there have been several descriptions of reflex preservation and hyperreflexia in axonal GBS in Chinese, Japanese, and European populations.[1,2] Although this variant is not common in the Indian subcontinent, a few cases have been reported.[3,4] A high index of suspicion is therefore needed to diagnose this rare presentation of GBS. It has been recently understood that an antecedent infection may predicate an immune response resulting in the development of GBS with Campylobacter jejuni and Cytomeglovirus being the commonly reported causative agents.[5] Tick borne diseases such as Borrelia burgdorferi, the causative agent of Lyme have been identified as a causative agent in lyme disease in humans. Lyme disease may have protean immune modulating manifestations involving multiple organ systems including the skin, joints, heart, and brain. Neuroborreliosis, a common presentation of CNS lyme disease is characterized by peripheral and cranial neuropathies, which may also be a presenting symptom of GBS .[6] This particular case, reports a possible association of B. burgdorferi as an inciting agent for GBS.

CASE REPORT:

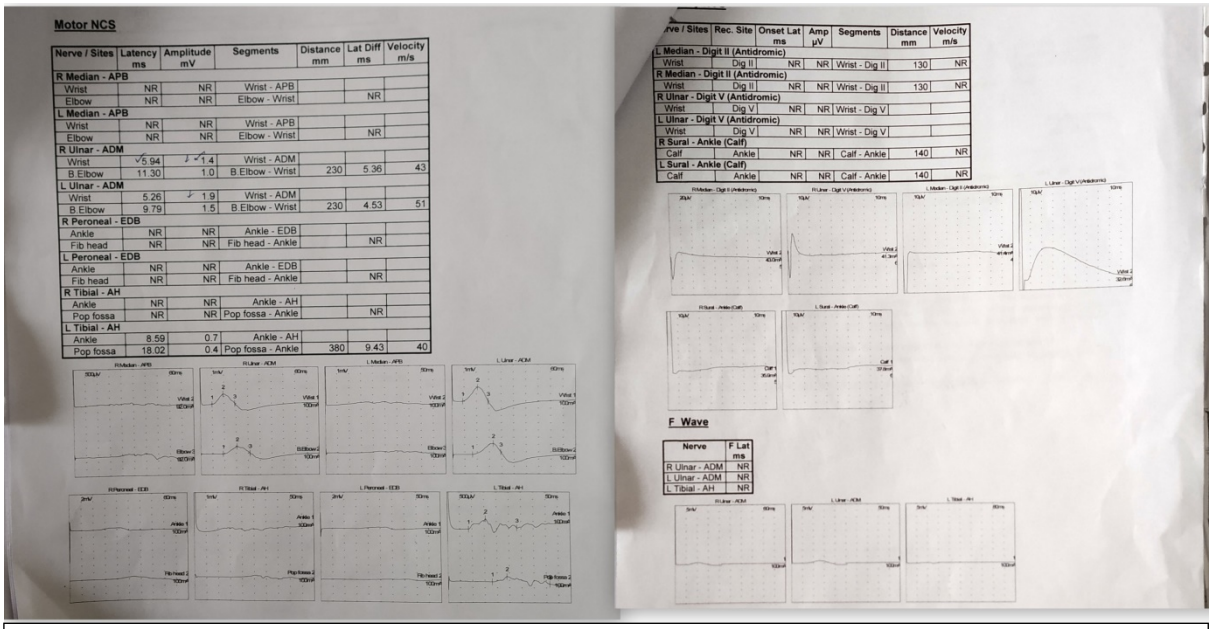
A 50 year old male,non-diabetic,non hypertensive presented with the chief complaints of numbness of the palms and soles, slurring of speech since last 7 days. He had difficulty in gripping objects with his hands and difficulty in walking without support with slippage of his slippers over these last 7 days along with backache. He had a history of fever 7 days back preceding this episode of weakness which lasted for only 3 days. There were no history of any rashes or joint pain. The patient was a vegetarian by diet and had a history of occasional alcohol intake. CNS examination revealed bilateral LMN type facial nerve palsy(Fig 1),normal tone of all four limbs, power of 5/5 in all four limbs, brisk deep tendon reflexes on the right side and absent on the left side, sensations were intact and plantars were bilateral flex or other systemic examinations were within normal limits.

Investigations revealed a normal hemogram,normal electrolytes,liver and kidney function tests.Thyroid function test,Vit B12 and Folate levels were within normal limits.CXR,NCCT head and MRI brain were within normal limits,serum ACE levels were normal.A lumbar puncture was done and CSF study revealed albuminocytological dissociation with nil cells,protein-100mg/dl,sugar-70mg/dl.An NCV was done which was suggestive of decreased CMAP amplitudes of bilateral ulnar and left tibial nerves with mildly delayed distal latency with rest of the nerves being non-recordable,features suggestive of polyneuropathy,axonal> demyelinating(Fig 2).So a provisional diagnosis of GBS(AMSAN with bilateral facial nerve palsy) was

made and patient was initiated on IVIg infusion at 2g/Kg body weight over 5 days,eye padding was done while sleeping.Lyme's,Campylobacter jejuni and Cytomegalovirus serologies were sent.

Patient responded to IVIg consequently,his gait had improved,there was appearance of the deep tendon reflexes on the left side but his numbness still persisted,so did the lagophthalmos.Lyme's serology(IGM) came out to be positive while Campylobacter and CMV serologies were negative.Patient was initiated on IV Ceftriaxone 2g/day for 14 days.He showed improvement in his residual weakness ,disappearance of lagophthalmos(Fig 3),his numbness had subsided as well.So this was an atypical case of GBS with hyperreflexia precipitated by Lyme's disease.

Fig 1 showing bilateral Bell's phenomenon suggestive of bilateral LMN facial nerve palsy.



Motor NCS

Nerve / Sites	Latency ms	Amplitude mV	Segments	Distance mm	Lat Diff ms	Velocity m/s
R Median - APB						
Wrist	NR	NR	Wrist - APB			
Elbow	NR	NR	Elbow - Wrist		NR	
L Median - APB						
Wrist	NR	NR	Wrist - APB			
Elbow	NR	NR	Elbow - Wrist		NR	
R Ulnar - ADM						
Wrist	5.94	1.4	Wrist - ADM			
B.Elbow	11.30	1.0	B.Elbow - Wrist	230	5.36	43
L Ulnar - ADM						
Wrist	5.26	1.9	Wrist - ADM			
B.Elbow	9.79	1.5	B.Elbow - Wrist	230	4.53	51
R Peroneal - EDB						
Ankle	NR	NR	Ankle - EDB			
Fib head	NR	NR	Fib head - Ankle		NR	
L Peroneal - EDB						
Ankle	NR	NR	Ankle - EDB			
Fib head	NR	NR	Fib head - Ankle		NR	
R Tibial - AH						
Ankle	NR	NR	Ankle - AH			
Pop fossa	NR	NR	Pop fossa - Ankle		NR	
L Tibial - AH						
Ankle	8.59	0.7	Ankle - AH			
Pop fossa	18.02	0.4	Pop fossa - Ankle	380	9.43	40

Nerve / Sites	Rec. Site	Onset Lat ms	Amp µV	Segments	Distance mm	Velocity m/s
L Median - Digit II (Antidromic)						
Wrist	Dig II	NR	NR	Wrist - Dig II	130	NR
R Median - Digit II (Antidromic)						
Wrist	Dig II	NR	NR	Wrist - Dig II	130	NR
R Ulnar - Digit V (Antidromic)						
Wrist	Dig V	NR	NR	Wrist - Dig V		
L Ulnar - Digit V (Antidromic)						
Wrist	Dig V	NR	NR	Wrist - Dig V		
R Sural - Ankle (Calf)						
Calf	Ankle	NR	NR	Calf - Ankle	140	NR
L Sural - Ankle (Calf)						
Calf	Ankle	NR	NR	Calf - Ankle	140	NR

F Wave

Nerve	F Lat ms
R Ulnar - ADM	NR
L Ulnar - ADM	NR
L Tibial - AH	NR

Fig 2 showing NCV of all 4 limbs showing decreased CMAP amplitudes of B/L ulnar and left tibial nerves with mildly delayed distal latency with rest of the nerves being non-recordable, suggestive of polyneuropathy,axonal> demyelinating-AMSAN variety of GBS.

Fig 3 showing disappearance of lagophthalmos on treatment.

Discussion

GBS is a heterogeneous disease consisting of many different clinical presentations to include: acute inflammatory demyelinating polyradiculopathy (AIDP), the most common type in the western world, acute motor axonal neuropathy (AMAN), acute motor and sensory neuropathy (AMSAN), as well as other less common variants.[7] An antecedent infection has been noted in a significant number of patients with GBS with Campylobacter being the most commonly encountered,occurring in about two-thirds of patients prior to the start of symptoms associated with GBS.[8] Campylobacter acting as an inciting agent for GBS originates from the principle of molecular mimicry which is described as a foreign antigen being perceived as a self-antigen due to the presence of similar structural units [8,9]. It is hypothesized that when humans are infected with Campylobacter ,autoantibodies are produced that target the Campylobacter ganglioside-like liposaccharrides and these liposaccharides are similar to gangliosides which are important in the function of Schwann cells, that myelinate peripheral nerves [8 9] and this results in the manifestation of GBS. It is a widely accepted hypothesis that B. Burgdorferi is capable of producing an autoimmune response[9]. It is therefore plausible that the spirochete or components of the spirochete associated with lyme disease may also act as antigens or immune complexes, which facilitate production of antiglanglioside antibodies predicated in the development of GBS in susceptible individuals although further research is warranted in this area[10]. Bilateral facial palsy is extremely rare with an incidence only 1 per 5 million patients and the most common infectious cause for this rare presentation is lyme disease.[11] The exact mechanism that causes hyperreflexia in these cases is unknown and hyperexcitability of the motor neurons and dysfunction of the spinal inhibitory interneurons have been proposed as the possible mechanism.[12]

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Cephalometric evaluation of soft palate thickness and size of the adenoid as an indicator for development of obstructive sleep apnea in children with mouth breathing habit.

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***Abstract*- STUDY OBJECTIVES:** To evaluate the size of the adenoid and thickness of soft palate in the test group consisting of children with mouth breathing habit and compare it with the control group which included children without mouth breathing habit. Also to correlate the occurrence of pediatric obstructive sleep apnea among such children.

METHODS: A total of forty children belonging to the age group ranging from 7 to 10 years were included in the study, the children were divided into two groups with and without mouth breathing habit consisting of twenty children in each group. Cephalometric tracings were done for all the children and ratio of air column to soft palate thickness was calculated and graded according to Cohen and Konak.

RESULTS: Children belonging to the test group had a reduced air column and thicker soft palate compared to that of the control group with a mean difference of 1.092. It was also shown on grading of adenoid that 100% children belonging to the control group and small sized adenoids whereas maximum number of children (80%) in the test group has medium sized adenoid.

CONCLUSION: Pediatric dentists do have an opportunity to recognize and make appropriate referrals of pediatric patients at risk for obstructive sleep apnea. Lateral cephalogram is a reliable and a simple diagnostic tool as it is readily available. Children with medium and large sized adenoid have an increased susceptibility to pediatric obstructive sleep apnea.

***Index Terms*-** Mouth breathing, Adenoid hypertrophy, Pediatric obstructive sleep apnea, Lateral cephalogram, Air column

INTRODUCTION

Post natal craniofacial development and adequate occlusion is a multifarious complex phenomenon which is affected by genetic and environmental factors. It is believed that functions of the stomatognathic apparatus play an important role in craniofacial and occlusal development.[1-2] Muscle adaptations also influence the growth and development of dentoskeletal unit.

The powerful urge to breathe through the nose is present in all individuals and is considered physiological.[3] Chronic obstruction of the nasal airway causes mouth breathing and respiratory needs are the primary determinant of the posture of jaws and tongue.[4] This shift from nasal to oral breathing in children is considered to affect their growth. Chronic mouth breathing is known to cause variation in the configuration of dentoskeletal unit. Open lips, elongated face, narrowing of nasal fossae, hypoplasia of paranasal sinuses, constricted maxillary arch associated with posterior cross bite, high palatal vault, dorsocaudal mandibular displacement, increased mandibular inclination in relation to the cranial base, lower positioning of the tongue and maxillary anterior gingivitis may be observed in children with chronic mouth breathing habit.[2-6]

Adenoid hypertrophy is frequently considered to be one of the main causes of respiratory obstruction. The adenoidal nasopharyngeal space is narrowest at 4.5 years of age and then

the adenoid reaches its greatest size between 7-10 years and it is during this time that the facial frame develops rapidly.[7]

Adenoid hypertrophy increased the risk of developing obstructive sleep apnea in children. Pediatric obstructive sleep apnea is characterized by repetitive episodes of partial or complete airway obstruction during sleep, which may or may not be associated with hypoxemia and sleep fragmentation.[8-9] In children, adenoid hypertrophy is known to be one of the common etiology of nasopharyngeal obstruction, preventing the child from adequately breathing through nose and compelling the child to breathe through the mouth during sleep and wakefulness. Such children may have a history of snoring, abnormal sleep patterns, daytime neurobehavioural problems and cognitive deficits. A positive association existed between the adenoid grade and Apnea-Hypopnea Indiex (AHI) in toddler, preschool and school children but not in the adolescent group.[7, 10-11]

The lateral cephalogram, a standardized skull radiograph is used universally to analyze both bony and soft tissue craniofacial relationships and morphology. A lateral cephalometric radiograph is an uncomplicated, economical and reproducible way to measure adenoid size and hence can be used as a reliable screening tool.[9-11]

Little attention has been paid to craniofacial and pharyngeal morphology in children with nocturnal breathing disorders even though there is little information regarding why snoring and sleep disruption may in some children develop into POSA.[12-14]

Hence, this study aims to evaluate the soft palate thickness and adenoid size in children with mouth breathing habit which can be an indicator to the developing pediatric obstructive sleep apnea in such patients. Therefore, an early diagnosis (if made) through simple techniques and timely management can improve a child's long term cognitive and social potential as well as the school performance.

METHODOLOGY

The present study was conducted in the Department of Pedodontics and Preventive dentistry, Rajarajeswari Dental College and Hospital, Bangalore. Forty children aged between 7-10 years were involved in the study. An informed consent was taken from the parent/guardian of the children involved in the study. The children were grouped into two categories, consisting of 20 children in each group. The first group – A (mean age 9.2 years) consisted of children with malocclusion in the anteroposterior spatial relation without mouth breathing as control and the second group - B (mean age 9.65 years) consisted of children with mouth breathing habit. The children were diagnosed with mouth breathing based on detailed history regarding position of the lips while in leisure and sleeping, drooling of saliva and wet pillow observed in the morning as well as clinical evaluation such as open lips during rest position. Water holding test was performed in order to confirm mouth breathing habit. Subjects with history of adenoidectomy, congenital abnormalities, mental disorders and debilitating diseases, children undergoing orthodontic treatment or appliances were excluded from the study.

Lateral cephalograms were taken for both the test and control groups (40 children) in the same Panoromic machine with Cephalometric projection- Orthophos XG 5 DS (Sirona) at the Department of Oral Medicine and Radiology at Rajarajeswari Dental College and Hospital. The cephalograms were obtained with constant physical and technical parameters (71 kVp; 10 mAs; focal length – 165 cm; distance from midline of the head to cassette – 14 cm). Since there might be a variation in the position of the soft palate to the pharynx in supine position, all the lateral cephalometric radiographs will be taken with the subjects in upright position with the Frankfurt plane parallel to the floor, teeth in maximal intercuspal position and lip relaxed (Fig – 1).

Cephalometric tracing was done using acetate sheet for all the forty cephalograms taken. Conventional cephalometric landmarks, reference lines, and measurements that were used for skeletal structures are as follows (Cohen D and Konak S)[15,16] as shown in fig 2.

- A : Point of maximal convexity along the inferior margin of the adenoid
- B: Posterior superior edge of the hard palate
- C: Point on the posterior border of the soft palate, 10 mm away from B
- AC : Distance between point A –C

- D: Thickness of the soft palate measured 10 mm away from point B

RESULTS:

The values thus obtained were subjected to statistical analysis. Table 1 shows the mean and standard deviation of the cephalometric measurements comparing the ratio of air column(AC) to soft palate thickness(D) between test and control group using independent student t test. Comparison of distribution of adenoids between control and test groups using chi square test is shown in Table 2.

The study shows an increase in the thickness of soft palate and decrease in dimension of air column in the test group compared to that of the control with mean difference of 1.092 ($p<0.001$). the assize of the adenoid was evaluated and it was observed that in the control group it 100% of the children had small sized adenoid (AC/D >/= 1) whereas in the test group it was observed to be large sized adenoid in 5% of the children (AC/D < 0.5), medium sized adenoid in 80% of the children (AC/D > 0.5 < 1.0) and 15% of them had small sized adenoid (AC/D >/= 1.0).

DISCUSSION:

Craniofacial development in children with respiratory obstruction have been studied extensively from the past few years though there is a considerable controversy in literature due to the absence of a direct relationship between the etiology of respiratory obstruction and its consequence on craniofacial growth.[9,17] According to Porter in 87.5% of the cases with mouth breathing had high arched palate. It would seem clear that on account of nasal obstruction in bilateral cases or partial obstruction in unilateral cases, the action of tongue in molding the palate has been interfered with.[3] During normal respiration there is decreased pressure of air during inspiration and an increased air pressure during expiration and that when the nasopharynx is blocked due to adenoid hypertrophy, this rhythmic increase and decease is lessened and peak inspiratory pressure differences between normal breathing and apnea can show the severity of obstructive sleep apnea syndrome.[18,19] Some studies suggest that the deformities of nose and face are more often the cause than the result of the nasal obstruction.

During sleep, the muscle activity is decreased and the resistance of the upper airways is increased.[20,21] This results in reduction in the muscle tone which can lead to obstructive sleep apnea syndrome in children with hypertrophic lymphatic tissue. It has been reported that sleep disturbances have an influence on the endocrine system, especially on the secretion of growth hormones.[9,22-24] Condylar cartilage seems to be a target and production site for hormonal agents as evidenced by insulin like growth factor I (IGF I) receptor and IGF I messenger RNA expression and children with sleep disorders have shown to have a reduced posterior facial height.[22,25] Children with obstructive sleep apnea have shown disturbances in the somatic growth because of abnormal nocturnal secretion of growth hormone.[26]
Children with sleep disordered breathing is shown to have an increased total and lower anterior facial height which refers to vertical growth pattern of the mandible (Agren et al, Lofstrand-Tidestrom et al, Zucconi et al, Kawashima et al).
In this study we have evaluated the soft palate thickness and adenoid size as an indicator for the development of obstructive sleep apnea in children with mouth breathing habit It was observed that children with mouth breathing habit had a decrease in the dimension of air column(AC) (mean-0.5025 mm) an increase in the thickness of soft palate (D) (mean-0.675 mm) compared to the control group (AC: mean-0.99mm and SP: mean-0.52 mm). The mean ratio of AC/D in the test group was 0.760 and that of the control group was 1.852.
A study conducted by Juliana B.R et al which included 73 children among which 29 were control subjects and 44 with adenotonsillar hypertrophy aged between 3-6 years. They were submitted to otorhinolaryngologic, speech pathologic and orthodontic assessment. The results so observed revealed a higher incidence of nasal obstruction, snoring, mouth breathing, apneas, nocturnal hypersalivation, itchy nose, repeated tonsillitis and bruxism in the test group. A study conducted Harari D et al in which they evaluated children with mouth breathing habit. They were classified into two groups, ages raging from 3 to 6

years and 7-10 years, with respiratory obstruction due to isolated adenoid hypertrophy and two groups, ages ranging from 3-6 years and 7-10 years, due to adenotonsillar hypertrophy. It was found that there was an increase in the posterior lower facial height in children belonging to the test group. A study was conducted by Parkinnen et al to assess the cephalometric features in children with sleep disordered breathing (SDB). This study included 70 children with habitual snoring and symptoms of obstructive sleep disorder for more than 6 months. On the basis of polysomnographic findings, the children were further divided into subgroups of 26 children with diagnosed obstructive sleep apnea (OSA), 17 with signs of upper airway resistance syndrome (UARS) and 27 with snoring. A control group of 70 non obstructed children matched for age and gender were selected. Children with upper airway resistance syndrome(UARS) and OSA were associated with decreased pharyngeal diameter at the level of adenoids and tip of uvula, a thicker soft palate and anteriorly positioned maxilla in relation to the cranial base. The results in our study also showed a decrease in the air column at the level of adenoids and also a thicker soft palate among the test group.

Studies have shown that normal linear measurement of superior posterior airway space (SPAS) value is 10 mm and every 1 mm decrease increases the susceptibility to severity of snoring by 1.61 times. A study conducted by Rabasco J et al on children with apparent life threatening events (ALTE) displayed a higher frequency of snoring, apneas, habitual mouth breathing, restless sleep and night sweating than the control group. The life threatening events (ALTE) group also had a history of adenotonsillectomy.[27]

Adenoid is said to be a simple 3- dimensional structure and when it is compressed in to 2- dimensional image as in case of a lateral cephalogram, there seems to be no loss of information. Studies conducted by Jean et al and Maw et al have shown fairly strong correlation of the size of the adenoid measures on a lateral cephalogram with that which were surgically excised by adenoidectomy. Studies conducted by Linder Aronson et al have also shown correlation between the adenoid measures in lateral cephalogram with that viewed and graded using endoscopy.[28]

Hence, lateral cephalograms have shown to be reliable for diagnosis of adenoid hypertrophy and has a strong correlation with standard intra-operative mirror nasopharyngoscopy and flexible endoscopic nasopharyngoscopy. It was also observed in a study that children undergoing diagnositic procedures by flexible endoscopy were above 10 years of age whereas those who underwent the procedure by lateral cephalograms where of youner age group children.[29]

CONCLUSION

Lateral cephalogram is a reliable and a simple diagnostic tool as it is readily available. Children with medium and large sized adenoid have an increased susceptibility to pediatric obstructive sleep apnea (POSA). A multidisciplinary approach is essential in order to manage the children as the severity may vary among the individuals belonging to this category and so will be the associated symptoms and manifestations which may be related to craniofacial development as well as overall health and well being of the child. Diagnosing the condition at a premature stage is possible through the pattern of breathing and an aberrant discrepancy in the growth and development of the child. Pediatric dentists may usually be the first to recognize this issue. There is limited information and statistics available regarding the present matter in India. Hence, an awareness regarding uncomplicated diagnostic method using a lateral cephalogram with non complex anatomical landmarks can lead to early intervention of this condition serving to modify and conduct the growth pattern as well as to enhance the quality of life among such children.

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Table 1 – Comparison of mean ratio of air column (AC) to soft palate thickness (SP) between test and control group using independent student t test

Group	**N**	**Mean**	**SD**	**S.E.M**	**Mean diff**	**t**	**p-value**
Control	20	1.852	0.627	0.140	1.092	7.418	<0.001*
Test	20	0.760	0.200	0.045			

*- Statistically significant

Table 2 – Comparison of distribution of adenoids between control and test group using Chi square test

Adenoid size	**Control**		**Test**		**X^2 Value**	**P- Value**
	n	%	n	%		
Small	20	100	3	15	29.565	<0.001*
Medium	0	0	16	80		
Large	0	0	1	5		

*- Statistically significant

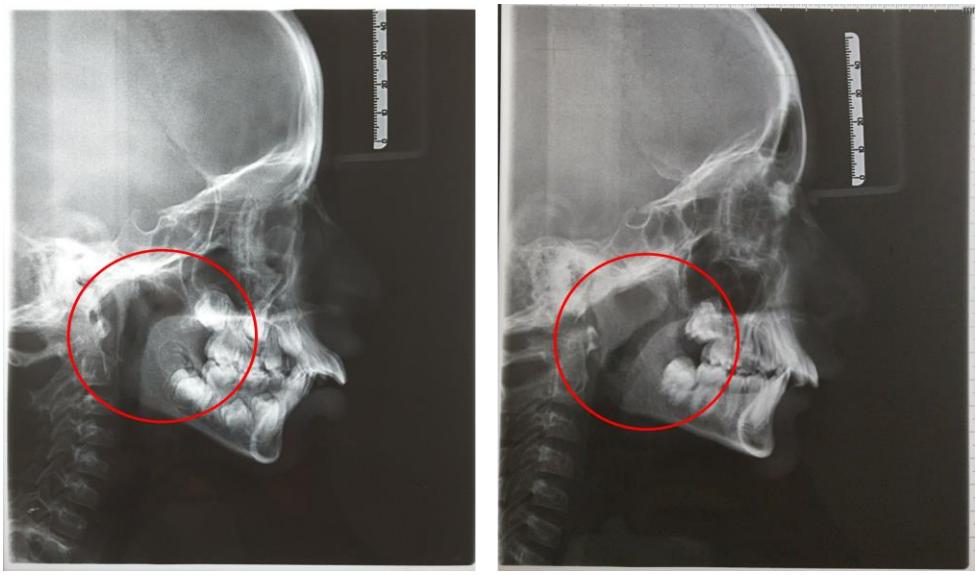

Fig 1 Lateral cephalogram of one of the children belonging to Group A(left) and Group B(right)

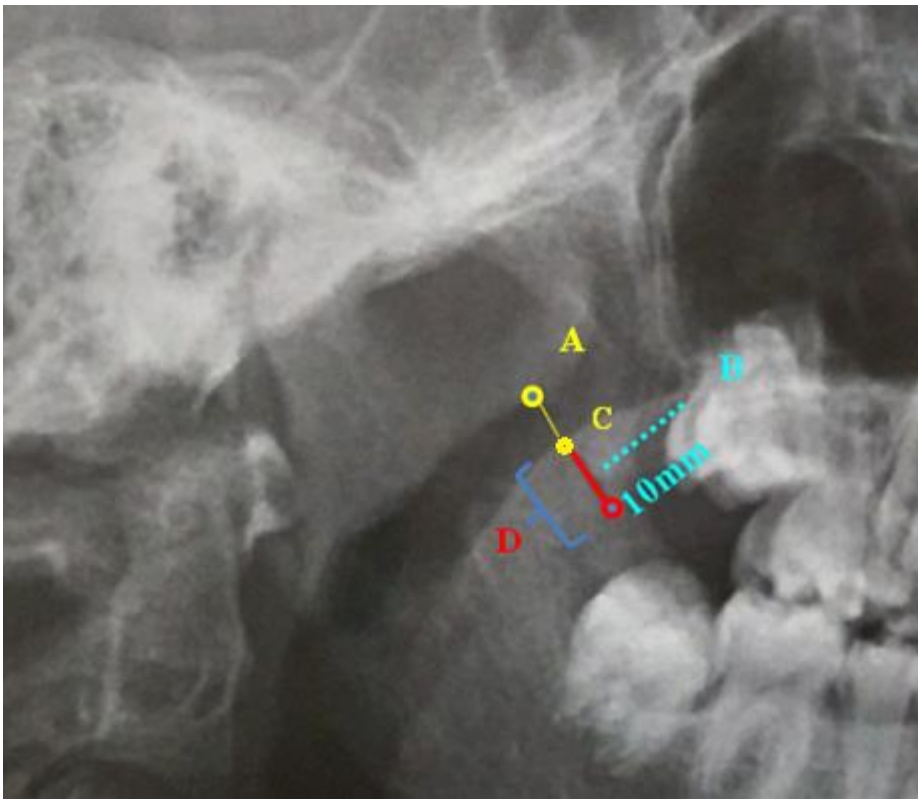

Fig.2 Cephalometric landmarks and reference point used for tracing

Building Information Modelling Adoption in Structural Design in Kenya - A Case Study of Nairobi.

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Abstract
Countries like the USA, UK and the Netherlands have all adopted Building Information Modelling as a standard and it is used in the design and construction process. In Kenya, neither is the use of Building Information Modelling mandatory nor has it been made a standard for any form of work. Its adoption is purely based on the organizations policies and preferences.

This paper seeks to explore the adoption of Building information modelling in Structural design. The research design employed was a survey research. Primary data was collected through a well-structured questionnaire using a sample size of forty respondents. Based on the findings, Building Information Modelling is in use in majority of the organizations. However, for the majority Building Information Modelling had been in use for under 3 years indicating that adoption of Building Information Modelling in Kenya is quite recent.

The major hinderances to Building Information Modelling adoption were found to be, the cost of the software, lack of trained personnel and lack of knowledge and awareness. To encourage Building Information Modelling adoption, it is recommended that, it is included in the Engineering curriculum, the use of Building Information Modelling is promoted among Construction Industry professionals by creating and increasing awareness through workshops and conferences and making the software cheaper and accessible.

Key words: Building Information Modelling, Structural Design

1. Introduction

Globally in construction, digitalization has progressively taken over most processes and structural design is one of them. There has been a move away from manual design to Computer Aided Design (CAD) to Building Information Modelling (BIM).

The construction industry in Kenya is growing. A statistical release by Kenya National Bureau of Statistics (2018) shows that the growth rate of real estate was 6.8%, 6.6% and 5.8% in the first three quarters of 2018. The government plans, policies and strategies such as the “Big Four Agenda” and “Vision 2030” have contributed to this growth.

In Kenya the Industry players directly affected by Building Information Modelling are Engineers, Architects and Contractors. A study done on Building Information Modelling adoption in Project management, focused mainly on Contractors, Builders and other industry Professionals found that only 25% had adopted it in their firms. (Mumbua, 2016) The same study found that the respondents agreed that the design and construction stages are where Building Information Modelling had the most benefits.

Another study done on the adaptation of Information Communication Technology (ICT) by contractors found that 35% reported using it always, 22% reported using it most times, 41% reported using it quite often and 4% reported using it rarely. (Nyaga, 2016) The significance of this study is that Building Information Modelling adoption is dependent on the use of Information Communication Technology.

Gitee (2018) studied the effects on implementing Building Information Modelling in Projects in Nairobi. The study discovered that when Building Information Modelling is implemented in project design and project estimation it had a positive and significant effect on the project implementation success. However, Building Information Modelling was not being fully relied on for material estimation and project scheduling.

The structural design processes of interest are design conceptualization, interpretation of design, structural analysis, clash detection, trade co-ordination, estimation of quantities, scheduling of work, design documentation, archiving of information and submission to the relevant authorities.

A study on Future Cities and Building Information Modelling found that there was a correlation between the world economic Forums, "Network Readiness Index" and the use of Building Information Modelling in countries. The index is a measure of a countries readiness to exploit opportunities of Information and Communication Technology. (Sielker and Allmendinger, 2018) The world economic forum report of 2016 ranked countries like the USA, UK and the Netherlands as 5th, 6th and 8th respectively whereas Kenya was ranked 86th. It is then no wonder that the USA, UK and the Netherlands also lead in Building Information Modelling adoption.

Table 1 Summary of BIM in the USA, UK and Netherlands

Countries	**USA**	**UK**	**The Netherlands**
Regulatory framework	BIM obligatory for government projects from 2008,	BIM mandate for public procurements, obligatory for government projects by 2016, development of standards	No governmental mandate, state agency today in tenders require BIM standard development
Financial framework	Indirectly through governmental projects,	BIM projects reflected in budget and financial support of institution	Indirectly, through governmental projects
Other elements	Support from federal governments, private stakeholders and universities supporting education	Development of institution and support of BIM community development, construction industry is involved in BIM definition through UK Task group	Marketing campaign, BIM weeks organised by private companies, standard development based on technological experiences
Focus	Initial focus on public service buildings	Focus on infrastructure and private buildings	Initial focus on private buildings, designed by architects etc., public projects focus on infrastructure
Timeframe	Start in 2003, BIM mandate 2007	Start in 2011, BIM mandate 2016	Start of debates in the 90s, early projects leading to standards by 2003, 2012 open BIM standards
Leading Stakeholders	Public entities and organisations	Government with the support of a Task Group including leading BIM companies	Led by construction industry stakeholders

Source: Sielker & Allmendinger, 2018

The National Construction Authority in Kenya is in the draft stages of developing a Construction Industry Development Policy. Listed in the draft among the challenges is the low technological uptake and exposure levels of stakeholders to international best practices. However, the absence of technological uptake as an independent policy objective does not give a platform to address Building Information Modelling. In comparison to the UK, where Building Information Modelling was among the main strategies for their construction Industry Strategies of 2011 and 2016, Kenya falls short.

Methodology

A quantitative approach using a well-structured questionnaire was adopted. The target audience were Structural Engineers registered with the IEK (Institute of Engineers of Kenya) in Nairobi County. Nairobi was selected as it is the Administrative and Economic capital of Kenya.

Random sampling was employed to ensure that the entire population had an equal probability of being selected. The sample size was 40 participants.

Primary data for this research was obtained through administering well-structured questionnaires, mainly comprised of closed and open-ended questions. The questionnaire had 4 parts and a total of 28 questions. The questionnaires were administered through an online link or a printed version delivered to various structural design firms. One questionnaire was delivered to each design firm to allow for a diverse response pool. The response rate was 87.5%. Google sheets was used to analyse the data.

Secondary data was then used to corroborate and draw comparisons from the findings obtained from the primary data. The sources of secondary data included, but are not limited to, books, thesis, journal articles, reports and internet searches.

Results and Discussion

This section presents the data and corresponding analysis obtained from the questionnaires.

3.1. Profession

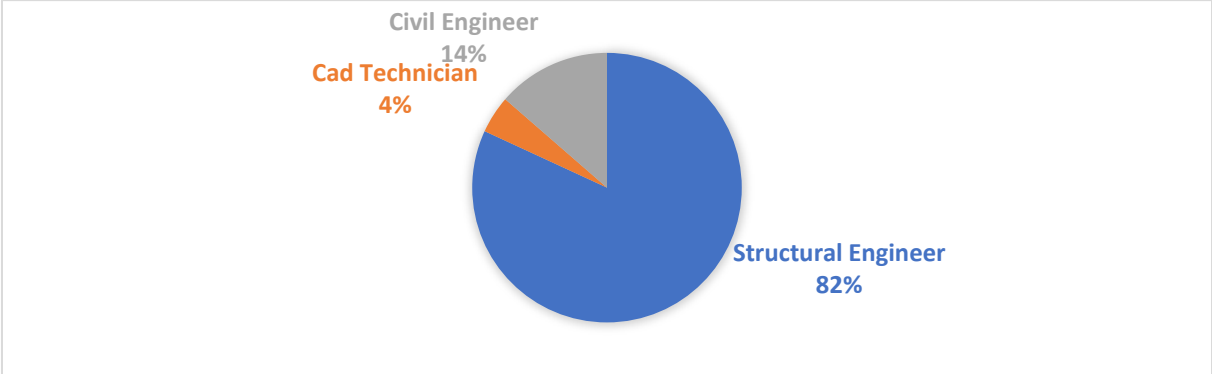


Figure 1 Distribution of Professionals

The percentages of the population surveyed are Structural Engineers at **82%,** Civil Engineers at **14%** and Cad Technicians at **4%**. This distribution is true of their respective involvements in the design processes. Generally, in a structural design, Engineers are involved in all the design processes and Cad Technicians are usually limited to the production of construction drawings and other construction documentation.

3.2. Experience

In order to gauge their proficiency in Structural Design the respondents were asked to indicate their work experience. **53%** of the respondents had 0-5 years' experience, **33%** had 5-10 years' experience and **14%** of the respondents had over 15 years' experience.

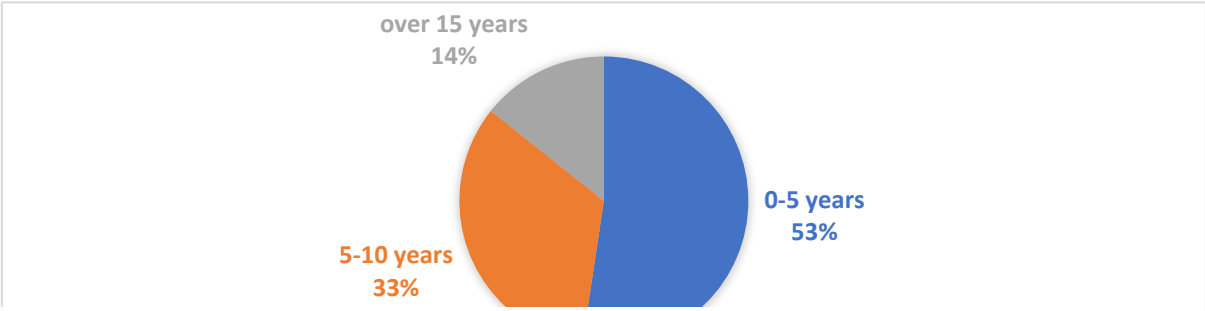


Figure 2 Work experience

3.3. Organization Size

The following criteria was used to classify the organizations:

Number of employees: where a small organization is one that has less than 10 employees, a mid-sized organization is one that has 10-50 employees and a large organization is one that has over 50 employees.

The type of projects handled: Generally, small organizations handle mainly simple residential and commercial projects. Mid-size organizations tend to handle residential, commercial and industrial projects that are complex. For large organizations, most of the projects they work on have government involvement, international funding and are major industrial projects that require heavy capital.

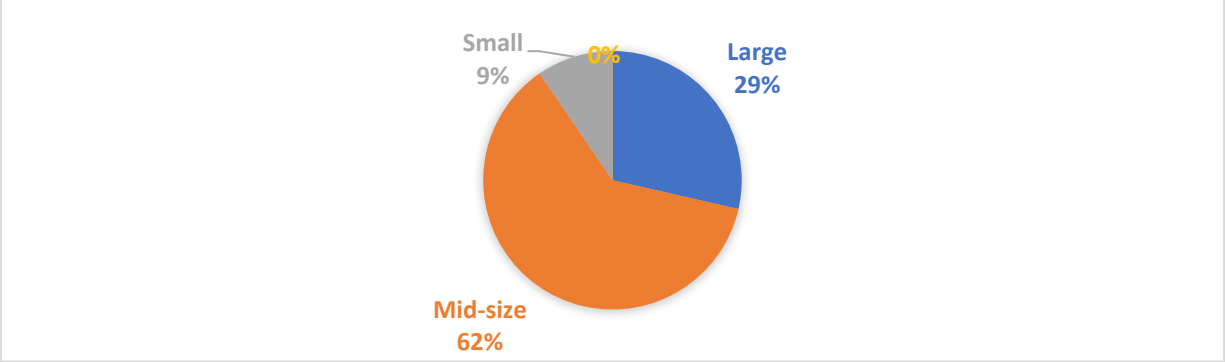


Figure 3 Organization Size Distribution

Of the organizations surveyed **61.9%** were mid-size organizations, **28.6%** were large organizations and **9.5%** were small organizations.

It is indicative of the distribution of organization sizes within the Engineering sector in Kenya. This is attributed to the complexity of the available projects. The country is still developing, and a large percentage of the clients are homeowners, residential developers and commercial developers. Such projects would be an underutilization of resources for large firms. As for small firms they may not be able to keep up with the constant need for data or may only be able to handle one project at a time. Thus, the Mid-sized organizations thrive as it is an optimal and sustainable use of resources.

3.4. The individual level of awareness of BIM.

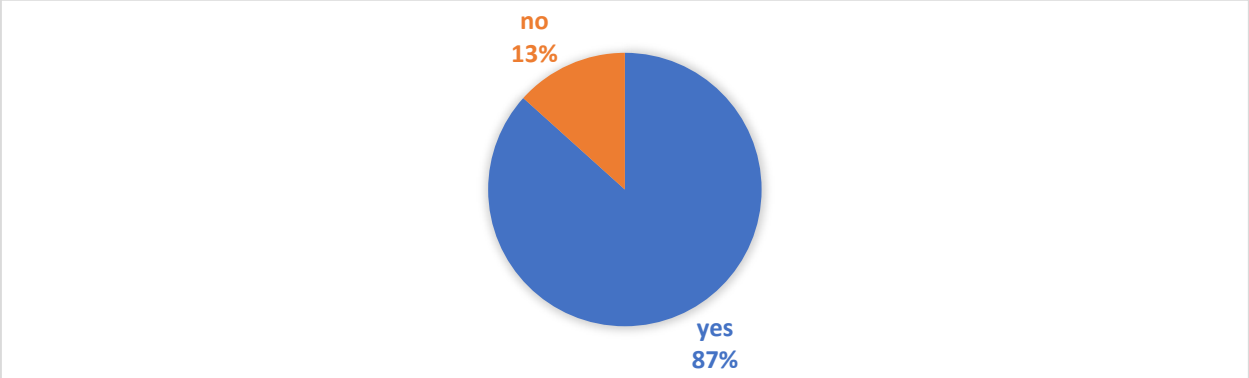


Figure 4 Level of BIM awareness

In order to gauge the general level of awareness on Building Information Modelling and level of understanding concerning its application in structural design the respondents were asked whether they knew about Building Information Modelling.

Majority of the respondents (**87%)** answered in the affirmative, that they were aware of Building Information Modelling and (**13%)** reported a lack of awareness of Building Information Modelling.

Mumbua (2016) obtained similar results in a study on Building Information Modelling adoption in construction project management. It can then be inferred that there is a high level of awareness of Building Information Modelling in the construction industry in Kenya.

3.5. The use of BIM in design in the organization.

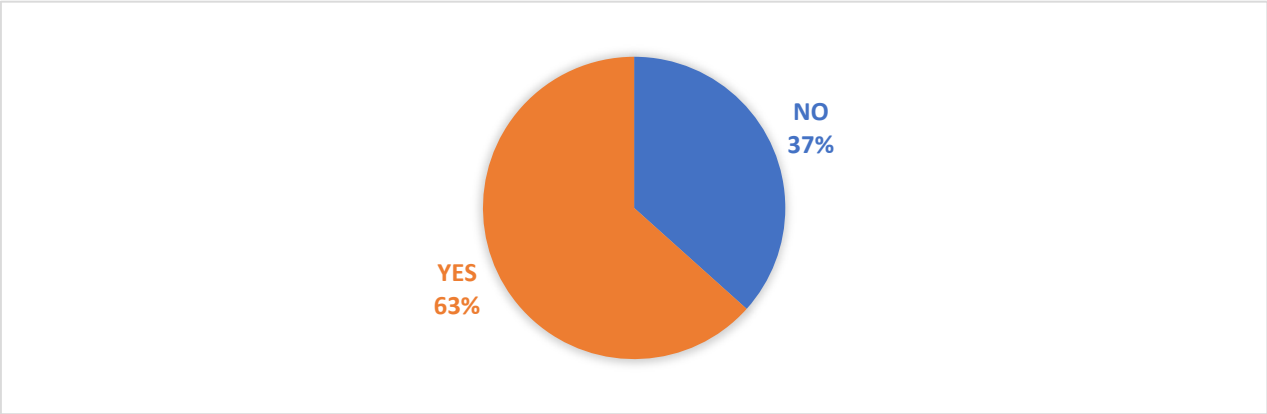


Figure 5 Organizational BIM use

The use of Building information modelling within the organisations was then established. **63%** reported the use of Building Information Modelling within their organisations while **37%** reported that Building Information Modelling was not being used in the organisation.

As compared to findings by Mumbua (2016) where only **25%** were using Building Information Modelling, there is a wider use of Building Information Modelling in structural design.

Building Information Modelling is an integrated workflow that involves all industry professionals. When the above data sets are compared, they indicate that Engineers use Building Information Modelling more than Construction Project Managers. Indicative of an inefficient use of Building Information Modelling as a coordination tool across the industry.

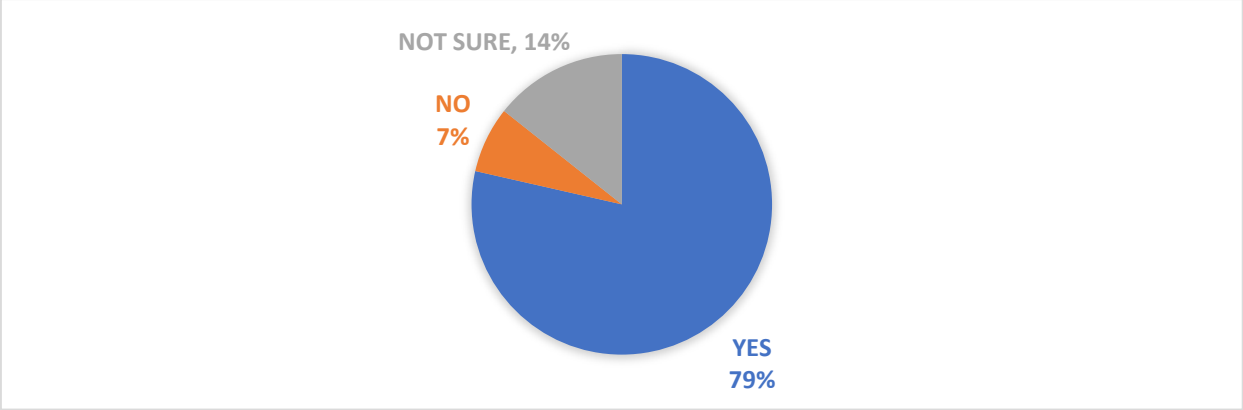


Figure 6 Possibility of Future BIM adoption

From **Figure 5**, of the **37%** that reported a lack of use of Building Information Modelling, **78.6%** thought it would be adopted soon, **7.1%** thought it would not and **14.3%** were not sure.

Similar statistics by Mumbua (2016) found that a majority thought it would be adopted soon. Showing that most professionals do realise that Building Information Modelling is essential and beneficial to the construction Industry.

3.6. Number of years BIM had been in use

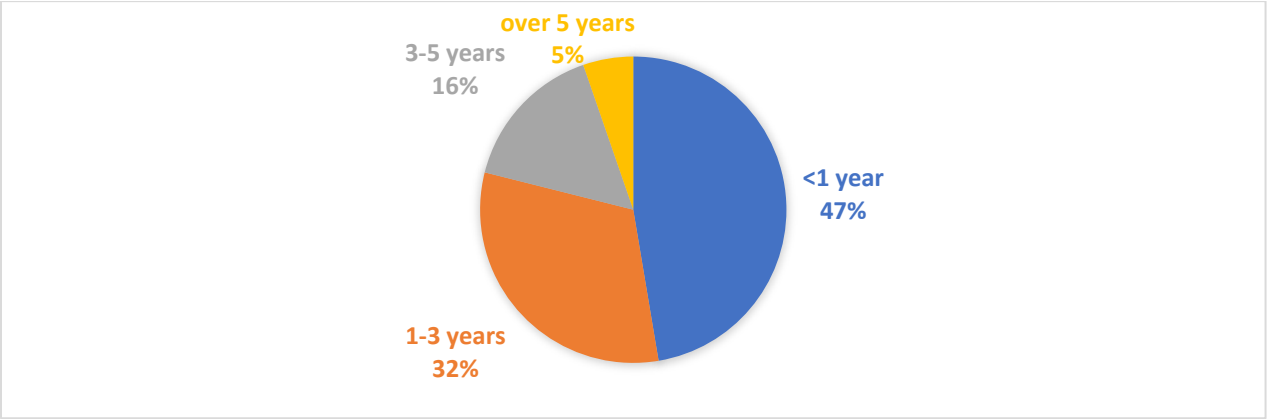
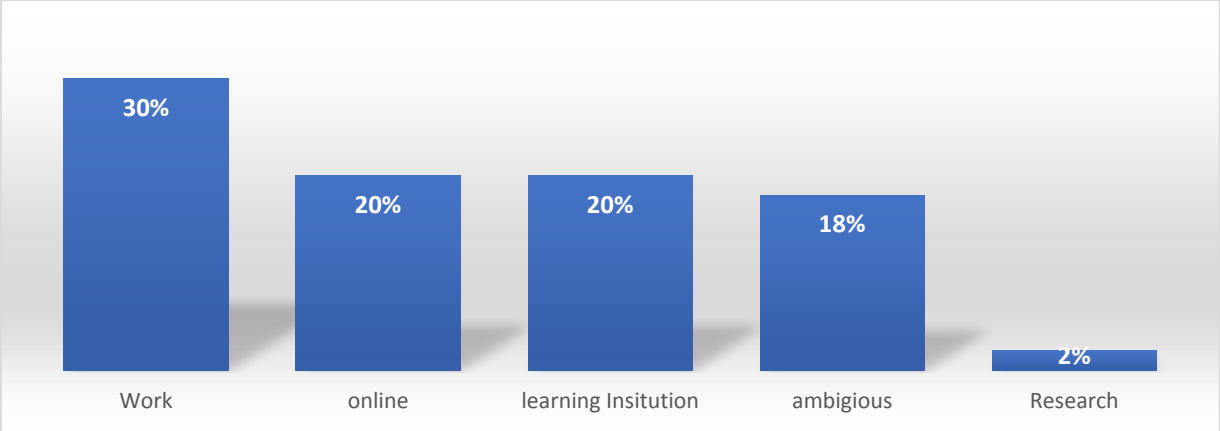


Figure 7 *Length of use of BIM.*

Of the **67%** who said that Building Information Modelling was in use in their organizations, **5%** said that it had been in use for over 5 years, **32%** said 1-3 years and **16%** said 3-5 years and **47.4%** said it had been in use for less than a year. This shows that there is an increase in the number of organizations adopting Building Information Modelling.



3.7. First BIM encounter

Figure 8 First BIM encounter

The respondent's first Building Information Modelling encounter was then established. Majority (**30%**) reported to have encountered it at work. This was closely followed by learning institutions, and Online activity at **20%. 7%** of respondents reported that they had encountered it in research. There were some unclear responses which came to (**18%**).

This is indicative of a clear variation in the syllabus of institutions of higher learning especially universities and that many graduates only encounter Building Information Modelling after they leave the learning institutions.

3.8. Rated level of adoption in the organizations

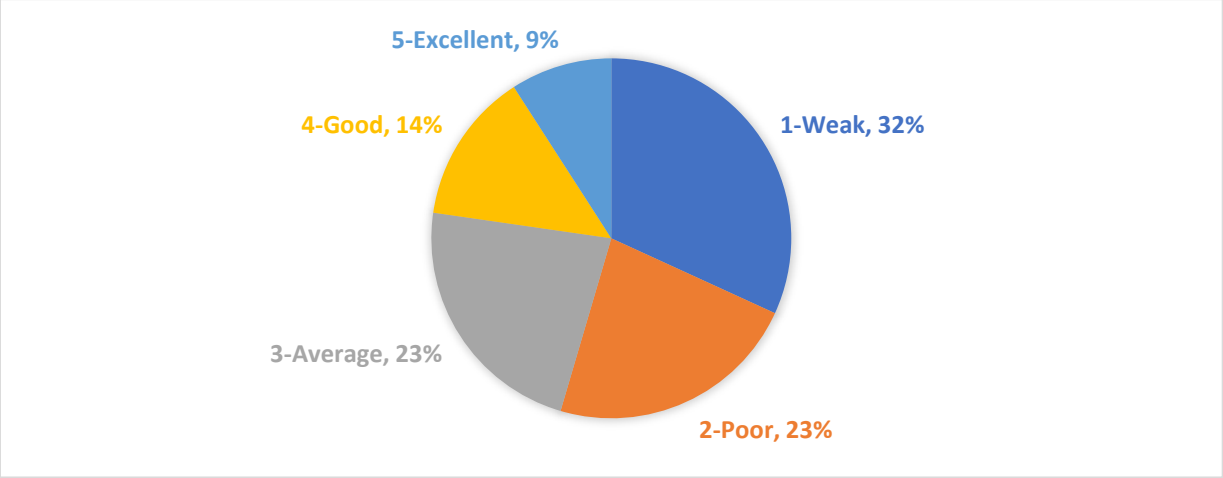


Figure 9 Level of BIM adoption

On the overall level of adoption of Building Information Modelling the results were as follows. **32%** of respondents rated the level as weak, **23%** of respondents rated the level as poor, **23%** of respondents rated the level as average, **14%** of respondents rated the level as good and **9%** rated the level as excellent.

As majority of respondents gauged the level of adoption as poor and weak, this shows that although most organizations are using Building Information Modelling it has not been fully integrated into the design process.

3.9. Use of the latest versions of the software.

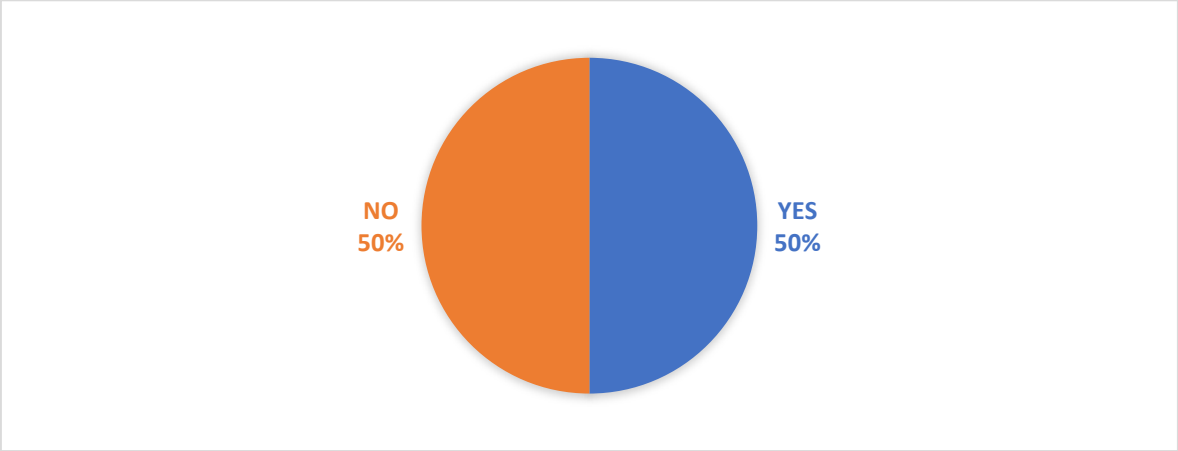


Figure 10 Use of the latest versions of software

Building Information Modelling software like most software are updated yearly. For example, Autodesk products are updated a minimum of yearly. With regards to whether organizations kept up with updated versions of the software the distribution was a **50-50** split. The use of up to date software is attributed to the recent adoption of Building Information Modelling by most organizations, as seen in **Figure 7** as they are likely to use the up to date software.

3.10. Design Processes in which BIM is used

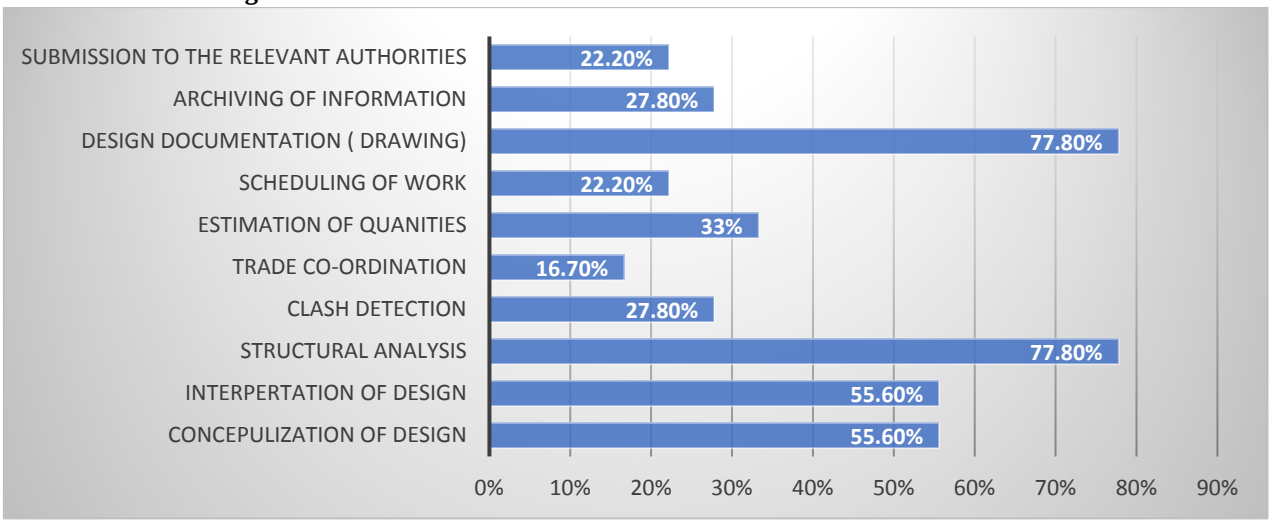


Figure 11 BIM use distribution in design Processes

The main uses of Building Information Modelling are Structural Analysis and Design Documentation (Drawings) **77.8%.** In the past Computer Aided Design was heavily and almost absolutely used in these two processes. It is no wonder then, that there has been a large progression to Building Information Modelling.

Respondents reported using Building Information Modelling in Interpretation of design and conceptualization at **55.6%.**

33.3% reported using Building Information Modelling in the estimation of quantities. A study on the effects of implementing Building Information Modelling in Nairobi found that majority of respondents agreed on the benefits of adopting Building Information Modelling in project estimation. (Gitee 2018) However, it was found that Building Information Modelling was rarely used in project estimation. This shows a prevailing use of other methods of quantity estimation or delegation of quantity estimation to Quantity Surveyors or Construction Project Managers.

27.8% of respondents reported using Building Information Modelling for Clash Detection and Archiving of Information and Documentation. In comparison to a study on the effects of implementing Building Information Modelling in Nairobi where majority of respondents agreed that Building Information Modelling boosted clash detection, (Gitee, 2018) the use of Building Information Modelling in clash detection is wanting.

Only **22.2%** of respondents were using Building Information Modelling to submit documents to the relevant authorities. On November 28, 2018, the Nairobi County changed the way documents were submitted for approval. With the opening of a new "eDevelopment Permit Management System" (e-DPMS). The system enables the submission of building plans online, submitted by Construction Industry professionals, to various departments of planning within the Nairobi City County for vetting and approval. Despite the submission being online, the standard has not been set as Building Information Modelling, which then contributes to the low percentage.

22.2% of respondents reported using Building Information Modelling in scheduling of work. This is indicative of the presence of other software such as MS Project which has been the traditional design tool for scheduling work. This corelates to a study on the effects of implementing Building Information Modelling in Nairobi, where it was found that majority of respondents were uncertain of the effect of Building Information Modelling in project scheduling. (Gitee, 2018)

The design process where Building Information Modelling is used the least is trade coordination where only **16.7**% of respondents reported its use. This is attributed to the disparity in coordination tools between construction industry professionals, Quantity surveyors and Construction Project Managers in the industry.

3.11. The level of application in the specific design processes

The respondents were asked to evaluate the use of Building Information Modelling in various design processes on a 5-point scale where 5 = excellent, 4 = good, 3 = average, 2 = weak and 1 = poor.

Table 2 Level of BIM application in design processes.

Area of use of BIM	*Mean*	*Variance*	*Standard Deviation*
Conceptualization	2.28	1.60	1.26
Interpretation of design	2.52	1.89	1.37
Structural Analysis	2.52	1.96	1.40
Clash detection	2.09	1.61	1.27
Trade co-ordination	1.87	1.41	1.19
Estimation of quantities	2.33	2.27	1.51
Scheduling of work	1.98	1.99	1.41
Design Documentation (Drawings)	2.75	2.29	1.51
Archiving of Information	1.83	1.96	1.40
Submission to relevant authorities	2.28	1.60	1.26

All the means were below 3, indicating a weak to average level of application even for the design processes that Building Information Modelling was heavily relied on. The data has a standard deviation ranging between 1.508-1.198 which indicates that most of the data lies around the mean.

It also shows that despite the use of Building Information Modelling in organizations, it is not fully relied on and may be supplemented by more traditional design alternatives such as CAD and manual methods. In comparison to the UK, Kenya would be ranked as Level 1 Building Information Modelling whereas the UK is moving towards Level 3 Building Information Modelling. This puts the Construction industry in Kenya in comparison to the UK between 10-20 years behind.

3.12. Factors hindering the adoption of BIM

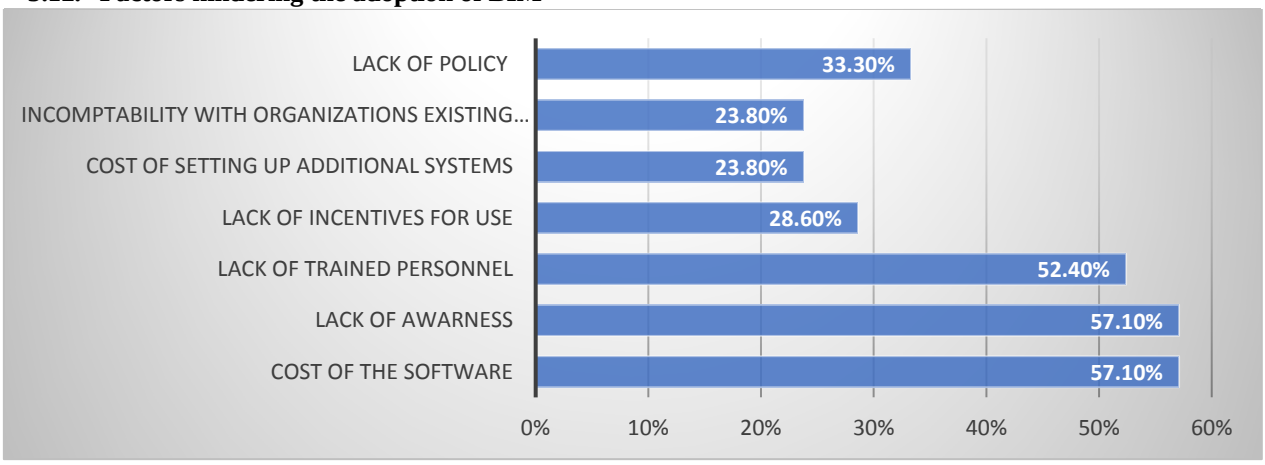


Figure 12 Hinderances to BIM adoption

57.1% of respondents agreed that the cost of the software hinders the adoption of Building Information Modelling. For instance, to buy the Autodesk Revit Structure software plus license from Autodesk costs 2,250$ (225,000 KES) per year exclusive of tax and other expenses. (Autodesk.com, 2019) A re-seller of Autodesk costed the same software at 168,000KES +VAT per year. This covers the cost of one license per device. Depending on the size of the organization, the number of required licenses would also vary leading to a proportional increase in cost.

57.1% of respondents reported that lack of awareness Building Information Modelling greatly affects its adoption. It is almost impossible for people to adopt something they are unaware of. The lack of awareness is perpetuated by the training given to construction industry professionals. The institutions of higher learning tend to focus on 'First Principles' of the design and may not be too keen on the technological aspects of the design process.

52.4% of respondents reported that lack of trained personnel is a hinderance. Building Information Modelling is relatively new to Kenya and many engineers are already used to using other methods and may not have the required training to use Building Information Modelling.

33.3% of respondents reported that lack of policy is a hinderance. Unlike the UK, Kenya has no governmental strategy that pushes or promotes the adoption of Building Information Modelling. Neither is it mandatory for the use of government projects as compared to the USA. Thus, the construction industry professionals are free to make the decisions on what design tools to use and are not compelled to use Building Information Modelling.

28.6% of respondents reported that lack of incentives for use and incompatibility with organizations existing structures as hinderances. Regarding the cost of setting up additional systems **23.8%** of respondents reported it as a hinderance**.**

This indicates that lack of incentives for use, incompatibility with organizations existing structures and the cost of setting up additional systems may not be major aspects hindering the adoption of Building Information Modelling and may only be applicable at an organizational level.

3.13. The Necessity for BIM adoption

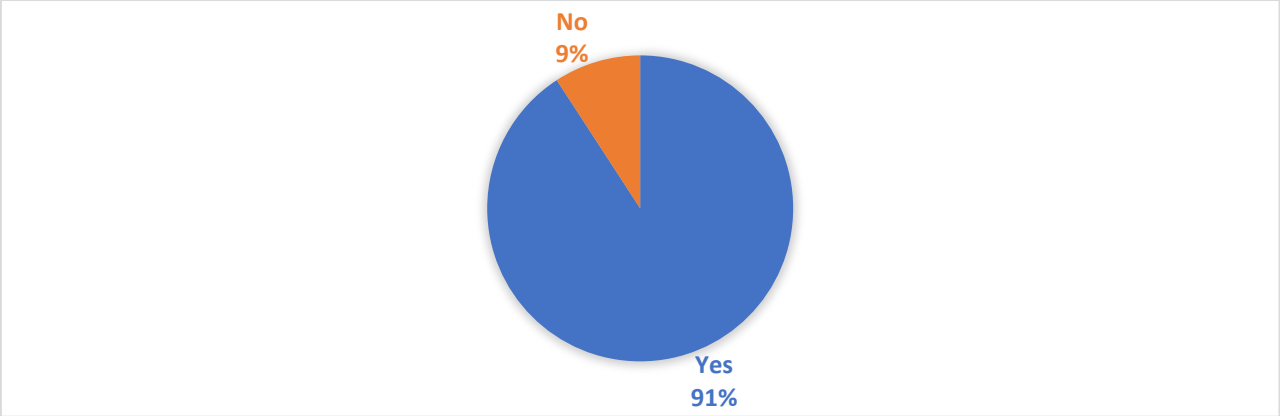


Figure 13 Necessity for BIM adoption

In order to gauge the future of Building Information Modelling in the country the respondents reported their opinion on the necessity of Building Information Modelling adoption. **91%** of respondents agreed that Building Information Modelling is necessary in Kenya.

9% of respondents reported they did not think it was a necessity.

3.14. Awareness of the use of BIM internationally

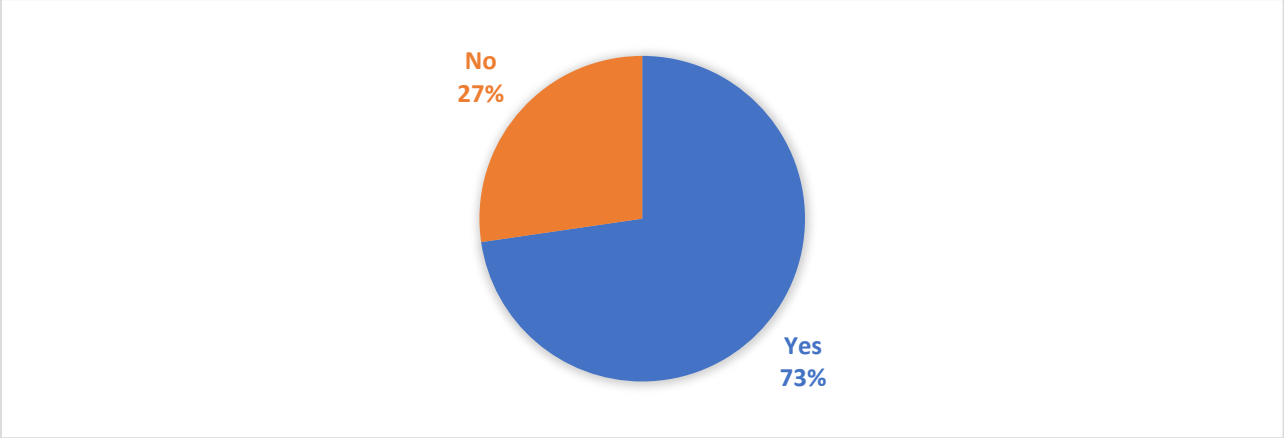


Figure 14 Awareness of International BIM use

In the recent past the construction industry in Kenya has had an increasing number of international companies involved in the various construction processes. The aim was to determine how Kenyan firms, compete in this environment and the impact of the design processes and tools used by the international firms.

73% of respondents were aware of Building Information Modelling adoption in other countries, were as **27%** of respondents were not aware.

3.15. Responsibility to push for the adoption of BIM

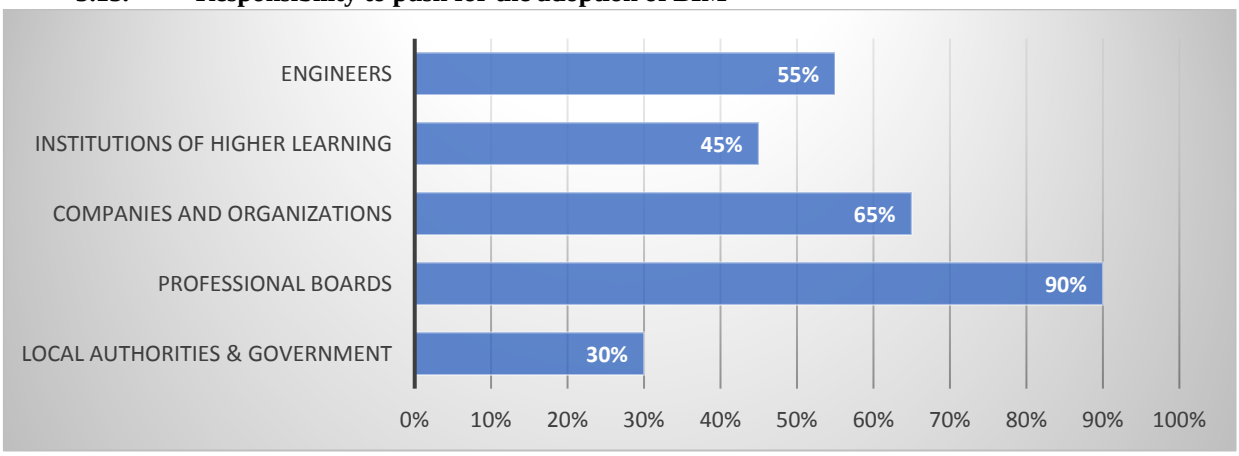


Figure 15 Responsibility to push for BIM adoption.

90% of respondents agreed that it was the responsibility of Professional Bodies to push for Building Information Modelling adoption. This is because they accredit and regulate the industry and thus are better placed to impact organizations and engineers.

65% of respondents reported that the responsibility to push for Building Information Modelling adoption was with the Organizations. Since change is easier when it is internal, here the pace of adoption would be controlled by the organization and customized to suit the organization's needs.

55% of respondents reported that it was the responsibility to push for Building Information Modelling adoption was with the engineers. This is mainly because they are the ones who directly benefit from it and have the capacity to influence the professional bodies, government and organizations to make the necessary change that would see adoption of Building Information Modelling.

45% of respondents reported that it was the responsibility to push for Building Information Modelling adoption was with the institutions of higher learning. Whereas **30%** of respondents reported that the responsibility lies with the government.

As professional bodies have the highest percentage, the most likely path that the Kenyan construction industry will follow with regards to Building Information Modelling adoption is that of the Netherlands. Where Building Information Modelling adoption was led by construction industry stakeholders. Below is a comparison between Kenya and the Netherlands, the similarities have been highlighted.

Table 3 Comparison between Kenya and the Netherlands

Countries	**Netherlands**	**Kenya**
Regulatory Framework	No governmental mandate, However, state agency currently requires BIM standard development	No governmental mandate. No requirement of BIM standard development
Financial Framework	Indirectly, through governmental projects	Organizational
Focus	Initially on private buildings.	Initially on private buildings.
Timeframe	Start in 90's, standards by 2003, open standards by 2012	Start in the 2010's gradual growth from then.
Leading stakeholders	Construction Industry	Construction Industry
Other Elements	Marketing Campaigns, BIM weeks organized by private companies, Standards based on Technological experiences	BIM talks organized by companies and institutions of higher learning. Standards are based on the companies.

3.16. Would a change in Policy affect BIM adoption?

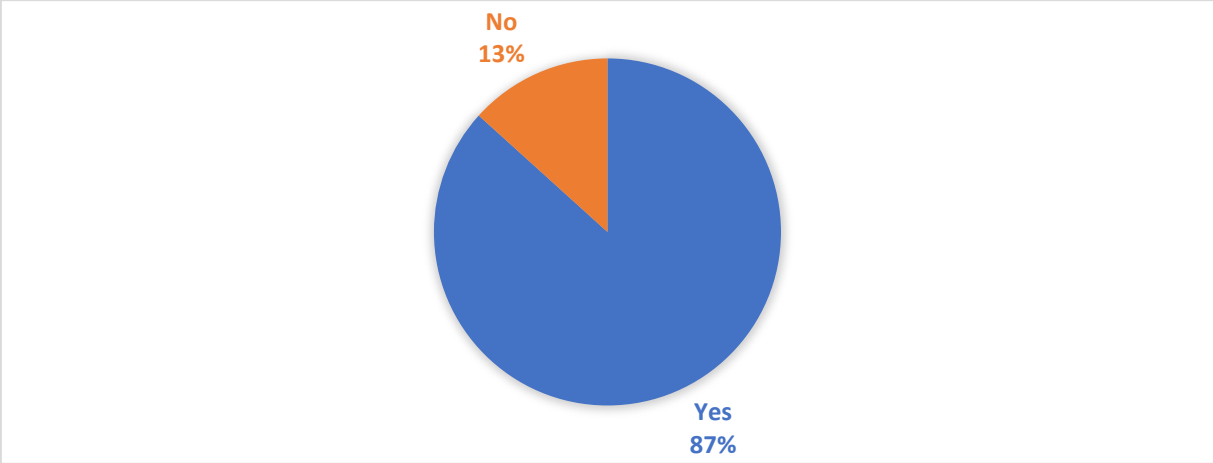


Figure 16 Effect of Policy change on BIM adoption

Majority of the respondents **87%** believed a change in Policy would increase the adoption of Building Information Modelling. Where, policy is a set of regulations, which form the base of day to day decisions. This is supported by the UK government Strategy (2011) where Building Information Modelling was mandated for public procurement, this has contributed to an increase in the level of Building Information Modelling adoption in the UK.

13% of respondents did not believe a change in policy would affect Building Information Modelling adoption.

3.17. Formulation of Policy

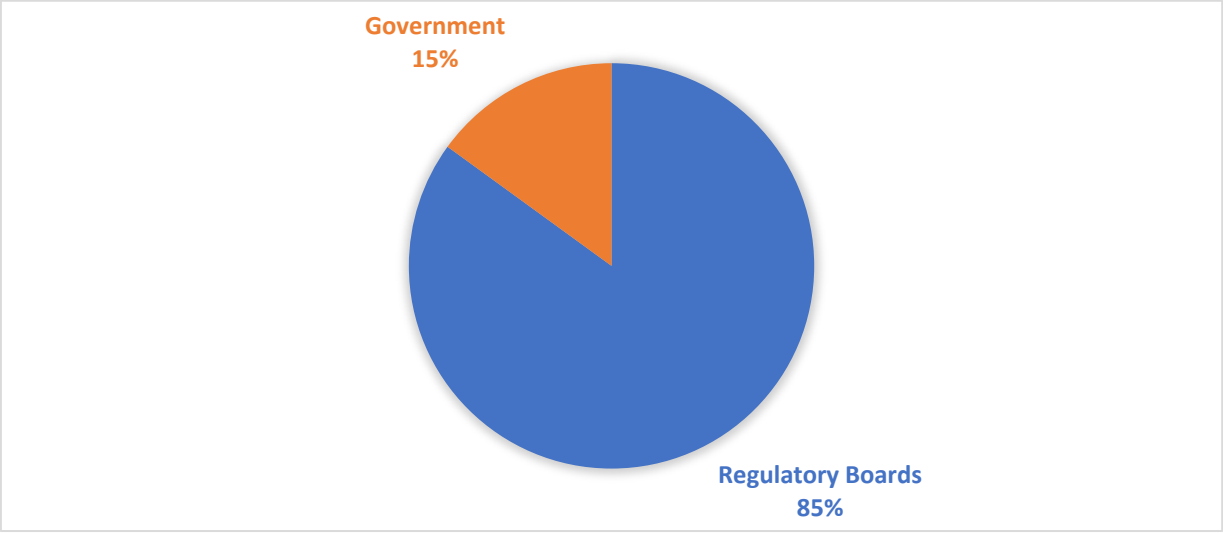


Figure 17 Responsibility on the formulation of Policy

85% of respondents reported that Regulatory boards are responsible for formulation of policy. Attributed to the fact that they are better acquainted to the industry and they understand Building Information Modelling use in the industry and applications. Again, drawing similarities to the Netherlands where construction industry stakeholders pushed Building Information Modelling adoption which led to the formulation of policy.

Only **15%** of respondents thought Government should formulate policy

3.18. Alternative ways to increase BIM adoption.

In order to increase and encourage the adoption of Building Information Modelling the following were suggested:

1) Inculcate it in the Engineering curriculum.
2) Promoting the use of Building Information Modelling applications by all professions within the built environment by
   - Encouraging of partnerships between software vendors and organizations to increase awareness.
   - Recognizing of Building Information Modelling awareness as a source of Professional Development Unit points by Architectural and Engineering regulatory bodies.
3) Creating awareness through workshops, conferences and including Building Information Modelling training in the curriculum of tertiary institutions.
4) Make it cheaper and accessible.

Conclusion

Based on the findings of the study the uptake of Building Information Modelling is quite average despite the high level of awareness on Building Information Modelling and its benefits to the design process.

The main design processes where Building Information Modelling is used are structural analysis and design documentation. The processes with average use are conceptualization of design and design interpretation. The processes where Building Information Modelling is least used for are clash detection, estimation of quantities, submission to relevant authorities, archiving of information scheduling of work and trade coordination. Despite this, there was a low level of application across all the processes. Indicative of an underutilization of Building Information Modelling in the processes.

The main hinderances to Building Information Modelling adoption are cost of the software, lack of awareness and lack of trained personnel. Lack of Policy, Incompatibility with existing structures, cost of setting up additional systems and lack of incentives for use were considered minor factors by the respondents.

Recommendations

On the basis that Building Information Modelling adoption is necessary the following are recommended:

a) Building Information Modelling should be made part of the Construction Industry curriculums. Thus, enhancing the training of industry professionals to be better equipped to join and contribute efficiently to the market.
b) Encourage further research into Building Information Modelling in Kenya and the continent of Africa.
c) Creating and increase awareness to all industry stakeholders on the importance of its adoption.
d) Introduction of Government Building Information Modelling strategies and policies in the Construction Industry Development Policy of Kenya that would see a guided and uniform adoption of Building Information Modelling.
e) Specifying Building Information Modelling use on governments project as was done in the USA by the GSA unit.
f) Make it cheaper and accessible through reducing the taxes charged on Building Information Modelling software.

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Comparison between Two Quality of Websites for Cinema Service Providers in Indonesia Using Webqual Method

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Abstract- Based on the results of the analysis of the quality of the website, analyzed the XXI and CG cinema providers in Indonesia, the utilization of the facilities is to market the currently aired and aired films. People can choose the movie they want to see, the location of the movie, the price of the movie, and any time available. However, in reality sometimes people also prefer to come directly to the Cinema because of the quality of the website is less user friendly for use by the community. So the quality of the website will greatly affect the level of user satisfaction itself. To know the level of user satisfaction of cinema service website, then do quality comparison between website XXI and CGV using WEBQUAL method (Website Quality) with 3 pieces of X that are information quality, interaction quality, and usability quality plus 1 additional variable Y namely customer satisfaction with smartPLS application.

Index Terms- Analisis, Comparison, WEBQUAL, smartPLS, Customer Satisfaction

I. INTRODUCTION

Today the need for information is increasingly high, thus opening the eyes of the world to unlimited business networks, commonly referred to as e-commerce. All forms of information that are unlimited in nature can be obtained through the internet, one of them is by using the website facilities. With that, promotional activities can be carried out easily, save time and also save energy, can even communicate with consumers.

XXI and CGV (Blitz Megaplex) are among cinema service providers in Indonesia, which also utilize website facilities to market Now Playing films and those who will air (Coming Soon). There the community can choose the film they want to watch, the location of the film screening, how much it costs, and what time is available. However, in reality sometimes there are also people who prefer to come directly because the constraints of the quality of the website are less user friendly for use by the community.

So that the quality of the website will greatly affect the level of satisfaction of the users themselves. The higher the quality of a website, the more users will access the website, the more useful it will be. Therefore, here will be analyzed the quality comparison between the two websites, websites XXI and CGV. Which is better, using the WEBQUAL (Website Quality) method with three X variables, namely information quality, service interaction, and usability quality in which there are 27 indicators, plus one additional Y variable, customer satisfaction, which has 6 indicators in it.

Where the perception of the end user is used as a benchmark by using several samples. Then the results of the data can be analyzed using SmartPLS.

Identification of Problems

Based on the description of the background above, identification of the problem is carried out, namely comparing the two websites of cinema service providers in Indonesia, whether the categories from information quality, service interaction, and usability quality have met user satisfaction with the quality of the websites provided.

Limitation of the problem based on the description of the identification of the above problems, the limitations of the problems obtained are as follows:

1. The population used is a user of the two websites of cinema service providers in Indonesia.
2. Variable observations carried out in this study are information quality, service interaction, usability quality, and customer satisfaction.
3. The questionnaire was conducted with a sample of respondents of at least 30 people based on a minimum theory of statistics and carried out using Purposive Sampling techniques.

Research Questions

Based on the description of the background and the formulation of the problem to be solved are as follows:

1. Have the two websites met the quality of the information quality, service interaction, and usability quality categories for user satisfaction?
2. Does the XXI website have a better website quality if measured by the webqual method or vice versa better CGV website?

Research Purposes

Based on the description of the background and formulation of the problem above, the objectives of this study are as follows:

1. To find out whether these two websites have fulfilled the satisfaction of end users obtained by using the Webqual method.
2. To find out which website is better, use the webqual, XXI or CGV method

II. MATERIAL AND METHODOLOGY

Website

The website in general is an interconnected website page that contains a collection of information provided either by individuals, groups, or organizations. The website can present information in various forms that have various objectives such as: art, education, entertainment, commercial, business, and personal use. For companies, websites can be used as a medium of information, communication and publications that can affect customer perceptions of the company or the products offered. The types of websites:

1. *E-commerce*
   E-commerce is a system for buying and selling products and services electronically to consumers or from one company to another with a computer as an intermediary for business transactions. Based on the purpose and origin of the transaction, e-commerce is divided into: Business To Business (B2B), Business To Consumer (B2C), Consumen To Consumen (C2C), and Consumen To Business (C2B).

2. *E-learning*
   E-learning is a common term as a synonym for online education. Electronic learning refers to the use of electronic devices for learning facilities, including the delivery of content through electronic media such as the internet, audio or video, satellite, TV broadcasts, interactive CD-ROMs and so on.

3. *E-government*
   E-government is a popular topic, where many countries invest their resources to improve public services. The main users of e-government are citizens. The quality of existing website services must be evaluated to improve the effectiveness and efficiency of services to the public.

From the types of websites, websites have their respective functions in achieving certain goals. So, in assessing the performance of a website it can be done with many approaches, one of which is WebQual, ISO 9126, Technology Acceptance Model (TAM) and others - according to the variables to be tested.

Webqual

The quality of the website has become one of the strategic issues in communication and transactions with customers. Webqual is one of the website quality measurement methods developed by Stuart Barnes and Richard Vidgen. Webqual is based on the concept of Quality Function Deployment (QFD), a process based on the voice of customers in the development and implementation of a product or service.

From the QFD concept, webquals are arranged based on the end user's perception of a website (Barnes and Vidgen, 2002).

Webqual has experienced several iterations in the preparation of categories and items of questions. The latest version is webqual 4.0 which uses three measurement categories with 22 questions. The three categories are usability, information and service interaction. The usability category is based on a study of the relationship between humans and computers and a study of the usefulness of the website, including the ease of navigation, design compatibility and the images conveyed to the user. Information categories are reviewed based on general information system studies. This category relates to the quality of the website content, namely the appropriateness of information for the user's goals, for example regarding the accuracy, format and relevance of the information presented. Service interaction category relates to the interaction of services perceived by users when deeply involved with the website.

While user perceptions consist of two parts, namely perceived service perceived (actual) and expectation level (ideal), quality websites can be seen from the level of perception of actual services that are high and the gap between actual and ideal perceptions is low.

Webqual 4.0 Dimensions

As explained earlier, Webqual 4.0 is based on three areas, namely usability quality, information quality, service interaction. According to Barnes & Vidgen (2003) quoted from the journal Sastika (2016) define it as follows:

1. **Information Quality**
   Information Quality includes accurate information, reliable information, up to date information, information that is in accordance with the topic of discussion, ease of information to understand, detailed information and information presented in the appropriate design format.

2. **Service Interaction Quality**
   Service Interaction includes the ability to provide security during transactions, have a good reputation, facilitate communication, create emotional feelings that are more personal, have confidence in providing personal information, are able to create specific communities, provide confidence that the promises delivered will be fulfilled.

3. **Usability Quality**
   Usability Quality includes convenience, traceability, ease of use, website reliability, pleasant interface, good competence and a pleasant new experience.

Table 1 The Provenance of Webqual 4.0

Table 1: The provenance of WebQual 4.0

Category	*WebQual 4.0 Questions*	*Illustrative Support for Questions*
Usability	1. I find the site easy to learn to operate	Bailey and Pearson 1983[2], Davis et al. 1989[2], Davis 1989[2], 1993[1], Ventakesh and Davis 2000[2]
	2. My interaction with the site is clear and understandable	Davis et al. 1989[2], Davis 1989[2], 1993[1], Shneiderman 1998[2], Ventakesh and Davis 2000[2]
	3. I find the site easy to navigate	Eighmey 1997[2], Levi and Conrad 1996[2], Nielsen 1999[2], 2000a[2], Spool 1999[2]
	4. I find the site easy to use	Davis et al. 1989[2], Davis 1989[2], 1993[1], Ventakesh and Davis 2000[2], Nielsen 1993[2], 1999[2], 2000a[2]
	5. The site has an attractive appearance	Nielsen 2000a[2], Parasuraman et al. 1988[1], 1991[2], Pitt et al. 1995[2], 1997[2]
	6. The design is appropriate to the type of site	From WebQual workshops; no strong support, but tangential to research on customer expectations of appearance, e.g. Zeithaml et al. 1990
	7. The site conveys a sense of competency	Parasuraman et al. 1988[1], 1991[2], Pitt et al. 1995[2], 1997[2], Zeithaml et al. 1988[2], 1990[2], 1993[2]
	8. The site creates a positive experience for me	Eighmey 1997[2], Moon and Kim 2001[2], Nielsen 2000a[2], White and Manning 1998[2]
Information	9. Provides accurate information	Bailey and Pearson 1983[2], Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	10. Provides believable information	Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	11. Provides timely information	Bailey and Pearson 1983[2], Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	12. Provides relevant information	Bailey and Pearson 1983[2], Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	13. Provides easy to understand information	Bailey and Pearson 1983[2], Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	14. Provides information at the right level of detail	Bailey and Pearson 1983[2], Strong et al. 1997[2], Wang 1998[2], Wang and Strong 1996[1], Wand and Wang 1996[2]
	15. Presents the information in an appropriate format	Bailey and Pearson 1983[1], Chau et al. 2000[2], DeLone and McLean, 1992[2]
Service Interaction	16. Has a good reputation	Aaker 1991[2], Aaker and Joachimsthaler 2000[2], Akshay and Monroe 1957[2], Cuningham 1966[2], Nielsen 1999[2]
	17 It feels safe to complete transactions	Parasuraman et al. 1988[1], 1991[2], Pitt et al. 1995[2], 1997[2], Zeithaml et al. 1988[2], 1990[2], 1993[2]
	18. My personal information feels secure	Clark 1999[2], Cranor 1999[2], Goodwin 1991[2], Hoffman et al. 1999[2], Wang et al. 1998[2]
	19. Creates a sense of personalization	Gilmore and Pine 2000[2], McKenna 2000[2], Parasuraman et al. 1988[1], 1991[2], Pitt et al. 1995[2], 1997[2], Schubert and Selz 1997[2], Zeithaml et al. 1988[2], 1990[2], 1993[2]
	20. Conveys a sense of community	Armstrong and Hagel 1996[2], Chang et al. 1998[2], Hagel and Armstrong 1997[2], Preece 2000[2], Rheingold 1993[2], Schubert and Selz 1997[2]
	21. Makes it easy to communicate with the organization	Bitner et al. 2000[2], Jarvenpaa et al. 2000[2], Hoffman et al. 1999[2], Nielsen 2000a[2]
	22. I feel confident that goods/services will be delivered as promised	Parasuraman et al. 1988[1], 1991[2], Pitt et al. 1995[2], 1997[2], Zeithaml et al. 1988[2], 1990[2], 1993[2]

[1] denotes a primary source for a question - reworded for WebQual 4.0
[2] denotes a secondary influence for the inclusion of a question in WebQual 4.0

smartPLS

PLS is a model of Structural Equation Modeling (SEM) based on components or variants. PLS is an alternative approach that shifts from a covariant-based SEM approach to variant based.

PLS is more of a Predictive Model. PLS is a powerful analytical method, because it is not based on many assumptions. For example, data must be normally distributed, samples do not have to be large. Besides being used to confirm the theory, PLS can also be used to explain whether there is a relationship between latent variables. PLS can simultaneously analyze the constructs formed with reflective and formative indicators.

The purpose of PLS is to help researchers for predictive purposes. The formal model defines latent variables as linear aggregates of the indicators. The weight estimate to create a score component for latent variables is based on how the inner model (measurement model) is the relation between the indicator and its construct) is specified. The result is the residual variance of the dependent variable.

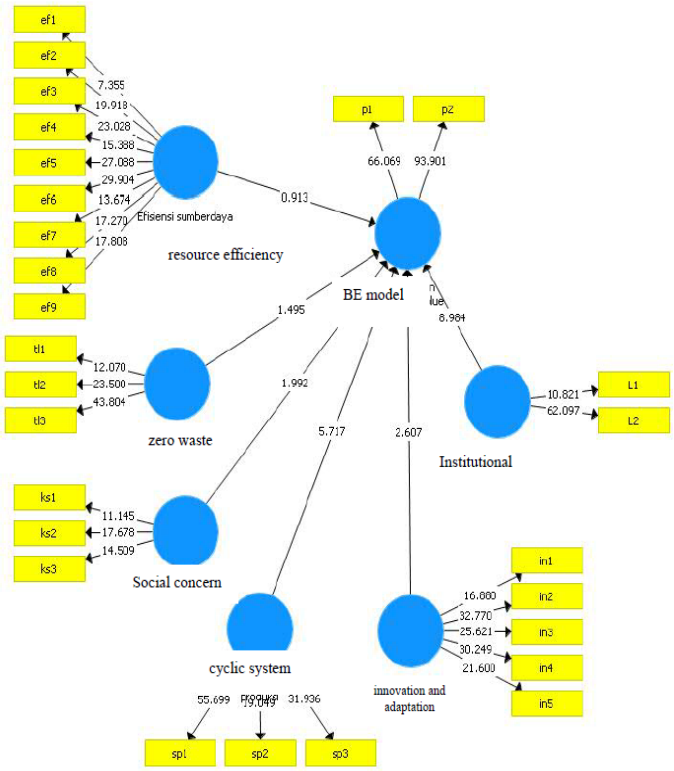

Figure 1 Diagram Path of PLS

Outer Model

This research is reflective because indicators of latent variables effect the indicators, for which 3 measurement methods are used, namely:

a. Convergent validity measures the magnitude of the correlation between constructs and latent variables. In convergent validity evaluations of individual checks, realibility items can be seen from standardized loading factors. Standardized loading factors describe the magnitude of the correlation between each measurement item (indicator) with the construct. Colleration can be said to be valid if it has a value> 0.5.
b. Discriminant validity is done to ensure that each concept of each latent variable is different from the other variables. The model has good discriminant validity if each loading value of each indicator of a latent variable has the highest loading value with other loading values for other latent variables. Another way that can be used to test discriminant validity is to compare the square of the AVE for each variable with the correlation value between the variables in the model. A good discriminant validity is shown from the AVE square for each variable greater than the correlation between variables in the model.
c. To determine composite reliability, if the reliability composite value is> 0.7 and cronbach's alpha is above 0.60 then the construct is declared reliable. And the criteria table can be seen in table 2.

Table 2 Research Criteria of PLS-SEM

No	Criteria	Explanation
	Evaluation of the Reflexive Measurement Model	
1	Loading Factor (LF)	Value of loading factor (lf) must be >0.7
2	Composite Reliability	Composite reliability measure internal consistency and the value must be> 0.6
3	Average Variance Extracted (AVE)	Value of Average Variance Extracted (AVE) must be > 0.5
4	Validity of Discrimination	Value of AVE square must be > correlation value between latent variables
5	Cross Loading	Another measure of discriminant validity. It is expected that each block indicator has a higher loading value for each latent variable measured compared to indicators for other latent variables.
6	T Statistic	Value of T Statistic must be >1.96 than T Table.
7	P Values	Value of P Values must be >0.05.

Inner Model

Inner model (inner relation, structural model and substantive theory) describes the relationship between latent variables based on substantive theory. Structural models were evaluated using R-square for the dependent construct, Stone-Geisser Q-square test for predictive relavance and t test and significance of the coefficient of structural path parameters. Interpretation of the R2 value is the same as the R2 linear regression interpretation, namely the magnitude of the variability of endogenous variables that can be explained by exogenous variables.

According to Chin (1998) (in Haryono, 2017) R2 criteria consist of three classifications, namely 0.67, 0.33, and 0.19. as substantial, moderate (moderate) and weak (weak). changes in the value of R2 can be used to see whether the effect of exogenous latent variables on endogenous latent variables has substantive effect. And for the initial stage of research on the development of a scale of measurement the loading value of 0.5 is considered sufficient.

Besides looking at the R-square value, the PLS model was also evaluated by looking at Q-square predictive relevance to measure how well the observation value was generated by the model and also its parameter estimation. Q-square value greater than 0 (zero) indicates that the model has a predictive value of relevance, while the Q-square value of less than 0 (zero) indicates that the model lacks predictive relevance.

Likert Scale

Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. In research, social phenomena are specifically determined by research, which is then referred to as the research variable.

In a Likert scale, the variables to be measured are translated into variable indicators. Then the indicator is used as the starting point for compiling the items that can be in the form of statements or questions.

The answer of each item using a Likert Scale has gradations from very positive to very negative, which can be in the form of words, among others.

For the purposes of quantitative analysis, the answer can be given a score, for example:

a. Strongly Agree is scored 5
b. Agree given a score 4
c. Neutral is given a score 3
d. Disagree is scored 2
e. Strongly Disagree is scored 1

User Satisfaction

Buyer satisfaction depends on bid performance in meeting buyer expectations. Satisfaction is the feeling of being happy or disappointed someone who comes from a comparison between his impression of the performance or results of a product and his expectations. This customer satisfaction can be formulated as follows:

S: Satisfaction
F: Function
E: Expectation
P: Performance

Customer expectations can come from a variety of things, such as from previous purchase experience, friends and market information. Customer satisfaction can create customer loyalty or high image. For example the product brand / company. Here are some customer satisfaction:

1. The level of one's feelings after comparing the results of perceived performance, compared to expectations.
2. Methods for tracking customer satisfaction:

   a. System of complaints and suggestions; where a customer system can give a complaint to the services provided and suggestions for services in order to provide better service.
   b. Customer satisfaction survey; conduct surveys in order to find out whether the customer is satisfied or not with the service provided.
   c. Stealth buyers are hiring people to pretend to be buyers, to report on their experience buying company products and competing products.
   d. Analysis of lost customers. That is knowing and looking for why customers can disappear by analyzing the results of the surveys that have been conducted.

Hypothesis

The hypothesis is a temporary statement that needs to be tested for truth. To test the truth of a hypothesis, a test is called a hypothesis testing.

Testing hypotheses will lead to conclusions to reject or accept the hypothesis. Thus we are faced with two choices. In order for our selection to be more detailed and easy, an alternative hypothesis is needed which is then abbreviated as Ha and the null hypothesis, hereinafter abbreviated as H0. Ha is also called a work hypothesis or research hypothesis. Ha is the opponent or counterpart of H0. Ha tends to be expressed in positive sentences. Whereas H0 is expressed in negative sentences.

The stages of the method of work in the preparation of this research are divided into five stages:
1. Abstract
2. Introduction
3. Research Elaborations
4. Hypothesis
5. Conclusions

1. Introduction

In this study, the object that was created as research material was two cinema service provider websites in Indonesia. The website is www.21cineplex.com and www.cgv.id.

2. Research Elaborations

- Determining Research Objects & Variables

In this study, the object that was created as research material was two cinema service provider websites in Indonesia. The website is www.21cineplex.com and www.cgv.id.

The variables used are three dimensions of X variables found on Website Quality and one Y variable, namely:

1. Variable XI is the dimension of information quality
2. Variable X2 is the dimension of the service interaction quality
3. Variable X3 is the dimension of usability quality
4. Y variable is the dimension of customer satisfaction

In relation to this research, the state of the method is considered as a good guideline or foundation where in this case data collection and analysis of data will give good direction. Dependent variable, In this study the dependent variable is User Satisfaction. Whereas the independent variable is Information Quality, Interaction Quality, and Usability Quality.

Table 3 Webqual Questions

No	Statement	Code
Indicator Information Quality (X1)		
1	The website provides accurate information	INF1X / INF1C
2	The website provides reliable information	INF2X / INF2C
3	The website provides timely information	INF3X / INF3C
4	The website provides relevant information	INF4X / INF4C
5	The website provides information that is easy to understand	INF5X / INF5C
6	The website provides information at the right and detailed level	INF6X / INF6C
7	The website presents information in the appropriate format	INF7X / INF7C
Indicator Service Interaction Quality (X1)		
8	The website has a good reputation	INT1X / INT1C
9	The website gives you security when accessing it	INT2X / INT2C
10	The website provides space to register as a member	INT3X / INT3C
11	The website maintains the security of your personal data	INT4X / INT4C
12	The website provides space for discussion between members	INT5X / INT5C
13	The website presents information according to your needs	INT6X / INT6C
Indicator Usability Quality (X3)		
14	You find it easy to learn website operations	USA1X/ USA1C
15	Interaction with the website is clear and easy to understand	USA2X/ USA2C
16	You find it easy to navigate the website	USA3X /USA3C
17	You feel the website is easy to use	USA4X /USA4C
18	The website has an attractive appearance	USA5X /USA5C
19	Design according to the type of website	USA6X /USA6C
20	The website contains competencies	USA7X /USA7C
21	The website provides a positive experience	USA8X /USA8C

Table 3 Webqual Questions (pt.2)

Indikator User Satisfaction (Y)		
22	You feel like the appearance of the website	US1X / US1C
23	You feel happy interacting with the website	US2X / US2C
24	Switching access from the main page to another page feels fast	US3X / US3C
25	Switching access from the main page to another page feels fast	US4X / US4C
26	Website can be accessed properly through many browsers (Mozilla, Chrome, Opera, Internet Explorer, etc.)	US5X / US5C
27	The website can be used as an example for other websites	US6X / US6C

Data Collection Phase

This study uses data sources that are primary data. The primary data is obtained in two ways, namely distributing questionnaires to respondents through the google forms. The population used in this study is website users in Indonesia who use both the websites of cinema service providers in Indonesia, namely the website www.21cineplex.com and www.cgv.id. And what will be used as a sample in this study are those who are at least 17 years of age who actively access the website several times in one month. This is done so that the data obtained is more accurate assuming that those who have fulfilled these requirements are people who already understand and feel the quality of the site www.21cineplex.com and www.cgv.id, totaling 100 people.

Table 4 Gender of The Respondent

Gender	Data
Men	37
Woman	63

Table 5 The Respondent's Work

Work	Data
Colleger	44
Employee	45
Etc	11

Table 6 Age of The Respondent

Age	Data
<25 Years Old	41
25-30 Years Old	50
>30 Years Old	9

Validity & Reliability Test

There are two conditions that apply to a questionnaire that must be valid and reliable. Anket is called valid if it is able to measure what is desired and can measure the meticulously analyzed data variables. The high and low validity of the instrument shows how far the data collected does not miss the estimate of the variable under study.

In this study the validity test is done by correlating the scores of each item with the total score. The technique used is the Pearson product Moment.

An analysis is said to be reliable if the respondent's answer to the question is consistent over time. The measurement used to determine the reliability of the questionnaire in this study is to use one shot / measured once. In order for the data collected to be utilized, then the data is processed and analyzed first so that later it can be used as a basis for decision making. In this study data analysis used the Partial Least Square (PLS) approach.

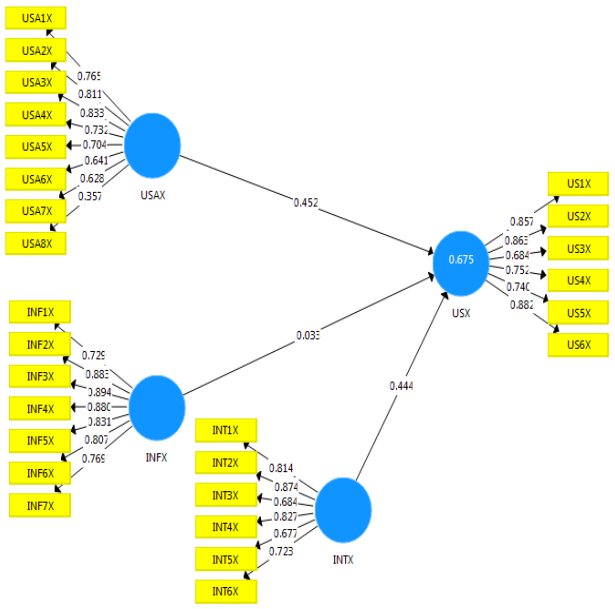

Figure 2 The First Diagram Path of XXI

Table 7 Outer Loadings of XXI

Variable	First Model	Modification
Information Quality		
INF1X <- INFX	0.729	0.729
INF2X <- INFX	0.883	0.883
INF3X <- INFX	0.894	0.894
INF4X <- INFX	0.880	0.880
INF5X <- INFX	0.831	0.831
INF6X <- INFX	0.807	0.807
INF7X <- INFX	0.769	0.769
Service Interaction		
INT1X <- INTX	0.814	0.831
INT2X <- INTX	0.874	0.807
INT3X <- INTX	0.685	0.769
INT4X <- INTX	0.827	0.831
INT5X <- INTX	0.677	0.807
INT6X <- INTX	0.723	0.769
User Satisfaction		
US1X <- USX	0.857	0.857
US2X <- USX	0.863	0.863
US3X <- USX	0.685	0.685
US4X <- USX	0.751	0.751
US5X <- USX	0.740	0.740
US6X <- USX	0.881	0.881
Usability Quality		
USA1X <- USAX	0.764	0.764
USA2X <- USAX	0.815	0.815
USA3X <- USAX	0.840	0.840
USA4X <- USAX	0.732	0.732
USA5X <- USAX	0.711	0.711
USA6X <- USAX	0.642	0.642
USA7X <- USAX	0.627	0.627
USA8X <- USAX	0.357	-

Factor usability quality 8 (USA8X) of XXI has a value of 0.357 so it is deleted from the diagram because it does not meet the criteria (invalid).

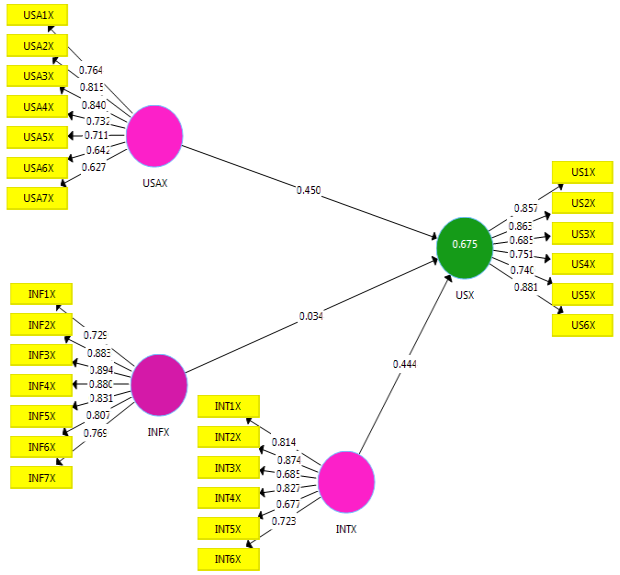

Figure 3 The Final Diagram Path of XXI

Table 8 Outer Loadings of CGV

Variable	First Model	Modification
Information Quality		
INF1C <- INFC	0.850	0.850
INF2C <- INFC	0.858	0.858
INF3C <- INFC	0.807	0.807
INF4C <- INFC	0.801	0.801
INF5C <- INFC	0.890	0.890
INF6C <- INFC	0.810	0.810
INF7C <- INFC	0.885	0.885
Service Interaction		
INT1C <- INTC	0.846	0.846
INT2C <- INTC	0.873	0.873
INT3C <- INTC	0.691	0.691
INT4C <- INTC	0.854	0.854
INT5C <- INTC	0.638	0.638
INT6C <- INTC	0.816	0.816
User Satisfaction		
US1C <- USC	0.868	0.868
US2C <- USC	0.805	0.805
US3C <- USC	0.792	0.792
US4C <- USC	0.804	0.804
US5C <- USC	0.774	0.774
US6C <- USC	0.783	0.783
Usability Quality		
USA1C <- USAC	0.815	0.815
USA2C <- USAC	0.804	0.804
USA3C <- USAC	0.849	0.849
USA4C <- USAC	0.808	0.808
USA5C <- USAC	0.823	0.823
USA6C <- USAC	0.776	0.776
USA7C <- USAC	0.652	0.652
USA8C <- USAC	0.571	0.571

Whereas for CGV all variables are valid.

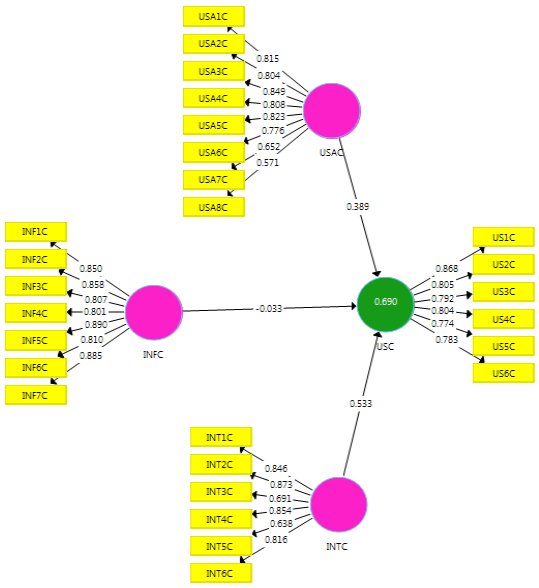

Figure 4 The Final Diagram Path of CGV

- Designing a Structure Model (Inner & Outer) & Diagram Path

Inner model (inner relation, structural model and substantive theory) describes the relationship between latent variables based on substantive theory. Structural models were evaluated using R-square for the dependent construct, Stone-Geisser Q-square test for predictive relavance and t test and significance of the coefficient of structural path parameters.

Convergent validity measures the magnitude of the correlation between a construct and a latent variable. In convergent validity evaluation of individual inspection items realibility, can be seen from standardized loading factors. Standardize loading factor illustrates the magnitude of the correlation between each measurement item (indicator) and its construct.

Table 9 Cross Loadings of XXI

Variable	INFX	INTX	USAX	USX
INF1X	0.729	0.568	0.506	0.502
INF2X	0.883	0.693	0.507	0.543
INF3X	0.894	0.671	0.472	0.615
INF4X	0.880	0.679	0.493	0.594
INF5X	0.831	0.677	0.514	0.543
INF6X	0.807	0.695	0.561	0.515
INF7X	0.769	0.65	0.524	0.531
INT1X	0.725	0.814	0.554	0.655
INT2X	0.736	0.874	0.487	0.599
INT3X	0.418	0.685	0.33	0.394
INT4X	0.544	0.827	0.457	0.551
INT5X	0.416	0.677	0.204	0.449
INT6X	0.727	0.723	0.543	0.65
US1X	0.579	0.680	0.564	0.857
US2X	0.632	0.642	0.585	0.863
US3X	0.591	0.583	0.462	0.685
US4X	0.375	0.459	0.652	0.751
US5X	0.421	0.477	0.559	0.740
US6X	0.570	0.645	0.663	0.881
USA1X	0.663	0.488	0.764	0.569
USA2X	0.553	0.468	0.815	0.547
USA3X	0.513	0.441	0.840	0.593
USA4X	0.339	0.196	0.732	0.437
USA5X	0.346	0.421	0.711	0.482
USA6X	0.476	0.560	0.642	0.548
USA7X	0.213	0.355	0.627	0.537

Table 10 Construct Reliability & Validity of XXI

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
INFX	0.923	0.927	0.939	0.688
INTX	0.862	0.876	0.897	0.594
USAX	0.857	0.860	0.892	0.543
USX	0.885	0.892	0.913	0.639

Table 11 Cross Loadings of CGV

Variable	INFC	INTC	USAC	USC
INF1C	0.850	0.630	0.699	0.575
INF2C	0.858	0.598	0.607	0.474
INF3C	0.807	0.662	0.598	0.488
INF4C	0.801	0.697	0.587	0.568
INF5C	0.890	0.596	0.631	0.574
INF6C	0.810	0.620	0.607	0.582
INF7C	0.885	0.652	0.671	0.610
INT1C	0.758	0.846	0.686	0.676
INT2C	0.689	0.873	0.657	0.733
INT3C	0.488	0.691	0.479	0.490
INT4C	0.502	0.854	0.502	0.593
INT5C	0.355	0.638	0.380	0.514
INT6C	0.708	0.816	0.649	0.687
US1C	0.605	0.703	0.727	0.868
US2C	0.504	0.539	0.638	0.805
US3C	0.536	0.639	0.615	0.792
US4C	0.482	0.675	0.521	0.804
US5C	0.594	0.544	0.495	0.774
US6C	0.472	0.682	0.589	0.783
USA1C	0.658	0.581	0.815	0.596
USA2C	0.668	0.478	0.804	0.471
USA3C	0.635	0.552	0.849	0.571
USA4C	0.495	0.542	0.808	0.538
USA5C	0.625	0.567	0.823	0.689
USA6C	0.631	0.664	0.776	0.683
USA7C	0.451	0.502	0.652	0.474
USA8C	0.369	0.483	0.571	0.485

Table 12 Construct Reliability & Validity of CGV

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
INFC	0.932	0.935	0.945	0.712
INTC	0.878	0.893	0.908	0.626
USAC	0.898	0.908	0.919	0.589
USC	0.891	0.896	0.917	0.648

4. Hypothesis

Based on the objectives of the study, the hypothesis test design that can be made is a hypothesis test design in this study presented based on the research objectives. The confidence level used is 95%, so the level of precision or inaccuracy limit is 5% = 0.05. And produce a t-table value of 1.96. So that:

a. If the t-statistic value is smaller than the t-table value [t-statistic <1.96], then Ho is accepted and Ha is rejected.
b. If the t-statistic value is smaller than the t-table value [t-statistic> 1.96], then Ho is rejected and Ha is accepted.
c. If the t-statistic value is greater or equal to t-table [t-statistic ≥ 1.96], then Ho is rejected and Ha is accepted.

The research hypothesis is:

H1: information quality affects user satisfaction.
H2: service interaction affects user satisfaction.
H3: usability quality affects user satisfaction.
H4: variable information quality, service interaction, and usability quality have an effect on the variable user satisfaction simultaneously

XXI

Table 13 Path Coefficients of XXI

Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEVI)	T Statistik (|O/STDEV|)	P Values
INFX -> USX	0.034	0.03	0.123	0.272	0.786
INTX -> USX	0.444	0.453	0.121	3.660	0.000
USAX -> USX	0.450	0.451	0.082	5.515	0.000

Table 14 R Square Adjusted of XXI

Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEVI)	T Statistik (|O/STDEV|)	P Values
INFX, INTX, USAX → USX	0.664	0.692	0.058	11.476	0.000

Hypothesis Test 1 (H1)

Formulation of the hypothesis:
H0: there is no effect of information quality on user satisfaction.
Ha: there is an effect of information quality on user satisfaction.

From Table 13 XXI Path Coefficients (Mean, STDEV, t-Value), it can be seen that the results of the information quality hypothesis show the effect (Original Sample) of 0.034, T Statistic is 0.272 which is smaller than T Table which is 1.96 and with the level P Values of 0.786, the level of P Values is greater 0.05, which means that the hypothesis in this study accepts H0 and rejects Ha. Thus it can mean that the H1 hypothesis "Information quality does not have a positive effect on user satisfaction" or is rejected. Information quality does not have a big effect on user satisfaction, it can be due to the hours of delivery that are late or faster than the information printed on the website.

Hypothesis Test 2 (H2)

Formulation of the hypothesis:
H0: There is no effect of service interaction on user satisfaction.
Ha: There is an effect of service interaction on user satisfaction.

From Table 13 XXI Path Coefficients (Mean, STDEV, t-Value), it can be seen that the results of hypothesis testing service interaction show an effect (Original Sample) of 0.444, T Statistics of 3.660 which is greater than T Table which is 1.96 and with P Values 0.000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the hypothesis H2 "Service interaction has a positive influen on user satisfaction" is accepted. Service interaction has an effect on user satisfaction. It can be seen from the large effect of 0.444, it can be effected from websites that have a good reputation, provide security, and provide a member list space.

Hypothesis Test 3 (H3)

Formulation of the hypothesis:
H0: there is no effect of usability quality on user satisfaction.
Ha: there is an effect of usability quality on user satisfaction.

From Table 13 XXI Path Coefficients (Mean, STDEV, t-Value) it can be seen that the results of the usability quality hypothesis test show the effect (Original Sample) of 0.450, T Statistic is 5.515 which is greater than T Table which is 1.96 and with the level P Values 0.000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the hypothesis H3 "Usability quality has a positive effect on user satisfaction" is accepted. Usability quality has an effect of 0.450 on user satisfaction can be seen, it can be effected from the ease of operation of the website, good navigation, attractive appearance, and design that fits the type of website. All of that makes people happy to surf on the website.

Hypothesis Test 4 (H4)

Formulation of the hypothesis:
H0: There is no joint effect on user satisfaction.
Ha: There is a joint effect on user satisfaction.

From Table 14 R Square Adjusted of XXI it can be seen that the results of testing the information quality, service interaction and usability quality hypothesis together show the effect (Original Sample) R^2 of 0.664, meaning together - together information quality, service interaction, and usability quality on user satisfaction is 66.4%, the remaining 33.6% can be added new variables in the next study. The resulting T Statistic is 11,476 which is greater than T Table which is 1.96 and with the level of P Values 0.000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the H4 hypothesis "Information quality, service interaction, and usability quality together have a positive effect on user satisfaction" is accepted.

CGV

Table 15 Path Coefficients of CGV

Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEVI)	T Statistik (|O/STDEV|)	P Values
INFC -> USC	-0.033	-0.046	0.128	0.259	0.795
INTC -> USC	0.533	0.549	0.115	4.650	0.000
USAC -> USC	0.389	0.389	0.102	3.801	0.000

Table 16 R Square Adjusted of CGV

Variabel	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEVI)	T Statistik (|O/STDEV|)	P Values
INFC, INTC, USAC → USC	0.680	0.703	0.051	13.217	0.000

Hypothesis Test 1 (H1)

Formulation of the hypothesis:
H0: there is no effect of information quality on user satisfaction.
Ha: there is the effect of information quality on user satisfaction.

From Table 15 CGV Path Coefficients of CGV (Mean, STDEV, t-Value) shows that the results of the information quality hypothesis show the effect (Original Sample) of -0.033, T Statistic of 0.259 which is smaller than T Table which is 1.96 and with the level of P Values is 0.795, the level of P Values is 0.05 which means that the hypothesis in this study accepts H0 and rejects Ha. Thus it can mean that the H1 hypothesis "Information quality does not have a positive effect on user satisfaction" or is rejected. Information quality does not have a big effect on user satisfaction, it can be due to the hours of delivery that are late or faster than the information printed on the website.

Hypothesis Test 2 (H2)

Formulation of the hypothesis:
H0: there is no effect of service interaction on user satisfaction.
Ha: there is an effect of service interaction on user satisfaction.

From Table 15 CGV Path Coefficients of CGV (Mean, STDEV, t-Value) can be seen that the results of testing the service interaction hypothesis show the effect (Original Sample) of 0.533, T Statistic of 4.650 which is greater than T Table which is 1.96 and with the level P Values 0.000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the hypothesis H2 "Service interaction has a positive effect on user satisfaction" or accepted. Service interaction has an effect on user satisfaction. It can be seen from the effect of 0.533, it can be effected from websites that have a good reputation, provide security, and provide a member list space.

Hypothesis Test 3 (H3)

Formulation of the hypothesis:
H0: there is no effect on usability quality on user satisfaction.
Ha: there is the effect of usability quality on user satisfaction.

From Table 15 CGV Path Coefficients of CGV (Mean, STDEV, t-Value) shows that the results of the usability quality hypothesis show the effect or effect (Original Sample) of 0.389, T Statistics of 3.801 which is greater than T Table which is 1.96 and with the level P Values 0.000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the hypothesis H3 "Usability quality has a positive effect on user satisfaction" or accepted. Usability quality has an effect of 0.389 on user satisfaction can be seen, it can be effectd from the ease of operation of the website, good navigation, attractive appearance, and design that fits the type of website. All of that makes people happy to surf on the website.

Hypothesis Test 4 (H4)

Formulation of the hypothesis:
H0: there is no effect together on user satisfaction.
Ha: there is a joint effect on user satisfaction.

From Table 16 R Square Ajusted of CGV shows that the results of testing the information quality, service interaction and usability quality hypothesis together show the effect or effect (Original Sample) of R ^ 2 of
0.680, meaning that together, information quality, service interaction, and usability quality on user satisfaction is 68.0%, the remaining 32.0% can be added new variables in the next study. The resulting T static is 13,217 which is greater than T Table which is 1.96 and with the level of P Values 0,000, the level of P Values is 0.05 which means that the hypothesis in this study rejects H0 and accepts Ha. Thus it can mean that the H4 hypothesis "Information quality, service interaction, and usability quality together have a positive effect on user satisfaction" is accepted.

5. Conclusion

- Users are quite satisfied with interaction quality and usability quality that are owned by the two websites, it is indicated by the service interaction and usability quality variables with a significant T statistic (| O / STDEV |) in each table. While the information quality dimension has a value (| O / STDEV |) below 1.96 with a P Values value above 0.05, influencing both but not too significant.

- And if it is calculated as a whole in the variables information quality, service interaction, and usability quality on user satisfaction with a P value below 0.05, CGV has a value of 13.217 while XXI has a value of 11.476. Overall CGV is better than XXI, so CGV that has website quality is better if measured using the webqual method.

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Statistical Fallacy: A Menace to the Field of Science

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Abstract- Statistical fallacy has been a menace in the field of sciences. This is mostly contributed by the misconception of analysts and thereby led to the distrust in statistics. This research investigated the conception of students from selected departments on statistical concepts as it relates statistical fallacy. Students in Statistics, Economics, Psychology, and Banking/Finance department were randomly sampled with a sample size of 36, 43, 41 and 38 respectively. A Statistical test was conducted to obtain their conception score about statistical concepts. A null hypothesis which states that there will be no significant difference between the students' conception of statistical concepts with respect to their departments was tested using One-way Analysis of Variance (ANOVA). The hypothesis was rejected based on $F(3,157) = 23.471$ and p-value < 0.001 which suggests statistical significant difference in their conceptions. It was then found out that Statistics students have a higher understanding about statistical concepts followed by Economics, Psychology and Banking/Finance students with a low understanding of Statistical concepts using a post-hoc (Tukey HSD) test and mean chart.

Index Terms- Statistics, Fallacy, Menace, Sciences, Misuse, Misconception, fallacies, statistical methods.

I. Introduction

The science of statistics is broadly divided into descriptive and inferential statistics. In research study, statistics is needed from the beginning to the end of the study. Statistics is the systematic collection and analysis of numerical data, which enables the researcher to investigate relationships among phenomena and develop accurate and reasonable inference (McGraw−Taylor, 2007; Annapurna, 2017). The use of statistics in almost all the fields of study can never be over emphasized. Since statistics deals with data collection and data analysis which is mostly used in making inference, extreme carefulness needs to be applied when working with data because, the usefulness of data in any field of study depends greatly on the method of collection, analysis and interpretation. The conclusion drawn will be accurate if the data collection processes and the statistical methods were carefully and judiciously applied. Inappropriate use of these processes and methods will obviously lead to inaccurate and fallacious conclusions.

Statistical fallacy refers to the wrong interpretation of data which may arise in the collection, presentation, analysis and interpretation of data. Statistics are supposed to make analysis easier to understand but when used in a fallacious approach can trick the casual observer into believing something other than what the data shows. In some cases, statistical fallacy may be accidental or unintentional. In others, it is purposeful and for the benefits of the analyst.

The fallacies committed intentionally refer to abuse of statistics and the fallacy committed unintentionally refers to misuse of statistics. A misuse occurs when the data or the results of analysis are unintentionally misinterpreted due to lack of comprehension. The fault cannot be ascribed to statistics; it lies with the user (Indrayan, 2007). Some of the basic tenets of statistics are often misunderstood and in some cases, deliberately misused to lend weight to false assertions (Salter, 2012). Statistical fallacies occur when an argument's conclusion is not supported by the numerical evidence provided as premises (Klass, 2008).

Statistics, which has over the years embedded into most fields of study due to its need in research works, has become a discipline of interest. Practitioners and professionals in the fields of study where statistics is needed have delved into statistical analysis in other to remain independent. Due to the inaccurate analysis of data, the world of research has not been without fallacious assertions. Analysts wrongly interpret statistical data which may be out of their selfish interest to prove a false assertion. In media, Journalists sometimes sell their news through wrong statistical captions and analysis of a published data. In politics, analysts misinterpret statistical data in other to win the mind of the people on certain issues of interest or to make the government consent to an idea or forecast because it can be statistically proven.

This research borders on the misuse of statistics by students which is caused by inappropriate understanding of statistics, thereby leading to statistical fallacy. Nevertheless, statistical fallacy cannot be explained or written about without taking cognizance to misconceptions of statistical concepts. Statistical misuse can also be as a result of the misconceptions of its methods and techniques by students and analysts. A solid understanding of inferential statistics is of major importance for designing and interpreting empirical results in any scientific discipline (Sotos, 2007).

Kirk (2001) explained that inferential ideas seem to be especially sensitive to be misunderstood and students are often prone to fall into deep misconceptions. This is because they require students to understand and connect many abstract concepts such as sampling distribution and significance level. Statistical misconceptions are argued to hinder meaningful

learning, impede research progress and interfere with decision making. For students, such misconceptions may be generated by poor understanding reinforced by statements uttered or written by one's mentor or teacher (Huck, 2009). When these misconceptions are applied in research studies, the results of the analysis become fallacious. The use of the inappropriate statistical methods, techniques and the analysis cost time and lost, it gives harm to science and humanity. Even if the study is carefully planned to be conducted as a result of applications with errors, the misleading results might be obtained, and mislead others who will reference the study (Ercan, 2007).

Fear and wrong orientation has contributed to students' misconception about statistical concepts. The course lecturers in the undergraduate level have in most cases failed to properly mentor the students. John and David (2002) added that for one to apply any statistical method correctly, one must have information about the variables used, information about the sampling process used and a sound understanding of the theory and assumptions underlying the method. If a researcher does not use a method correctly, then conclusions may overestimate or underestimate an important relationship or effect.

When statistical fallacies are observed especially by non-scientists, it leads to the distrust in statistics where people will choose not to accept statistical inference, causing a menace to the field of sciences. Statistical fallacy is undoubtedly a very great menace in the field of sciences. Lack of appropriate training, inadequate orientation, misunderstanding and misconceptions has contributed a great deal in fallacious interpretation and data analysis. Since Aristotle's time, the generally accepted method of evaluating informal arguments has been to analyze them for common forms of fallacious reasoning (Klass, 2008). Statistical inference is central to the justification of claims across scientific fields. When statistics serve as the basis for scientific claims, it is essential that researchers interpret them appropriately; otherwise, one of the central goals of science, the justification of knowledge, is undermined. It is therefore critically important to identify and correct errors where researchers believe that a statistic justifies a particular claim when it, in fact, does not (Hoekstra & Morey, 2014).

Social cognitive theory developed by Albert Bandura in 1986 is a learning theory based on the idea that people learn by observing others. These learned behaviours can be central to one's personality. People learn by observing others, with the environment, behaviour, and cognition acting as primary factors that influence development in a reciprocal triadic relationship. Each behaviour witnessed can change a person's way of thinking (cognition). Similarly, the environment one is raised in may influence later behaviors. For example, a child raised among statisticians tends to develop interest in any statistics related course. When this interest is applied to the study of statistics, there is high probability that the student will understand statistical concepts better and will definitely avoid misuse of statistics.

The core concepts of this theory are explained by Bandura through a schematization of triadic reciprocal causation (Bandura, 2008). The schema shows how the reproduction of an observed behaviour is influenced by the interaction of the three determinants. Personal determinant is based on whether the individual has high or low self-efficacy toward the behaviour (i.e. Get the learner to believe in his or her personal abilities to correctly complete a behavior). Behavioural determinant looks at the response an individual receives after they perform a behavior (i.e. Provide chances for the learner to experience successful learning as a result of performing the behavior correctly). Environmental determinant is the aspects of the environment or setting that influence the individual's ability to successfully complete a behavior (i.e. Make environmental conditions conducive for improved self-efficacy by providing appropriate support and materials).

Cognition is usually defined as the mental processes, representations, and activities involved in the acquisition and use of knowledge. Statistical cognition is accordingly defined as the processes, representations, and activities involved in acquiring and using statistical knowledge (Beyth-Marom, Fidler & Cumming, 2008). The issues relevant in the study of statistical cognition can be explained in three aspects. One aspect is how people acquire and use statistical knowledge and how they think about statistical concepts, this is the descriptive facet of statistical cognition. The study of how people should think about statistical concepts is the normative, also an important aspect of statistical cognition as this is often what we are exposed to (e.g., in school) and it is also the standard to which our performance is usually compared. Finally, the question of closing the gap between the descriptive (the "is") and the normative (the "should") is the prescriptive which is a critical issue in statistical cognition. As such, statistical cognition is a field of theory research and application concerned with normative, descriptive, and prescriptive aspects. It focuses on (a) developing and refining normative theories of statistics and their application, (b) developing and testing theories explaining human thinking about and judgment in statistical tasks, and (c) developing and testing pedagogical tools and ways of communication for the benefit of practitioners and teachers (Beyth-Marom, Fidler & Cumming 2008). Statistical cognition improves the students understanding about statistical concepts and thereby, limits the increase in statistical fallacies committed due to misuse of statistical techniques and methods.

Whitaker (2015) explained that a student who has never been exposed to statistics will likely demonstrate understanding consistent with first level and have to progress through second level before being able to demonstrate understanding consistent with third level. With the varied student backgrounds, curricula, and standards used throughout the country, it is not reasonable to assume that students of any particular age or grade level operate statistically at the three levels. When these levels are properly harnessed by the course lecturers, the students will understand statistical concepts better.

Gupta (2011) explained the six factors that lead to statistical fallacy as bias, inconsistencies in definitions, false generalization, inappropriate comparison, wrong interpretation of statistics measures, and technical errors.

Kuhberger and Fritz (2015), researched on the significance fallacy in inferential statistics. They investigated into the intuitive understanding of the notion of significance. They described the results of two different experiments published in a major psychological journal to a sample of students of psychology, labeling the findings as significant verse non-significant. Participants were asked to estimate the effect size and

sample sizes of the original studies. It was established through the result that labeling the result of a study as significant was associated with estimations of a big effect, but was largely unrelated to sample sizes. Similarly, non-significant results were estimated as near zero in effect size. In the research, it was concluded that after considerable training in statistics, students largely equate statistical significance with medium to large effect sizes, rather than to statistical tricks like increasing sample size.

Haller and Krauss (2002), investigated on misinterpretations of significance. The study involved six (6) German Universities and the respondents from Psychology department where sorted into three (3) groups namely; Methodology Instructors, Scientific Psychologists and Psychology Students with sample size of 30, 39 and 44 respectively. In the research it was noted that 90% of Scientific Psychologist, 80% of Methodology Instructors and 100% of Psychology Students perceive at least one of the false meanings of a p-value as true. They concluded that teaching statistics to Psychology students should not only consist of teaching calculations, procedures and formulas, but should focus more on statistical thinking and understanding of the methods. This recommendation agrees with Zaidan and Ismail (2012) on statistical reasoning as one of the concepts that should be taught in class.

Therefore, this research study seeks to find out the level of students misconception and to know if there is a statistical significance difference in statistical conceptions between the students who major in statistics and those who offer more than introductory statistics courses.

II. Method

Participants

The population of this study comprises of 400 level students of Ebonyi State University, Abakaliki, who major in statistics and those who offer more than introductory statistics courses in their undergraduate programme. The participants were one hundred and fifty eight (158) students comprising of ninety two (92) females and sixty six (66) males from the four selected departments. 36 students from Statistics department, 38 students from Banking & Finance department, 43 students from Economics, and 41 students from Psychology department.

Instrument

A primary data was collected for this research work through conducting a statistics test using Assessment of Students Conception on Statistical Concepts Questionnaire (ASCSCQ) which was based on statistical reasoning. This was done to find out the level at which the students' understand the basic concepts of statistics and their applications which will suggest the rate at which statistical fallacy can be committed by the students. The instrument consists of four sections; Section A – socio demographic data, which consists of four (4) questions, Section B – students behaviour towards statistics which consists of three (3) questions, Section C – statistical measures and dispersion which consists of five (5) questions, Section D – use of statistical techniques and significance which consists of ten (10) questions. Section B was aimed at understanding the statistical process the students think is most prone to error, their responds towards published statistical data, and statistical concepts. Section C was designed to obtain the students' understanding in the interpretation of statistical measures. Section D was targeted at obtaining the students' ability to use and interpret statistical techniques and significance. Section C and D were basically used to score the students because it consists of a correct answer and wrong answers. The result of the test is a number ranging from 0 to 100 percent which was scored based on the selection of the correct option or the wrong option. A low score indicates the students' low understanding about statistical concepts which suggest a higher tendency to misuse the concepts. Face validity of the instrument was carried out by experts in applied statistics and research methodology. The internal consistency reliability test of the instrument was conducted using a subset of 35 Psychology students which gave a General Cronbach's Alpha of 0.79.

Procedure

Undergraduates in 400 level were randomly selected from four (4) departments that properly defined the population of the study, namely; Statistics, Banking/Finance, Psychology and Economics. A well designed statistics test was randomly sampled to forty five (45) students in each department after a brief explanation on the reason and method of the research. The students were required to answer and return the question to the researchers within 15 minutes. After conducting the test in Statistics, Banking/Finance, Psychology and Economics department, 36, 38, 41 and 43 test sheets were collected respectively. Therefore, the sample size is one hundred and fifty eight (158) respondents.

Design/Statistics

The design adopted for this study is a cross sectional survey design because it is a study which is done at a particular point in time. The data was analyzed descriptively using mean and standard deviation to determine the level of variation in the students' conception. Inferential analysis was employed using One-Way Analysis of Variance (ANOVA) to determine if there exists a significant difference between the student scores with respect to their disciplines.

III. Results

Descriptive analysis was used to present the data collected on students' understanding and behaviour towards statistics and statistical data. The questions are as follows:

1. Which one of these statistical processes is error most observed?

a. Sampling b. Data Collection c. Data Analysis d. Interpretation

2. How will you treat a published statistical data?

a. Reliable b. Unacceptable c. Manipulated d. Biased

3. Statistical concepts are very difficult to understand.

a. Strongly Agree b. Agree c. Disagree d. Strongly Disagree.

Response from the Students based on behaviour towards Statistics and Statistical data.

Response to Question 1

Statistics students believed that error is most observed in data analysis and interpretation with a tie of 28% each, 47% of Banking and Finance students responded to data analysis as the statistical process where error is mostly observed. Data collection was seen as the most error prone statistical process by 64% of Economics students while 40% of Psychology students believed that interpretation of statistical data was the major area of error in statistics.

Response to Question 2

Statistics Students with 42% showed trust in a published statistical data. 34% of Banking and Finance students responded that published statistical data is reliable. 33% of the Economics students could treat published statistical data as reliable while 33% other students would treat it as manipulated. On the other hand, 54% of Psychology Students also believes that published statistical data is reliable.

Response to Question 3

High percentage of students from the three departments agreed that statistical concepts are very difficult to understand with Statistics, Banking/Finance, Economics and Psychology responding at 53%, 81%, 53% and 56% respectively.

TABLE 1: The test score of the students from the four (4) departments.

	N	Mean	Std. Deviation	Std. Error	Maximum
STATISTICS	36	59.06	17.465	2.911	93
PSYCHOLOGY	41	36.88	13.130	2.051	60
ECONOMICS	43	40.98	12.749	1.944	60
BANKING/ FINANCE	38	34.53	12.212	1.981	60
Total	158				

From the descriptive table above, we have seen that the students' scores are reasonably low in a 100 percent scoring pattern. Statistics students have the highest mean score ($\bar{X} = 59.06$) in the test with a standard deviation of ($SD = 17.47$) and maximum value (max = 96). Banking and Finance Students had the lowest mean score $\bar{X} = 34.53$ and standard deviation of ($SD = 12.21$).

TABLE 2: The ANOVA Summary Table

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	13678.713	3	4559.571	23.471*	.000
Within Groups	29916.730	154	194.264		
Total	43595.443	157			

*Significance at p<0.01

According to the table above, there was a statistically significant difference between the disciplines as determined by one way ANOVA F(3, 154) = 23.471, p < 0.01. This shows that the mean scores of the students with respect to their departments differ statistically.

TABLE 3: The Multiple Comparisons Table for the Post-Hoc Test (TukeyHSD).

(I) DEPARTMENTS	(J) DEPARTMENTS	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
STATISTICS	PSYCHOLOGY	22.178*	3.183	.000	13.91	30.45
	ECONOMICS	18.079*	3.149	.000	9.90	26.26
	BANKING AND FINANCE	24.529*	3.242	.000	16.11	32.95
PSYCHOLOGY	STATISTICS	-22.178*	3.183	.000	-30.45	-13.91
	ECONOMICS	-4.099	3.042	.534	-12.00	3.80
	BANKING AND FINANCE	2.352	3.139	.877	-5.80	10.50

ECONOMICS	STATISTICS	-18.079*	3.149	.000	-26.26	-9.90
	PSYCHOLOGY	4.099	3.042	.534	-3.80	12.00
	BANKING AND FINANCE	6.450	3.103	.165	-1.61	14.51
BANKING AND FINANCE	STATISTICS	-24.529*	3.242	.000	-32.95	-16.11
	PSYCHOLOGY	-2.352	3.139	.877	-10.50	5.80
	ECONOMICS	-6.450	3.103	.165	-14.51	1.61

*. The mean difference is significant at the 0.001 level.

The Tukey HSD test reveals that the mean difference in the scores of Statistics students was reasonably high when compared to Psychology (22.178), Economics (18.079) and Banking/Finance Students (24.529) while the mean difference between Psychology, Economics and Banking/Finance Students were low. It also showed that there was no statistical significant difference between Psychology, Economics and Banking/Finance Students while Statistics students had a significant difference with Psychology, Economics and Banking/ Finance Students ($p < 0.001$).

IV. Discussions

The findings reveal that majority of students believe that data analysis and interpretation is the major area in statistical processes where error is mostly obtained. This is in line with Midi and Imon (2007), who opined that, one does not just learn formulae and plug in numbers in the formulae, but one has to learn about the conditions or assumptions under which the statistical testing procedures can be applied. This means that students has to be taught on the necessary conditions under which a statistic should be used. Misconception of statistical techniques and methods results to error in data analysis. These in turn intensify statistical fallacy in the statistical results and interpretations.

A high percentage of students agree that statistical concepts are very difficult to understand. This indicates that most of the statistical concepts which involve techniques and methods prove to be difficult for the students to understand. Zaidan and Ismail (2012) in their research on students misconception in descriptive statistics also found out that students find it very difficult to interpret descriptive statistics. This shows that the students' lack basic knowledge of statistical concepts and thereby believe that statistical concepts are very difficult to understand. Bennett and Anway (2003) agreed that students have the greatest difficulty with probability and sampling variability. Magina and Cazorla (2008) also believed according to their research that Average presents to be a difficult concept to be understood by the students. Students with such misconceptions are prone to committing statistical fallacy because they will possibly interpret result of analysis wrongly.

The mean score of the test indicated that most of the students performed below average. This shows a high misconception about statistical concepts. This result aligns with the result of Hallar and Krauss (2002), whose investigation showed that 90% of Scientific Psychologist, 80% of Methodology Instructors and 100% of Psychology Students perceived at least one of the false meanings of p-value as true. This result also agreed with Bennett and Anway (2003) that students initially held misconceptions and were deficient in their ability to reason correctly with statistics and probability.

It also revealed that Statistics students have a higher mean score in their understanding about statistical concepts. This indicates that the students who major in statistics have a less chance of committing statistical fallacy during data collection, analysis and interpretation. The test of significance showed a statistical significant difference between students in the four departments namely; Statistics, Banking/Finance, Economics and Psychology which is because of the high score margin of the Statistics students. It also shows that there is no significant difference between Economics, Banking/Finance and Psychology Students in their conception about statistical concepts. Studying statistical concepts and techniques reduces misconception. Previous researchers added that for one to apply any statistical method correctly, sound understanding is required because it seems to be especially sensitive to be misunderstood (John & David, 2002; Kirk, 2001; Zaidan & Ismail, 2012) and statistical techniques cannot be used blindly (Midi et al, 2007).

V. Conclusion

Statistics plays a vital role in every fields of human activity (Annapurna, 2017). The challenging aspect is that most students who in no time will become statistical analysts conceive a lot of misconceptions about statistical concepts. In today's society, statistical techniques are being used with increasing rate in Education, Medicine, Social Sciences and Applied Sciences such as Engineering. They are crucial in interpretation of data and making decisions. Based on our experience and observation through seminars, conferences and consultations, we noticed some statistical practitioners often misuse some of the statistical techniques in their researches (Midi et al, 2007) which results to statistical fallacy. This no doubt indicates that most of the fallacies committed in statistics are due to lack of statistical reasoning and misconception of statistical concepts. Since students who major in statistics prove to have greater understanding about statistical concepts, it will be of great help if statistical analysis should rest only on the shoulders of Statisticians so as to reduce the rate of statistical fallacy. On the other hand, since the field of psychology majors its research on empirical analysis, it is very important that the tutors of statistics courses in the undergraduate level improves the rate at which the course is been handled. Considering the trust students have in a published statistical data, it is required that statistical assertions should be replicated before application so as to detect any possible error in the analysis.

Further research studies should be carried out in specific statistical concepts to evaluate the areas in which the students are more prone to misunderstand. Studies on teachers' misconceptions of statistical techniques and methods should also be considered in further studies.

We therefore, recommend that statistical techniques should not to be used as tools for deceit, so that the science of statistics will not lose its reputation. Analysts should be very careful while working with statistical tools. Teaching statistical courses should not only be based on formulas and calculations but also emphasis should be laid on statistical reasoning. Statistics course lecturers in the undergraduate level should devote time to embed courage in the student in learning statistics.

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APPENDIX A: ASSESSMENT OF STUDENTS CONCEPTION ON STATISTICAL CONCEPTS QUESTIONNAIRE (ASCSCQ)

Note: Please fill in the blank spaces

SECTION A: Socio Demographic Data

1. Faculty: _____
2. Department: _____
3. Level: _____
4. Gender: _____

Note: Tick the option that seems most appropriate to you.

SECTION B: Behaviour towards statistics

1. Which one of these statistical processes is error most observed?
   a. Sampling
   b. Data Collection
   c. Data Analysis
   d. Interpretation
2. How will you respond towards a published statistical data?
   a. Reliable
   b. Unacceptable
   c. Manipulated
   d. Biased
3. Statistical concepts are very difficult to understand
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

SECTION C: Test on Statistical Measures

1. Mean (Average) of a distribution shows the
   a. Deviation
   b. *Central tendency
   c. Variation

d. Dependence

2. When the mean is far from the center of the distribution curve, it means that the distribution is

   a. Normal

   b. *Skewed

   c. Correlated

   d. Binomial

3. A high value of standard deviation indicates

   a. *High level of variation

   b. Low level of variation

   c. High level of dependence

   d. High level of independence

4. Variance tells us how

   a. How real the mean is

   b. How reliable the data is

   c. *How far each number in the set is from the mean

   d. No idea

5. What does kurtosis tell us

   a. *The level of the standard deviation

   b. The mean is typically greater than the mode

   c. The data is randomly collected

   d. No idea

SECTION D: Test on the use of Statistical Techniques and Statistical Significance

1. Assuming income has a strong relationship with expenditure, can we conclude that income is the main cause expenditure

   a. Yes

   b. *No

   c. Sometimes

   d. No idea

2. If the average score in percentage of performance for male is 43% and female is 62%. Can we conclude that the females performed better than males.

   a. Yes

b. *No

c. Sometimes

d. No idea

3. We use students t-test when we encounter

a. *Small sample size

b. Biased sample

c. Violation of assumptions

d. Sampling error

4. Which of the following can Chi-square be used for

a. Difference in mean

b. Difference in variance

c. Degree of relationship

d. *Independence

5. A test with 5% level of significance indicates

a. 5% confidence in the test

b. 0.05 confidence in the test

c. *95% confidence in the test

d. 95% error was committed

6. To compare or contrast error value (α) and p-value, we can say that

a. Error value is the same as p-value

b. Error value can be used to in estimate effect size while p-value explains the effect size

c. *Error value suggests the confidence level while p-value is the probability of chance outcome

d. Error value is always 0.05 while p-value is always 0.10

7. Small sample size can

a. Yield better result

b. Be easy to interpret

c. Make analysis more interesting

d. *Bias the conclusion

8. Conclusions drawn from sample data about a population are subject to uncertainty because

a. The data are not reliable

b. Calculations are not accurate

c. * Only part of the population is available

d. Don't know

9. To avoid biasing the results of a survey, a sample selected from a population should be

a. Large

b. * Random

c. Representative

d. Don't know

10. In doing a statistical test we

a. * Draw conclusions about populations from sample data

b. Draw conclusions about populations and then collect sample data to support these conclusions

c. Collect sample data and use the data to make assumptions about a population

d. Don't know

SCORING

Section A and B are not scored but rather presented.

Section C and D is scored based on one point per item for a correct answer and zero for any wrong answer. The total score is presented as a percentage.

A Study to evaluate the effectiveness of patient tailored nutritional intervention on fatigue & nutritional status among cancer patients at OPD of selected Hospital, Ambala, Haryana.

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Abstract- **Design:** True experimental i.e: "Randomized controlled Trail: pretest posttest design"

Setting: Cancer OPD of Maharishi markandeshwar institute of medical sciences and research hospital mullana,Haryana.

Sample size and sampling technique: Total 60 patients were selected by convenience sampling technique and randomized into two groups experimental (n=30) and control (n=30) by computer generated code method.

Intervention: Patient tailored nutritional intervention was administered in experimental group.

Results: The post intervention mean score of nutritional status in experimental group was 5.00 which was significantly higher than mean score of control group 6.70 (t=3.90, p=0.001). The computed pearson's correlation between posttest fatigue and nutritional status was 0.63 & correlation between fatigue and nutritional status was 0.67 which is highly significant (p=0.01**)

Conclusion: The use of Patient tailored nutritional intervention was effective in improving nutritional status among cancer patients. There is no effect of patient tailored nutritional intervention on fatigue among cancer patients. There was a positive moderate relationship between fatigue and nutritional status among cancer patients. As the level of fatigue increase, the nutritional status decrease in cancer patients. Therefore, it is recommended that the 'patient tailored nutritional intervention' can be used in case of patients suffering from side effects of patients undergoing chemotherapy and radiation therapy treatment.

Index Terms- Fatigue, Nutritional status, Patient tailored nutritional status, Cancer

I. Introduction

Cancer arises from the transformation of normal cells into tumour cells in a multistage process that generally progresses from a pre-cancerous lesion to a malignant tumour.[i]

Chemotherapy is an important treatment modality in oncology which can prolong life of cancer patients. These drugs are chemically designed to target cancer cells that are dividing and growing rapidly. However most chemotherapy drugs have some side-effects such as nausea and vomiting, mouth sores and ulcers and increased susceptibility to infection that can profoundly affect the nutritional status. Patients who have lost a significant amount of weight before cancer treatment are at increased risk of becoming further malnourished during treatment.[ii]

The prevalence of malnutrition in cancer patients ranges from 40-80%. This varied prevalence is due to the elevated basal energy requirements due to the inherent illness and decreased oral intake. Whereas in simple starvation, re-feeding restores normal nutritional states, cancer related weight loss is different, in that abnormalities associated with tumour frequently prevent restoration of muscle mass by provision of nutrient. Loss of weight can be attributed to increased cytokines associated with tumour, including- malabsorption, obstruction, diarrhoea and vomiting, host response to the tumour (causing anorexia and altered metabolism) and the side effects of anti-cancer treatment.[iii]

Malnutrition can influence the effectiveness and success of chemotherapy, radiotherapy, and cancer-related surgery due to changes in metabolism, pharmacokinetics and healing dynamics. Moreover, malnutrition seems to be responsible for changes in absorption, protein binding, hepatic metabolism and renal elimination of drugs and their metabolites.

Fatigue is the most frequent side effect of cancer and its treatment that is subjective in nature and experienced as a feeling of tiredness that varies in degree, frequency and duration. Cancer associated fatigue is reported in 14% to 96% of patients undergoing cancer treatment & in 19% to 82% of patients post management.[iv]

65% to 95% of patients experience fatigue during chemotherapy. Such fatigue is mostly encountered in the late afternoon and perceived as reasonable during chemotherapy by patients. It is also ignored or left untreated by 80% of healthcare professionals. Lack of attention to treatment can allow the fatigue to worsen in intensity and prolong patients' recovery process.[v]

II. Need of the Study:

It is known that fatigue is the commonest side-effect of chemotherapy and radiotherapy: it has been shown that 65–100% of patients undergoing radiotherapy and up to 82–96% of those receiving chemotherapy suffers from fatigue during their treatment. As could be imagined, fatigue is correlated to the intensity of treatment, and becomes a relevant toxic effect the more the treatment intensity is increased. This correlation could be predictive of the fatigue observed at some time after treatment.[vi]

Cancer patients undergo metabolic alterations, which render them to have protein energy malnutrition throughout all stages of the disease. Malnutrition globally impacts all cancer patient by increasing the risk of infection, delaying wound healing, increasing treatment toxicity, prolonging hospital stay and increasing health related costs. While malnutrition is already very prevalent among cancer patients, nutrition supportive intervention should always be part of the global oncology strategy.[vii] Nutrition plays an important role in maintaining better quality of life among cancer patients, and it is an instinct for every human being to value food intake in order to maintain social structure, self esteem and enjoyment.[viii]A study by Gupta et al showed that well-nourished (a good SGA-subjective global assessment score) cancer patients were associated with better survival outcomes.[ix]

Malnutrition has been observed to negatively impact patients reaction to treatment, elevate treatment side effects, disrupt consecutive treatment regimens, increase hospital stay, weaken functionality and immunity of patient hence affecting survival rates of the patients.[x] Malnutrition and weight loss are prevalent in 20–80% of cancer patients.[xi] Early recognition and detection of risk for malnutrition through nutrition screening followed by comprehensive nutrition assessment and timely interventions should be considered a valuable measure within the overall oncology strategy.[xii]

III. Objective:

This study was conducted with an objective to assess the effectiveness of patient tailored nutritional intervention on fatigue and nutritional status among cancer patient at OPD of selected hospital.

IV. Methodology:

A randomized control trial was taken up and 60 patients were selected by convenience sampling technique and randomized into two groups experimental (n=30) and control (n=30) by computer generated code method. The internal consistency of Brief fatigue inventory Scale was determined by using Cronbach's Alpha and found to be 0.94**.** The inter-rater reliability of Patient generated subjective global assessment scale was determined by using Pearson Correlation. Two raters independently assessed the patients for muscle strength examination. The inter-rater reliability was calculated by Pearson Correlation and found to be 0.80. The internal consistency was also calculated by using Cronbach's Alpha and found to be 0.86. patient tailored nutritional intervention was administered in experimental group. The pre and post interventional fatigue and nutritional status score were assessed in both the group by using a scale i.e. brief fatigue inventory (BFI) and patient generated subjective global assessment scale (PG-SGA). The data was collected by self reported, record review and anthroprometric measurement.

Ethical approval to conduct study was obtained from institutional ethical committee of M.M (Deemed to be University), Mullana. Consent form was taken from the patients regarding their willingness to participate in the research project. The purpose for carrying out research project was explained to the subjects and assurance of confidentiality was given.

V. Results:

Section- I

Sample characteristics and clinical variables of patients:

Half of the patients in experimental group (50.0%) were in the age group of 40-60years and more than half of the patients in control group (53.3%) were in the age group of 60-80years. Majority of the patients in both the experimental group (66.7%) and control group (60.0%) were males. More than 1/3rdof the patients in both the experimental group (40.0%) and control group (36.7%) were having no formal education. 1/3rdof the patients in both the experimental group (36.7%) and control group (30.0%) were self employed. More than half of the patients in both the experimental group (53.3%) and control group (56.7%) were having the monthly income < 10000rs. Most of the patients in both the experimental group (80.0%) and control group (86.7%) were vegetarian by dietary habits. Majority of the patients in both the experimental group (66.7%) and control group (63.3%) were residing in the rural area. more than half of the patients in both the experimental group (56.7%) and control group (63.3%) were receiving chemotherapy. More than 1/3rdof the patients in experimental group (36.7%) and more than half of patients control group (53.3%) were having the 2nd stage of cancer. More than half of the patients in the experimental group (53.3%) and more than 1/3rdof the patients in control group (43.3%) were having the Hb level ≥11 gm/dl. Majority of the patients in both the experimental group (60.0%) and control group (73.3%) were having the BMI between 18.5- 24.99. Majority of the patients in both the experimental group (96.7%) and control group (96.7%) were not taking any vitamin and nutritional supplement.

Chi squire was applied and findings shows that both groups were homogeneous with respect to Age, Gender, Education, Occupation, Monthly family income, Dietary habits, Residential area, Type of treatment, Stage of cancer, Hb level (gm/dl), BMI, Taking nutritional and vitamin supplement.

Section – II

Table- 1

Mean, Mean difference, Standard Error of Mean difference and 't' value of fatigue score of Experimental and Control Group before & after administration of patient tailored nutritional intervention.

N=60

Group	Mean	M_D	SE_{MD}	t value	p value
Experimental	25.40 22.43	2.96	4.51	3.60	0.001***
Control	23.90 25.23	1.33	2.39	3.04	0.005***

***** very highly significant (p<0.01)** **t(29)= 1.699**

T Table 1 & fig 1 shows a comparison of fatigue score in experimental and control group using paired 't' test

In the experimental group, the mean pretest fatigue score was 25.40 and mean posttest fatigue score was 22.43 with the mean difference of 2.96 which was found statistically significant (t=3.60, p= 0.001**) at 0.05 level of significance. The mean posttest fatigue score of patients in experimental group was significantly lower than the mean pretest fatigue score. Therefore, it can be inferred that patient tailored nutritional intervention was effective in reducing fatigue among patients in experimental group.

In control group, the mean pretest fatigue score was 23.90 and mean posttest fatigue score was 25.23 with a mean difference of 1.33 which was found to be statistically significant (t= 3.04, p=0.005**). The mean posttest fatigue score of patients in control group was significantly higher than their mean pretest fatigue score. Therefore, it can be inferred that in absence of patient tailored nutritional intervention, the fatigue score of patients in control group increased significantly.

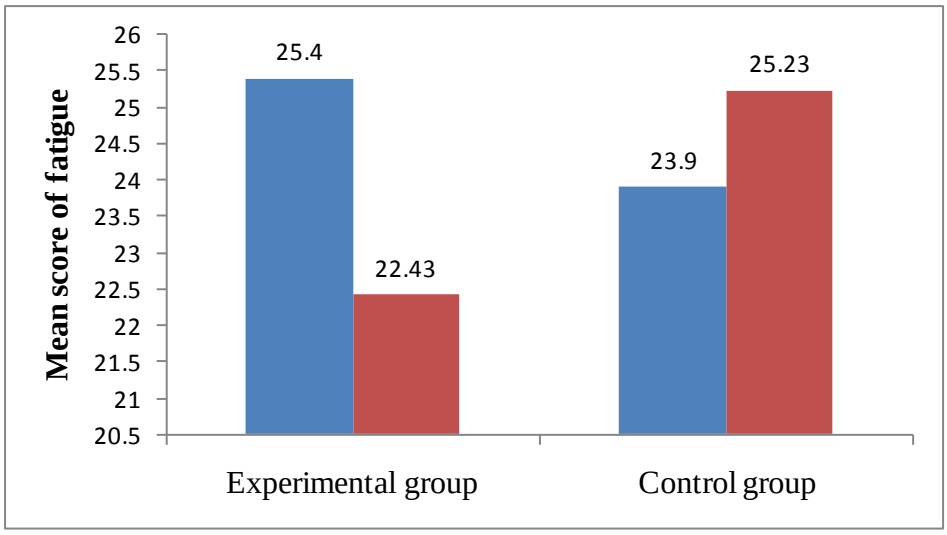

Figure: 1 Bar graph showing mean fatigue score before and after administration of patient tailored nutritional intervention in experimental and control group

TABLE: 2

Mean, Mean difference, Standard Error of Mean difference and 't' value of nutritional status score of Experimental and Control Group before & after administration of patient tailored nutritional intervention

N=60

Group	Mean	M_D	SE_{MD}	T Value	P Value
Experimental	6.80 5.00	1.80	0.26	8.75	0.001***

Control	7.17	0.47	0.234	1.99	0.06^{NS}
	6.70				

^{NS}Not Significant (p>0.05) ***** very highly significant (p<0.01)**
t(29)= 1.69

Table 2 & fig 2 shows a comparison of nutritional status score in experimental and control group using paired 't' test.

In the experimental group, the mean pretest nutritional status score was 6.80 and mean posttest nutritional status score was 5.00 with the mean difference of 1.80 which was found to be significant (t=8.75, p= 0.001) at 0.05 level of significance. It shows that the posttest nutritional status score was significantly lower than the pretest score in experimental group which indicates that the nutritional status of patients improved in experimental group after the administration of patient tailored nutritional intervention.

In the control group, the mean pretest nutritional status score was 7.17 and mean posttest nutritional status score was 6.70 with the mean difference of 0.47 which was found to be statistically non significant (t=1.99, p= 0.06^{NS}) at 0.05 level of significance. It can be inferred that in absence of patient tailored nutritional intervention, there was no change in nutritional status of patients in control group.

Therefore, it can be concluded that patient tailored nutritional intervention is effective in improving nutritional status among cancer patients.

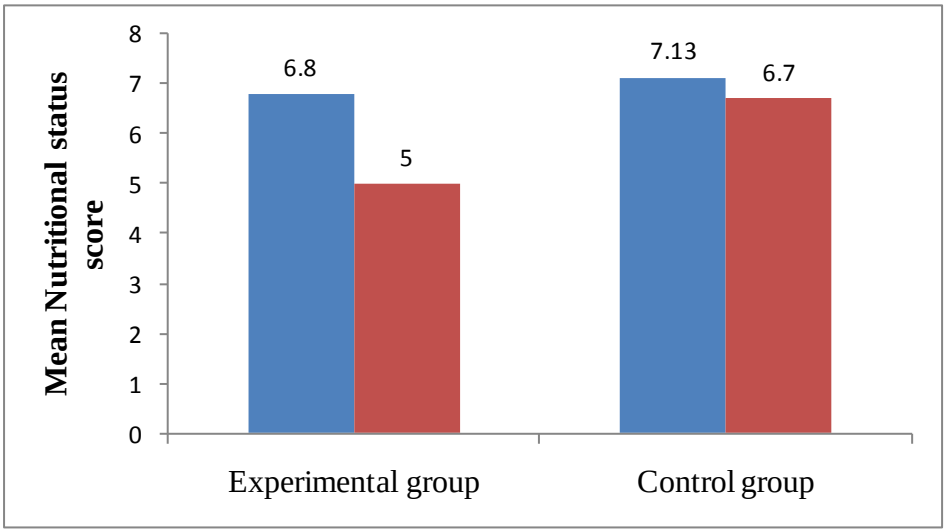

Figure: 2 Bar graph showing comparison of mean nutritional status score before and after administration of patient tailored nutritional intervention in experimental and control group

Section – III
TABLE 3
Pearson's correlation showing relationship of posttest fatigue and nutritional status in Experimental & Control Group
N=60

Correlation		**Nutritional status 'r' value**	**Fatigue 'r' Value**	**p value**
Fatigue	Experimental group	0.63	xx	0.01**
Nutritional status	Control group	xx	0.67	0.01**

*** * highly significant (p<0.01)** **r(58)= 0.250**

The finding in Table 3 reveals that the computed Pearson's correlation between posttest Fatigue and Nutritional status after administration of patient tailored nutritional intervention in experimental & control group. The computed Pearson's correlation between posttest Fatigue and Nutritional status score was 0.63, which is statistically significant at 0.05 level suggesting a moderate degree positive relationship between posttest Fatigue and Nutritional status scores of experimental group. This indicates that as the fatigue score decrease the nutritional status score also decrease lower score of nutritional status indicates good nutritional status. Therefore, it can be

inferred that as fatigue level of patients decrease, the nutritional status improves and vice versa.

In control group, the computed Pearson's correlation between posttest Fatigue and Nutritional status score was 0.67 which is statistically significant at 0.05 level suggesting a moderate degree positive relationship between posttest Fatigue and Nutritional status scores. This indicates that as fatigue score decrease, nutritional status score also decrease. Therefore, it can be inferred that as fatigue level of patients decrease, the nutritional status improves.

Hence, null hypotheses (H_{03}) was rejected and research hypotheses(H_3) was accepted.

VI. Discussion:

The present study shows that 50% patient were in the age group of 60-80year which is consistent with the findings of the study conducted by **Wen-Hao Su et al (2011)** who reported that the 73% patients were more than 65 year.

The present study shows that 66.7% of cancer patients were male and rest 33.3% were female which is consistent with the findings of the study conducted by **Kavyaparasa et al (2016)** which shows that 71.5% were male and rest 28.5% were female.

The present study shows that 26.7%were underweight, 60.0% were normal weight and 6.7% were overweight, 6.7% were obese which is consistent with the findings of the study conducted by **Bincy R et al (2014)** in which 23.3% patients were underweight 43.3% normal weight and 23.3% overweight 6.6% obese.

The present study shows the mean nutritional status score of patients in experimental & control group before intervention was 6.80 & 7.13 respectively before administering patient tailored nutritional intervention. These findings are consistent with the study conducted by **Opanga Y et al (2017) Error! Bookmark not defined.**who reported mean PG-SGA score of cancer patients as 6.76±5.17.

In the present study, the mean posttest fatigue score of experimental group (22.43) was significantly lower than control group (25.23) after administering patient tailored nutritional intervention.

In the present study, the mean posttest nutritional status score of experimental group (5.0) was significantly higher than control group (6.70) after administering patient tailored nutritional intervention. It indicates better nutritional status in experimental group as compared to control group. This finding is consistent with the study conducted by **Langius JAE et. Al(2013)Error! Bookmark not defined.** systematic review to assess the effect of nutritional intervention on nutritional status in which four out of 10 studies showed significant benefits of nutritional counseling on nutritional status.

The present study shows that there was a significant relationship between nutritional status scoreand fatigue score (r=0.63, p=0.01). The findings were consistent with the study conducted by **Young Heeet. Al(2003)** to assess the relationship between fatigue and nutritional status in patients with cancer undergoing radiotherapy which shows that there is significant correlation between the fatigue scores with Body weight (r=0.38, p<0.01) and BMI (r=0.34, p<0.01).

VII. Conclusion:

Patient tailored nutritional intervention was effective in improving nutritional status among cancer patients. There is no effect of patient tailored nutritional intervention on fatigue among cancer patients. There was a positive moderate relationship between fatigue and nutritional status among cancer patients. As the level of fatigue increase the nutritional status decrease in cancer patients.

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Post-Natal Developmental Stages Of Lesser Whistling Duck At Paleik In (Lake), Sinkaing Township, Mandalay Division, Myanmar

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Abstract-Hatching success and post-natal stages of *Dendrocygna javanica* (Lesser Whistling Duck) were recorded from January 2007 to December 2007 at Paleik In in SinKaing Township, Mandalay division. Nests of *D. javanica* were observed among a variety of sites. All nests are nearly cup-shaped with a slight depression at the center. During the study period it was observed that 12 nests were constructed of twigs and broken dry leaves of Myet Mont Nyin grass (*Carex pandanophylla*), among the broken dry leaves of Myar grass (*Cyperus* spp.) and on the bending branches of Kyee tree (*Barringtonia acutangular*) at Paleik In. During the year 2007, 12 nests, 87 eggs and 49 hatchlings were observed in Paleik In. Among these nests 50% were recorded as successful, 25% as lost by predator, 16.67% were lost by flooding and 8.33% as abandoned. Of the 87 eggs observed, 49 eggs (56.32%) survived until hatching.

Keywords- Hatchlings, Hatching success, Nest sites, Water birds, Wetland.

I. INTRODUCTION

Reproduction in birds requires the nurturing of eggs and young outside the body. Nests, which provides a receptacle for egg during incubation and for baby birds until they fledge, vary in construction from simple accumulations of sticks or scrapes in the earth to major architectural achievements (Gill, 2001).

Differential resource selection is one of the principal factors which permit species coexistence (Schoener, 1974 cited by Parejo, Sanchez and Aviles, 1999). In studies of niche partitioning nest location has received much less attention than food or habitat, perhaps because suitable nest sites are presumed to be readily available for most species. However, when a species has specific nesting locations it may be difficult to obtain (Wiens, 1989 cited by Parejo, *et al., 1999).* To breed successfully waterbirds require suitable places in which to build their nest. Nesting sites vary from species to species. Many species of waterbirds such as cormorants, herons and egrets build stick nests in tree next to lake or wetland. Often these nests are built in branches that overhang open water (Scott, 1997).

Nest-building techniques and construction materials vary widely. Materials used are commonly twigs, grass or mud. A dove build a nest with twigs, the Robin with mud and grass, a duck used special down materials all readily available to the builder (Wallace, 1963). Having selected a nest site, the breeding bird must built a nest, lay a clutch of eggs and incubate them. The number of young hatched will depend on the size of clutch. Incubating birds must divide their time between the eggs and the need to spend some time feeding, the balance depending on the fat reserves which can be lost over the incubation period (Patterson, 1982). As soon as a clutch is completed, or in some cases before it is complete, one of the parent birds sit on the eggs with varying degrees of attentiveness until they hatch. The incubation period, or time interval required for hatching an egg, varies with different species and is not necessarily uniform within a species (Wallace, 1963).

At the end of the period of incubation fertile eggs with live embryo hatch, or give birth to young; unhatched eggs may be infertile embryos that died at some stage of development. Young birds are equipped with an "egg tooth", or caruncle a horny protuberance on the tip of the upper mandible which used to open the shell but which disappears soon after birth (Wallace, 1963).

A highly significant difference occurs between precocial and altricial birds. The precocial bird, hatches out covered with down, legs well developed, eyes open and alert, and is soon able to feed itself. Because it is usually able to leave the nest and to run after its parents shortly after hatching, it is also called a nidifuge or nest fugitive. Nidifuges are often ground-nesting species as adults, are good runners or good swimmers and feed either on the ground or in the water (Welty, 1982).

Parental behavior normally involves a number of different activities; feeding the young, providing them with shelter and protecting them from predators and other dangers. Shelducks, like other parents of precocial young, do not feed their broods but merely accompany them while they feed themselves. The parents do, however actively provide shelter and protection (Patterson, 1982). Being mobile while still very small, precocial young birds are very vulnerable to a number of hazards, the principal ones being the risk of predation and the danger of chilling when not being brooded by a parent. As a result, most suffer a high mortality in their first week or ten days of life (Patterson, 1982).

Many lesser whistling duck are found at Paleik In. Which is a moderately large natural wetland. Birds can get enough food supply. A total of 12 nests, 87 eggs and 49 hatchlings were observed during breeding season (2007). Since there is no information available on the reproduction of these species the present study has been undertaken at the Paleik In where these species are observed to be present throughout the year. The main objective is to study and record the post- natal developmental stages.

II. MATERIALS AND METHODS

Study Area and Study Period

Study area was carried out at Paleik In (21° 50'N 96° 03'E). This In is situated at Sinkaing Township, Mandalay Division. It lies near Mywe Pagoda. The water body of Paleik In is largest in the rainy season about 323.76 hectares while 40.47 hectares in hot season. The length of the Paleik In is 2.3 km and the width about 2.1 km (Fig 1). It is connected with Myintnge River, a tributary of Ayeyarwady River and other agricultural fields. There are rich habitats and microhabitats for water birds. Land birds are also observed at the vicinity. This In also supports a large variety of different flora and fauna. Myet Mont Nyin and Myar grass are the dominant emergent plants in this In. The study period is from January to December 2007.

Hatching Site Characteristic

After hatching is completed ten hatchlings of lesser whistling duck from one clutch was reared in captivity at Paleik In.

Hatchling Metric

After hatching, the young were measured until 5 days old. The following measurement were taken, the wing length from the carpal joint to the end of the longest primary feather, tarsus-length from the tarsal joint to the base of the foot; culmen-length, from the unfeathered base of the beak to its tip; total length, from the tip of beak to the tip of the tail.

Nest, Egg and Hatching Success

Among the recorded nests, successful nest numbers and number of hatchlings were recorded. If one egg of the clutch hatched then the nest was considered successful. Clutch that fail included those that were abandoned or that were destroyed or unknown reason. Cold eggs were assumed abandoned. Evidence of predation includes partially eaten eggs in or below the nest and dead chicks with wound were also attributed to predator.

Hatching Time and Hatchling Characteristics

Hatching time and hatching characteristics were recorded.

Hatching Success of Individual Eggs

Among the successful nests, hatching success of the individual eggs were observed during the year 2007. Hatching date of successful nests were recorded during the breeding season.

Survival of Hatchling

After hatching, the survival rate of hatchling were recorded.

Fig.1.Location Map of Paleik In, Sinkaing Township

Source: From Google Earth

III. OBSERVATION AND RESULTS

Hatchling Characteristics

After hatching, the young was observed with pale black down feathers; a white eyebrow and a conspicuous white patch on the back of the head; a white patch on the wings and two other white patches on either side of the lower back and rump.

Hatchling

Measurements of total length, wing, tarsus and culmen of five days old hatchling were recorded (Table 1). Hatching date for 49 young ranged from 18th June to 24th July during breeding season (2007). After two days of hatching, hatchling of lesser whistling ducks were found as good runners and good swimmers and feed mainly on weeds in the water without the help of parents (Fig A, B).

Nest, Egg and Hatchling Success

A total of 12 nests and 87 eggs were found during the breeding season (2007). Among these nests, six nests (50%) survived giving rise to 49 hatchings. Of these nests that failed three nests (25%) were lost to predator, two nests (16.67%) were flooded and only one nest (8.33%) were abandoned and six nests (50%) were observed as successful (Table 2). Number of nests, young and the percentage of total young were recorded (Table 3).

Hatching Time and Feeding of Hatchlings

During the hatching period, eggs of each clutch hatch out by striking with egg-tooth or caruncle within a period of about 3 hours (Table 4).

After hatching, newly hatched young whistling ducks were observed to stay in the nest for at least 22 hours. The hatchlings feed themselves mainly on water weeds (*Chana* spp.) near the nests.

Hatching Success of Individual Egg

Among the successful nests, the eggs were observed to hatch successfully. In the present study the breeding success at Paleik In showed that 83.14% of the eggs hatched in 2007 (Table 5).

Survival of Hatchling

After 10 days of age, 3 hatchlings disappeared and 4 died. The number of surviving hatchlings decreased in the second week of life were observed. The survival rate of hatchlings was observed as 30 percent (n=10) in the present study.

Table 1. Measurements of total, wing, tarsus and culmen length of *Dendrocygna javanica*

Age	Mean of total length (cm)	Mean of wing length (cm)	Mean of tarsus length (cm)	Mean of culmen length (cm)
1st day old	10.05	2.34	1.47	1.10
2nd day ol	10.39	2.50	1.67	1.34
3rd day old	10.83	2.81	1.95	1.51
4th day old	11.42	3.09	2.33	1.83
5th day old	12.01	3.46	2.65	2.05

Table 2. Nest success and nest lost of *Dendrocygna javanica* at Paleik In (2007)

Nest numbers	Nest outcome	Nest (2007)
2, 3, 5, 6, 8, 9	Successful	50%
1, 4, 12	lost of predator	25%
7, 11	lost by weather (flooded)	16.67%
10	Abandoned	8.33%
Total, 12		100.00

Table 3. Number of nests and young of *Dendrocygna javanica* at Paleik In (2007)

Number of young	Numbers of nests	Total young	% of total young
6	1	6	12.25
7	1	7	14.29
8	1	8	16.33
9	2	18	36.74
10	1	10	20.41
	6	49	100.00

Table 4. Hatching time duration of *Dendrocygna javanica* at Paleik In (2007)

Nest No.	Numbers of egg	Hatching time duration
1	8	3 hours
2	10	2 hours 45 minutes
3	11	3 hours
4	12	3 hours 25 minutes
5	9	3 hours 15 minutes
6	9	3 hours 25 minutes
Mean ± SD	9.83 ± 1.34	3.02 ± 0.27

Table 5. Percentage of the hatching success of *Dendrocygna javanica* at Paleik In

Nest No.	Numbers of egg	Number of hatchlings	Chicks hatched/eggs laid (%)
1	8	6	75%
2	10	9	90%
3	11	8	72.73%
4	12	10	83.33%
5	9	7	77.78%
6	9	9	100.00%
Mean ± SD	9.83 ± 1.34	8.17 ± 1.34	83.14 ± 9.44

Fig A. Two days old Ducklings

Fig B. Seven Days old Ducklings

IV. DISCUSSION

In Myanmar, *Dendrocygna javanica* is widely distributed (Smythies, 1953) and are present the whole year round at Paleik In. The breeding season of *D. javanica* starts from May to August. The date on which the first egg of the clutch is laid can only rarely be determined by direct observation during the egg-laying period, due to the inaccessibility to the nests and bird's intolerance of disturbance. Instead, a number of indirect methods must be used. In a few nests, observed before laying is complete, the laying date of the first egg can be back-dated since normally one egg is laid per day. If the hatching date and clutch size are known, the laying date can be estimated using the incubation period of 29-31 days, plus one day for each egg in the clutch (Patterson, 1982).

At Paleik In, some nests were observed before laying is completed, the laying date of the first egg were calculated by using back-dated system according to Patterson (1982). Incubation period ranged from 25-26 days. Among the successful nests, incubation period of two nests were recorded 25 days and four nests were observed 26 days at Paleik In during breeding season. After 28 days of incubation, the dozen or so eggs of the mallard, *Anas platyrhynchos*, generally all hatched out within a period of about two hours (Welty, 1982).

At Paleik In, after 25-26 days of incubation all eggs hatched out within a period of about 3 hours. The eggs of lesser whistling duck are much larger than eggs of bittern or eggs of grebe and other eggs of small size water birds that were observed at Paleik In during breeding season. The egg length and width were compared with other waterbirds it was observed that D. *javanica* length and width were (60.00 – 71.50 and 34.00 – 37.5 mm) whereas *Ixobrychus cinnamomeus* egg length and width were (39.35 – 44.28 and 25.46 - 26. 75 mm). From the above result it was obvious that D. *javanica* are much larger than other waterbirds.

Wallace (1963) stated that the eggs of precocial birds which contain more yolk and albumen hatch out more fully developed young than the eggs of altricial birds. The chief role in hatching is played by the chick itself. In preparation for liberation from its limestone prison, the maturing chick develops two tools. One is a short, pointed, horny “egg-tooth” at the tip of its upper mandible. The other is a set of prominent hatching muscles located largely on the upper side of its neck and head (Welty, l1982). At Paleik In, during the study period “egg-tooth” or caruncle of the maturing chicks were observed in the hatching period. There is highly significant difference between precocial and altrical birds (Portmann, 1950 cited by Welty, 1982). The precocial bird; hatches out

covered with down, legs well developed, eyes open and alert, and is soon able to feed itself. The altrical bird is born naked, blind and too weak to support itself on its legs (Nice, 1962 cited by Wetly, 1982).

At Paleik In, hatchling were observed as covered with down, legs well developed, eyes open and alert. Thus they are regarded as precocial. Precocial birds such as ducks, pheasants and grouse leave the nest upon hatching. Among the ducks, gallinaceous birds, plovers, and sandpipers lead their young from the nest soon after hatching (Wallace, 1963). Patterson (1982) also pointed out that in precocial species such as the domestic fowl and many ducks, the female takes complete charge of the brood from the time of hatching leading the young to food, but not feeding them directly.

In the present study the female of lesser whistling duck do not feed their broods and hatchlings were observed to feed themselves. In lesser whistling duck eggs were observed to hatch successfully. In the present study the breeding success at Paleik In were observed that 83.14% of the egg hatched. Most of the ducklings disappeared while they are still young. The number of survived ducklings decreased most rapidly in the first week of life and survival rate after three weeks of age was high. This pattern of increasing good survival with age is fairly general among Anatidae (Patterson, 1982).

During the year 2007, some of the hatchlings disappeared and some died. The number of surviving hatchling decreased in the second week of life were also recorded in the present study. Reproductive success of *D. javanica* at Paleik In has been estimated by observation data of nests in 2007. Predation and flooding were the major cause of nest, egg and hatchling destruction of lesser whistling duck at Paleik In. A total of 12 nests, 87 eggs and 49 hatchlings were found in the study period of 2007. Among these six nests (50%) and 49 hatchlings (56.32%) were observed as successful.

V. CONCLUSION

Paleik In is a moderately large natural wetland. Many different kinds of waterbirds were found in this In . They can get enough food supply. In Myanmar, information on the breeding ecology of waterbirds at Paleik In is little known. With a little knowledge on the breeding ecology of waterbirds their conservation is not possible and problematic and thus to study the ecology of waterbirds needed.

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A Literature Review of Impacts of Urbanization on Water Resource Management: A Case Study in South Africa

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Abstract- As urban space continues to expand to accommodate a growing global population, there remains a real need to quantify and qualify the impacts of urban space on natural processes. The expansion of global urban areas has resulted in marked alterations to natural processes, environmental quality and natural resource consumption. The urban landscape influences infiltration and evapotranspiration, complicating our capacity to quantify their dynamics across a heterogeneous landscape at contrasting scales. Impervious surfaces exacerbate runoff processes, whereas runoff from pervious areas remains uncertain owing to variable infiltration dynamics. Increasingly, the link between the natural hydrological cycle and engineered water cycle has been made, realizing the contributions from leaky infrastructure to recharge and runoff rates. Urban landscapes are host to a suite of contaminants that impact on water quality, where novel contaminants continue to pose new challenges to monitoring and treatment regimes. This paper focuses on the impacts of urbanization on water resource management using South Africa as a Case study.

Index Terms- Urbanization, Water Resources, Runoff, Impervious Surfaces, Hydrology

I. INTRODUCTION

Water stress has become a major concern in most urban areas. According to Rosegrant, Cai and Cline (as cited from Jansen, 2012), water development is essential to the livelihood of people, as well for ensuring growth in the industrial sector and for environmental sustainability. Water is essential for human life. Water availability is influenced by factors such as climate change, urbanization and pollution, which affect both the quantity and quality of surface water and groundwater (Jansen, 2012).

Rapid urban population growth coupled with inadequate planning and resource management can pose significant social and economic consequences. Rapid urbanization is a global phenomenon, approximately 54% of the world population live in urban areas and this number is expected to increase by the year 2050 (Maria E. Freire; Somik Lall & Danny Leipziger, 2014). The world population is growing relatively fast and as a result water consumption is likely to double. Urbanizations is among the main factors that affect water supply and consumption in urban areas. According to Wua & Tanb (2012) urbanization has been and is the major cause for current water shortage and water environment changes; and the deteriorating urban water supply/demand balance arising from massive urban population increase.

The World Bank (2017) stated that by the year 2025 approximately 1.8 billion people will reside in regions/counties with absolute water scarcity. Water is a very scarce resource and it needs to be utilized efficiently on an equitable basis in order to

meet all the competing demands. Failure to recognize the economic value of water can lead to wasteful and environmentally damaging uses of this resource. Urbanization directly affects the availability and management of water resources. Total urban water demand will increase continuously along with urbanization and if appropriate action is not taken to better plan and mitigate the negative impacts of urbanization on water resources, humanity will be adversely affected.

This paper focuses on the impacts of urbanization on water resource management using South Africa as a Case study. Countries such as South Africa, China and India are all among those that are presently experiencing water shortages and all striving to achieve sustainable urbanization simultaneously with improved and integrated water resource management.

II. THE CURRENT STATUS

As economies of countries continue to boom they are most likely to be accompanied by expanding cities and growing urban industries and in turn would most likely, without exception, have to face major water shortage and other resultant environment problems. It is estimated that with the current practices the world will experience a 40% shortfall between the demand and available supply of water by 2030 (World Bank, 2017). These figures are further aggravated by the current chronic water scarcity, hydrological uncertainty, extreme weather conditions of floods and droughts, rapid development, pollution and inefficient utilization of water. Water scarcity and security is largely becoming a major challenge for many countries. Water resources are dwindling and this has profound implications for food security, people's health and the functioning of aquatic ecosystems.

The importance of safeguarding the quality of water in urban areas has also largely gained prominence and urban water resources are now regarded as important environmental asset. Thus the design of the urban form is now subjected to greater scrutiny and innovations which are to be adopted in order to minimize its ecological footprint in relation to the water environment (Goonetilleke & Thomas, 2004).

The relationships between urban form and water quality are not intuitively obvious however, as McGrane (2014) observe, urban spaces simultaneously expand with population increase.

This expansion of urban space leads to alterations to natural processes, environmental quality and natural resource consumption. The built up environment has an effect on the infiltration and evapotranspiration as it involves erection of impervious surfaces which exacerbate runoff processes, whereas runoff from pervious areas remains uncertain owing to variable infiltration dynamics.

This paper also tries to provide a broader understanding of the relationship between urbanization and water resource management, looking at the issues that exist and exploring mitigation measures to ensure sustainable and equitable use.

III. AIM OF THE REVIEW

In the past 20 years, available fresh water resources in Africa have greatly reduced due to severe and prolonged droughts(Donkor & Wolde, 2000). Water pollution resulting from industrial effluent, urban runoff, sewerage and agro-chemicals are on the increase and continue to deteriorate freshwater quality and affect its quantity. The aim of this research is to establish the various impacts of urbanization on water resource management focusing on urban water quality and shortage.

IV. OBJECTIVES

The objectives of this paper are as follows:

- To appraise the Government, City Planners, Administrators and all relevant stakeholders about the effects of urbanization water resources and equip them with the necessary information and understanding to enable them to better plan for the future.
- Raise awareness of the importance of protecting water resources, water quality and aquatic ecosystems.
- To provide an in depth understanding of the relationship between the water cycle and urbanization
- Explore challenges faced in developing countries (South Africa) when it comes to water resource management.

V. TRENDS IN URBANIZATION AND ITS IMPACTS ON WATER RESOURCES MANAGEMENT

Water Resource Management and Urbanization in South Africa

South Africa is a developing country with a total population of about 57 million, according to the United Nations (as cited from Jansen, 2012). South Africa's projected urban population for 2010 was 61.7% of the total population, as compared to 79.6% projected for 2050. With these figures South Africa can be regarded as one of the most urbanized countries in Africa. According to Edmonds (2013) presently nearly two-thirds of South Africa's population of 50 million lives in urban areas. South Africa's rapid urbanization occurred predominantly during the postcolonial 20th century.

South Africa is a water-stressed country with an average annual rainfall of 500mm (60% of the world average). Only a narrow region along the south-eastern coastline receives good rainfall, while the greater part of the interior and western part of the country is arid or semi-arid. 65% of the country receives less than 500m per year, which is usually regarded as the minimum for dryland farming; 21% of the country receives less than 200mm per year (DWAF 1994). Four of South Africa's main rivers are shared with other countries, which together drain about 60% of the country's land area and contribute about 40% of its total surface runoff (river flow).

The natural availability of water across the country is variable, and rainfall displays strong seasonality. Stream flow in South African rivers is at a relatively low level for most of the year. This feature limits the proportion of stream flow that can be relied upon for use. Moreover, as a result of the excessive extraction of water by extensive forests and sugar cane plantations in the relatively wetter areas of the country, only 9% of the rainfall reaches the rivers, compared to a world average of 31% (DWAF 1996).

Water availability across South Africa is faced with the following major challenges (Anon., n.d.): Uneven spatial distribution and seasonality of rainfall (43% of the rain falls on 13% of the land). Relatively low stream flow in rivers most of the time, which limits the proportion of stream flow that can be relied upon for use, Location of major urban and industrial developments remote from the country's larger watercourses, which necessitates large-scale transfers of water across catchments. Urbanization is largely influencing water demand in South Africa and will increase future water requirements and lastly Climate change causing significant changes to precipitation patterns. These challenges represent the urgent need to adequately manage and conserve water resources. According Phyllis & Pramod (2011) the current trends in South Africa indicate that, water problems will continue becoming more complex, conflicting and interfering with other developmental sectors such as: agriculture, mining and energy, industry, transportation and communications and with social sectors including education, environment, health, rural and regional development. Water issues touch all segments of society and all economic sectors. According to the State of the

Environment (as cited from Jansen, 2012), increasing temperatures and higher variability in precipitation will lead to floods in certain areas, and drought in others.

Water resource management plays a critical role in ensuring food and ecological security. Despite the importance water assumes in overall human development, it is among the most mismanaged resources in South Africa (Phyllis & Pramod, 2011).

The figure (1) below

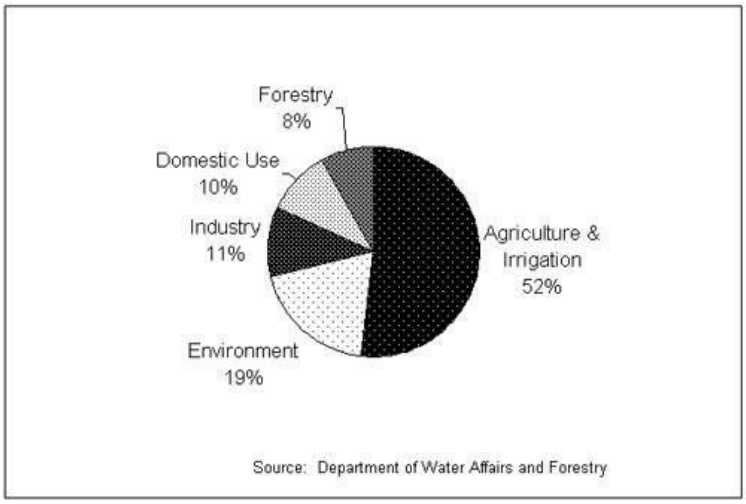

Fig 1: shows water allocation and usage in South Africa. *Jacobson (as cited from Phyllis & Pramod, 2011)*

Figure 1 indicates that agriculture and irrigation is allocated 52% of the water while only 10% is allocated for domestic use. The industry takes 11% and the remaining is left for forestry and the environment. Figure highlights the huge imbalances in water allocation. Further indicating the mismanagement of water resources and emphasizing the need for proper legislations on water management in South Africa. However, considering that South Africa is a developing country perhaps it makes much sense that agriculture and irrigations takes a big portion. In South Africa, there is a gross under-utilization or inefficient utilization of water resources hence there is a need to put land and water resources potentials to productive use. Development should proceed on basis of sound policies and proper planning strategies that take into account the interfaces and interlinkages with the national socio-economic development perspectives (Donkor & Wolde, n.d.).

Phyllis & Pramod (2011) stated that recent national water policy document lacks substances, direction and seriousness in addressing the real issues pertaining to water. The Global Water Partnership (2013) also stated that the Current models of urban planning and water management in South Africa have already failed or likely to fail from the perspective of cost effectiveness, technical performance, social equity, and environmental sustainability. This requires a shift in paradigm perhaps a shift towards an Integrated Urban Water Management (IUWM) which would serve to provide a framework for interventions over the entire water cycle and a reconsideration of the way water is used and reused (Global Water Partnership, 2013).

According to Global Water Partnership (2013) the principles of Integrated Urban Water Management (IUWM) include the following three main inter connected dimensions:

- **Governance**: critical aspect for supporting IUWM. Without government policy and framework support and comprehensive stakeholder participation, optimum management of water resources cannot be achieved.
- **Service**: This component includes closed loop systems for water supply and sanitation (making whole water cycle as one), storm water management, good Operation & Maintenance and at the same time maintaining the water quality as required for use. Decentralized wastewater treatment systems and innovative via utilizing affordable technologies.
- **Resource**: making use of available resources; conventional or unconventional in the form of wastewater, rainwater, surface water, grey water and black water etc. Wastewater is not wasted water! Simultaneously, demand side management should be utilized to lessen the stress on water resources.

VI. URBANIZATION AND THE WATER CYCLE

The water cycle is the continuous exchange of water between the land, waterways, and atmosphere (California NEMO Partnership, n.d.). Urbanization is characterized by an increase of impervious/hard surfaces, this includes rooftops and pavement and parking lots. This decreases the amount of water that infiltrates into the ground. The consequences of these land modifications include changes in water supply from altered hydrologic processes of infiltration, groundwater recharge, and runoff; water quality degradation from urban runoff and combined sewer overflows (CSOs); and changes in water demand (Chen, et al., 2017).

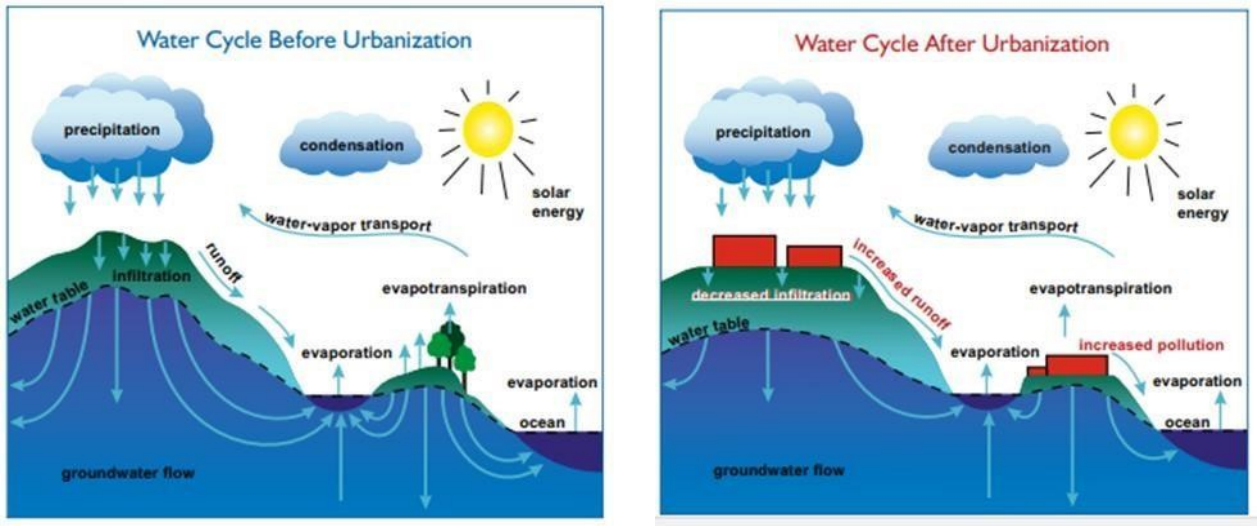

Fig 2: Shows the effects of urbanization (Donaldson, n.d.)

Surface runoff and river discharge will increase if vegetation decreases. When urbanization takes place, the vegetation decreases due to the construction of impervious surfaces. Impervious surfaces contribute to surface runoff due to decreased infiltration (Chen, et al., 2017). According to Bhaduri et al., 2001; Suriya and Mudgal, 2012 (as cited by Chen et al, 2017) reduced infiltration leads to higher peak flows, even for short duration low intensity rainfall, and increases the risk of flooding.

The following are the water cycle problems associated with urbanization as identified by the City of Melbourne (n. d.): Pollution, Waterway flushing, Flooding and Decreased soil moisture

In summary, increased impervious cover associated with urbanization alters the natural cycling of water. Changes in the shape and size of urban streams, followed by decreased water quality, are the most visible effects of increased imperviousness (California NEMO Partnership, n.d.). Alterations in the aquatic environment associated with these hydrological changes greatly compromise the normal functioning of waterways (California NEMO Partnership, n.d.).

Following urbanization, the consequences are most likely to be increased frequency and severity of flooding, channel erosion, and destruction of aquatic habitat.

VII. URBANISATION AND WATER RESOURCE MANAGEMENT

Urbanization represents a number of benefits and consequences. The benefits include provision of convenience of infrastructure, goods and services needed by people, government, economic development, industry, and trade and the consequences include; land surface modifications including vegetation reduction, soil compaction, and change from pervious surfaces to impervious surfaces such as roofs, roads, and parking lots (Chen, et al., 2017). Population growth, rapid urbanization and industrialization, the expansion of agriculture and tourism, and climate change all put water under increasing stress. Given this growing pressure it is critical that this vital resource is properly managed. Urban runoff also carries non-point source pollutants, such as oil, grease, metals, and pesticides, into streams and rivers during rainfall events.

On the positive side urbanization has led birth of gigantic cities, it has opened up new opportunities, and importantly it has led to competition at national and international levels. While on the negative side, it has led to a series of health hazards. It has been reported that urbanization is not only causing land use change but excessive use of energy and resources have overburdened the ecosystem and has worst implications on the human health (Kelly et al., 2008).

Rapid urbanization is in an alarming state in many developing countries because of the associated problems such as unemployment, economic crisis, health issues, poor sanitation, increase in urban slums, and degradation of ecosystem (Adepoju, 1993). Increased urbanization and demographic trends for employment, food security, water supply, and shelter and sanitation implications, especially the disposal of wastes (solid and liquid) that the cities produce are overwhelming (Goodland et al., 1992). Water shortage and pollution are among the developed world's greatest challenges. Related to such challenges are the issues of water scarcity and water pollution in the developing world. The safe drinking water supply is important in terms of both quality and quantity as it is essential to human existence (Shilling and Manahan, 1994). As the civilization evolved, human activity increases and changes occur in the nature of pollutants entering into watercourses (Hussain et al., 2014). Rivers are waterways of strategic importance across the world, providing main water resources for domestic, industrial and agricultural purposes (Singh et al., 2009).

Change in land use from ''agriculture'' or ''barren'' to urban results in Reduction in evapotranspiration and change in groundwater recharge. A change from unpaved to paved results in Reduction in groundwater recharge (% of rainwater infiltrating) and runoff. Increase in number and location of commercial establishments Increases in commercial demand for water in each census area. Change in population density and spatial location, Change in quantity and location of urban water demand.

Figure 3, illustrates traditional drainage approach which also introduces significant alteration to water quality as pollutants deposited on hard surfaces are transported with runoff to the receiving waters. These pollutants come from varied catchment sources, ranging from natural atmospheric deposition to ill-controlled industrial activities (Urrutiaguer, 2016)

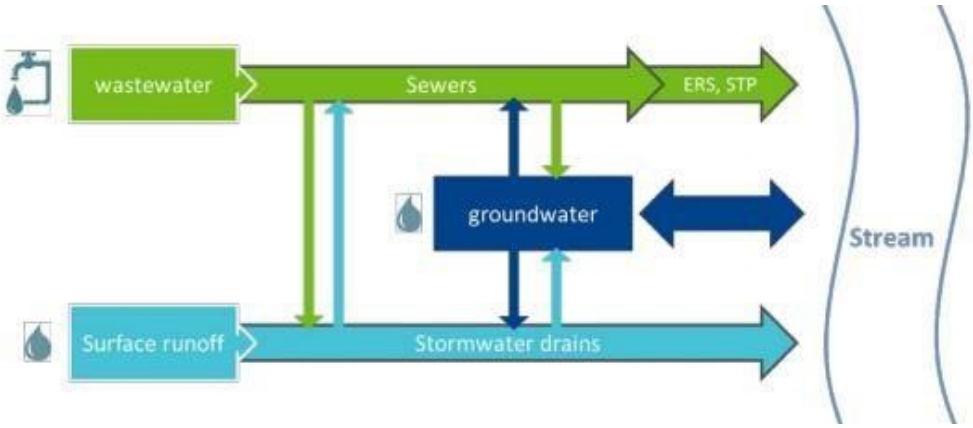

Figure3: traditional drainage approach (Urrutiaguer, 2016)

Moreover, as the urban population grows, so does the demand for water and sanitation facilities. If this is not accompanied by an expansion of the appropriate water infrastructure facilities, water quality will be affected. In addition, climatic conditions can also alter the demand for water: increased temperatures may cause people to consume more water. Other factors that influence the demand side are changes in the irrigation requirements of the agricultural sector and increased water consumption by manufacturers. (Jansen, 2012).

VIII. STRATEGIES FOR SUSTAINABLE WATER SUPPLIES

Demand Management

A key challenge for sustainable development in South Africa is reconciliation of water demand and supply both for the medium and long term. While there is planning for future sources of water supply, it appears as if demand has been neglected. Reducing demand can increase supply thereby creating a greater margin of safety for future droughts. This can be through a range of measures that 'encourage efficient water use including education, voluntary compliance, pricing policies, legal restrictions on water use, rationing of water or the imposition of water conservation standards on technologies' (Schulze & Perks 2000: 108). **Water Services Losses**

The domestic sector accounts for 15% of total national use and has the highest expected growth in demand. The level of unaccounted for water in urban distribution systems is between 15 and 20%, which is viewed as high by international standards (Goldblatt et al 2002). Efficient use of water will reduce treatment and distribution costs.

Control of Water Quality

Polluted water that is unfit for drinking or other uses can have a similar effect as reduced water supply. Reducing water pollution effectively increases the supply of water, which in turn increases the safety margin for maintaining water supplies during droughts (Schulze & Perks 2000). The protection of water quality presents a major challenge to water policy in South Africa.

Allocation of Water Supplies by Market-Based Systems.

Most policy papers dealing with natural resource management in South Africa recognize the need for economic instruments and market mechanisms for efficient utilization and allocation of natural resources and environmental resources. The provision of water at prices below the true economic value is considered the main reason for inefficient use of water and allocation in South Africa. Further, in the context of water scarcity, an argument can be made for the introduction of economic incentives in water-stressed catchments to encourage the conservation of water and its shift from low Water resource management and climate change in South Africa to higher value use. This can be done administratively or by using market-related mechanisms. Issues to be considered when reviewing the pricing of water are (Hassan et al 1996): Marginal cost pricing is more appropriate than average cost pricing since it sends the right signal to efficient water users. Variable tariff rates, as opposed to flat rates, to provide for periods of scarcity and peak demands. Opportunity cost of water, especially when water is scarce. Pricing undelivered water i.e. rainfall runoff that is absorbed by crops vs natural vegetation. Property rights and tradable permit systems in water. Lifeline tariffs and equity. Rewarding quality return flows from waste streams. Market-based allocations are able to respond more rapidly to changing conditions of supply and also tend to lower the water demand, conserve water and consequently increase both the robustness and resilience of the water supply system (Schulze & Perks 2000).

Modification of Catchment Vegetation

Through the modification of the vegetation in various catchments, where water-thirsty vegetation with high transpiration rates has reduced the stream flow, the available water supply can be increased. Invading alien plants have covered some 10 million hectares, about 8%, of South Africa. They cause the loss of some 7% of the annual flow in South Africa's rivers each year – about 33 million m3 of water. (This excludes their severe impact upon groundwater reserves.) Through the Working for Water Programme it is estimated that approximately 750 000 hectares will need to be cleared each year over a 20-year period (Kasrils 2000).

Planning for Drought

Much research has been conducted into the adaptation to climate variability (droughts and floods) and specifically measures that could be taken to prevent or minimize the disruption and damage caused by such occurrences.

In the past, most of this research has been conducted in agricultural sector; more recently research has been focused on the impacts of drought and floods on people and their livelihoods. The lessons from this research, and resilience strategies of vulnerable communities, need to be taken into consideration when developing strategies to deal with the impacts of future long-term climate change. If the development goals of the country are to be achieved despite the impacts of climate change, then the appropriate lessons need to be incorporated into national and local water management policy. The cost of developing contingency plans to adapt to water shortages and mitigate droughts is relatively small compared with the potential benefits (Schulze & Perks 2000).

Improved Monitoring and Forecasting Systems for Floods and Drought

It is possible that climate change will affect the frequency of floods and droughts. Monitoring systems will help in coping with these changes, even without the impact of climate change (Schulze & Perks 2000).

Inter-Basin Transfers

Transfers of water between basins may result in more efficient water use under the current and future changed climate. Inter-basin transfers are considered an effective short-term measure for addressing drought and water supply on a regional scale. This, however, is an expensive option (Schulze & Perks 2000).

Marginal Changes in Construction of Infrastructure

Marginal increases in the size of dams or marginal changes in the construction of canals, pipelines, pumping plants and storm drainage should be considered (Schulze & Perks 2000).

Maintain options for new sites

Potential sites for new dams should be kept open till they are required, since there are a limited number of sites that can be used efficiently as reservoirs and removing structures once an area has been developed may be very costly or politically difficult (Schulze & Perks 2000).

IX. FINDINGS/OBSERVATIONS

There is a direct relationship between urbanization and water resource management. Various published literature from various authors has confirmed this fact. However most of the impacts are related to water shortages for the urban population as well as ensuring water quality. This perhaps calls for a more integrated and sustainable approach, linking social and economic development with protection of natural ecosystems

The most visible impacts of urbanization are the changes in the shape and size of urban streams, followed by decreased water quality, which is the immediate consequence increased imperviousness. Waterways are severely degraded by urbanization. Further growth of our cities represents a major risk to waterway health as there is strong evidence showing that continuation of current urbanization practices, storm water management practices in particular, will result in severe degradation across countries.

X. CONCLUSION

The South African rapid urbanization has shown a potential effect on environment, water resources & its quality, soil salinity and urban infrastructures. The water resources are steadily degrading and could potentially form an environmental hazard. The impact of urbanization on the aquifer complexes is very varied. The greatest hydrogeological impacts of urbanization are found on the flat surfaces of the high terraces and the interfluves. The frequency of extreme hydrological events has been increased due to increase runoff causes more intense local flooding, while droughts during dry weather are deeper and longer. These changes have started showing their impact in South Africa on water habitats, exporting high concentration of pollution into the rivers, wetlands and reservoirs, destabilizing ecological processes, handicapping ecological stability of ecosystems. As a result, the findings of this study demonstrated that:

- There is growing imbalance between demand and supply of water. Both surface and groundwater quality is deteriorating due to urbanization.
- Urbanization has led to the lowering of water levels in many urban localities due to abstraction. This has shown a major impact on the surface environment.
- Poorly developed drainage systems/no drainage systems in cities causes frequent flooding leading to the spreading of viral and epidemic diseases.
- Groundwater run-off, infiltration rate and recharge have reduced and water storage is much lower.
- Frequency of surface runoff has increased.
- South Africa has high density of population. This dense population coupled with high growth rate, which is generating huge demand for additional water.

XI. RECOMMENDATIONS

Increasing urban population growth continues to set a heavy demand on water and other natural resources. This calls for an increased focus on the management of water as a finite resource which requires co-ordination and integration of water, land-use, and population policies for sustainable development. This also requires pulling efforts of relevant stakeholders to actively participate to tackle these issues and to better plan for the future. This includes users, planners and policy-makers at all levels.

The current challenges also call for a review and amendment of the current policies to bring them up to date with the status quo and to ensure integration from all levels of government with an integrated effort to ensure optimal utilization and distribution of water. This is also necessary to ensure adequate funds are allocated to ensure better management of water resources which is currently marginalized and to put measures in place to improving water use efficiency and to reducing wastage and damage to natural resources by rehabilitating infrastructures. There is very little compressive study that look into the quality of urban form and the role that urban planning can play in insuring water quality and mitigating the negative impacts of urbanization on the environmental resources. A good example is the use of high density residential development which results in a relatively smaller footprint.

Water not used in a consumptive manner should be re-used or recycled. This could be either by returning the water back to the river in a fit state for further use downstream or for reuse within the system from which it was first abstracted, specifically for industrial and domestic users. Coastal towns specifically could look to recycling as a potential source of additional water, before discharging waste water to the sea. Reduction of losses due to agriculture, as stated before, irrigation accounts for almost 60% of water used in South Africa. There are significant losses in many distribution and irrigation systems as well significant evaporation losses. Alternative irrigation methods and practices should be investigated.

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Complexities of transitions in the medical education and how to transform transition period from a threat into a rewarding experience.

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***Abstract*- Introduction:** There are lots of transitions within the trajectory of being an independent medical practitioner. Transition is an inevitable process in the medical career, it starts from the first day at medical school and continues until doctors' retirement, with accompanying changes in identities. Transition period can be a double-edged sword, it represents potential threats as well as valuable learning opportunities. Isaac Asimov stated in his famous dictum that "Life is pleasant, death is peaceful, it is the transition that is troublesome". Jindal Snape also, argued that transitions can be times of multiple adversities for some as what it might be seen as minor hassles by others. Transition is a continuous process and a stepping stone between each stage, yet it does not eliminate on stepping up to a new level. Understanding the complexity of the transitions helps smoother processes, better preparedness and adaptation of junior doctors for their new responsibilities and ultimately safer patients.

Aim of this case study : Morrow et al (2009) highlighted that transitions in the medical career have not fully addressed by medical education research, and ways to enhance these period for the benefit of the patients and doctors have not been appropriately explored. Transition from undergraduate to first clinical practice is the most difficult transition period and described as a plethora of new changes. This paper focuses mainly on the transition from undergraduate to junior doctor, and sheds some light on other transitions within the medical education continuum. The first section illustrates the main challenges involved in the transitions. The second section provides solutions to overcome these obstacles and suggests alternative approaches to transform transition period from being a potential threat to a valuable learning opportunity and a rewarding experience.

Conclusion: Doctors go through many intense transition periods in their career and without understanding the intensity of these periods, doctors performance and patients safety can be compromised. Donaldson L and Haller et al (2006) reported that, there are quantifiable risks to patients safety during the transitions at all level of seniority and evidences that patient care can be compromised during transition process. A better understanding of challenges of the transitions and establishing a supportive network, would help mutual adaptation of doctors and organisations, and building up a more supportive relationship. This also, might offset any negative impact on a range of stakeholders, maximise afforded learning opportunities for junior doctors and ultimately ensure safer patients.

***Index Terms*-** Transitions, medical career, junior doctors, preparedness, better doctors, safer patients

I. Introduction

There are lots of transitions within the trajectory of being an independent medical practitioner. Transition is a double-edged sword it represents potential threats and carries valuable learning opportunities. Isaac Asimov stated in his famous dictum that "Life is pleasant, death is peaceful, it is the transition that is troublesome". Transition periods are inevitable processes during the progress in the medical education continuum that run from the first day at medical school and continue until doctors' retirement. Doctors go through many intense transition periods in their career and without understanding the intensity of these periods and appropriate preparedness, doctors performance and patients safety can be compromised. There are three main transitions in the medical education continuum, first is shifting from preclinical to clinical life, then from medical students to junior doctors and finally from junior trainees to independent specialist or general practitioner. Transition is a continuous process and a stepping stone between each stage, yet it does not eliminate on stepping up to a new level. Transitions include lots of adjustments to accommodate working in a new environment, or to adapt managing broad spectrum of diseases and mastering new technical skills or learning managerial skills.

Each transition is a highly demanding stage and without enough understanding the challenges involved in these periods, it can be problematic and become a real threat rather than a rewarding experience. Transition is defined by Clack GB (1994) as a period of change, where doctors are forced to develop new attitude and life space to be able to cope with the new situation. Challenges of transition vary in each phase; for the newly qualified doctors the main challenges are application of theory into practice, reinforcing what is learnt and developing new skills in a self directed way. As specialist trainees, the challenges involve handling many responsibilities and simultaneously learning from daily work during providing patients care. For an independent specialist, delegating tasks, managerial and leadership skills become the main challenges.

Understanding the transitions helps smooth processes of these challenging periods and better preparation of future doctors to their new responsibilities and guiding them in their journey. Donaldson L and Haller et al (2006) reported that, there are quantifiable risks to patients safety during the transitions at all level of seniority and evidences that patient care can be compromised during transition process. Kilminster et al (2011) also stated that transition is an ongoing process and does not end when we qualified, and often hard to be adapted at all level of seniority, yet there is little research on these transitions. In line with this Morrow et al (2009) highlighted that transitions in the medical career have not fully addressed by medical education research, and ways to enhance these period for the benefit of the patients and doctors have not been explored.

This case study focuses mainly on the transition from undergraduate to junior doctor, and sheds some light on other transitions within the training medical education continuum. The first section illustrates the main challenges that can be encountered during these transitions. The second section suggests solutions to overcome these obstacles and explores ways to enhance the process of transitions and how to transform a transition from being a potential threat to a valuable learning opportunity.

II. Problems of the current transitions in medical education

There are many factors that affect the transitions process which cannot be fully addressed in this article, however, this paper focuses mainly on the most common challenges that can hinder junior doctors' progress and have negative impact on their learning. Transition is an ongoing processes in the medical career, it does not end after changing over to a new phase, and it continues beyond training. It does not only include changes in

role and seniority, but also, changes in professional identity and responsibilities, and can be seen as intensive learning period. Kilminister et al (2011) defined transition as "the process of change or movement between one state of work and another".

Preparedness for transitions can be complex due to the lack of institutions' understanding of the challenges involved in each transition, and consequently lack of developing a mutual supportive relationship between doctors and organisations. This is vital, not only for the well-being of the doctors and the organisations, but most importantly for patients.

It was reported by many doctors that the transition from undergraduate to new junior doctor is one of the most challenging period can be encountered in the medical career and includes high level of anxieties. Bligh (2002) described the first year in the medical career as a "survival exercise". For most of foundation year one (FY1) doctors, it is the first job in their life, which may necessitate geographical relocation, moving to unfamiliar places away from their family and working for long hours including nights and weekends. The transition is described by (FY1) trainees as a discrete stepping stone between being a student to become a responsible doctors, taking new professional identity and to be called doctor by patients and other medical staff. V R Tallentire (2011) also, described this particular transition as " a plethora of new challenges". There are many factors behind new qualified doctors' anxieties. In the medical school, students are provided with a curriculum and clear guidelines for each academic year until they qualify, on the other hand when they finally qualified and become junior doctors , there is no longer clear guidelines to follow. The only curriculum they are provided with is an online website based system "e-portfolio" to complete certain number of assessments, however, they are not provided with a formal teaching on how to use this website. Illing et al (2008) highlighted that there are negative views reported from FY1 doctors and senior clinicians about e-portfolio and how it can be time consuming.

Yet, there is a lack of conceptual frameworks to identify the challenges involved in this particular transition which can form real threats to most of the trainees. Luther et al (2004) described the negative implication on newly qualified doctors due to poor support and education provided by the institutions. S. Kilminster et al (2011) highlights the necessity for institutions to recognise the challenges included in these transitions and trusts should take account of transitions as critical intense learning period and support junior doctors for a better performance.

High expectation from workplace is another challenge can be encountered, it was reported by the new junior doctors that the tasks were given to them were above their experience and responsibilities. Sedlack and Kolars (2004), reported that there is a high expectations on the new graduate doctors and it is expected that medical students have been prepared to an adequate level to participate in the workplace environment. J. Weller (2004) also highlighted that medical students have been ill prepared to participate in the wards and clinical skills are poorly taught during undergraduate years. There are evidences that students preparedness for their first practice may vary between medical schools, Gold acre et al (2003) reported that nearly 40% of UK medical graduates feel underprepared and there is significant differences between graduates of different medical schools.The General Medical Council (GMC), the doctors regulatory body, published their guidelines on what should be expected from the newly qualified doctors and what employers of the new graduates expect to receive. In "Tomorrow's Doctors" (2009) GMC stated that new graduates are not expected to have the clinical experience or leadership skills as specialist expertise, but they must be able to demonstrate a range of clinical experience in order to be prepared for clinical practice.

Uninformative induction program is one of the main concerns of the FY1 doctors. Currently the two-week induction program does not include simulation workshops to practice the most common medical emergencies to refresh their practical and clinical skills and the time scheduled for shadowing is not enough. Evans et al (2004) explained the importance of the informative induction program to improve the new doctors clinical skills and enhance their confidence. Berridge et al (2007) highlighted the importance of the time spent as shadowing for the new doctors, that helps and eases the transitions. Illini et al (2008) stated that it is essential for FY1 doctors to spend time shadowing senior trainees, and it is the responsibility of foundation schools to ensure that shadowing trainees not to be taken away from the ward during their induction.

Ambiguity of the community languages is another challenge was reported not only by the overseas doctors, but also by UK graduates and described as a barrier that often hinders learning in the workplace and can break down the communication within the team. Despite that all medical terms are used and taught in the undergraduate teaching, the language used in the workplace often takes longtime to be adapted. Lave and Wenger (1991) highlighted the importance of using the language of the community to be able to communicate within the community and be a legitimate member within that community.

It was reported by FY1 doctors that some hospitals are better than others at providing useful placement and maximise their exposure to the clinical environment and allow them to perform tasks during their placement for variety of reasons. Paper work in the workplaces is often allocated to juniors doctors and can interfere with their participation and engagement in clinical work. Lack of supervisors' support and absence of effective supervision during transitions often add to juniors doctors' anxieties. S Kilminister et al (2011) highlighted that transitions are not systematically monitored and supervision varies, some supervisors are distant or absent, specially if doctors started transitional period working out of hours.

III. How to enhance the transitions for the benefit of the new doctors

In order to enhance the transition periods for the benefit of the learners in the workplace, firstly; it is essential to recognise these transitions as critically intensive learning periods by the institutions and all clinical staff, secondly; to acknowledged the stress involved in these periods both for the trainees and institutions, which can jeopardise patient safety. S Kilminister et al (2011) highlighted that the institutions and wards have their own learning cultures and recognition of transitions as intensive learning period has its implications of new doctors performance.

In this section I will provide suggestions in how to ease the transitional period to become a pleasant rewarding experience and how to use this period for the benefit of the new qualified doctors to improve their performance. It will be difficult to address all possible solutions on this paper but I will focus mainly on finding alternative approaches to overcome the most common problems, and explore few ways which could be applied in practice.

Ambiguity of the community is one of the main concerns highlighted not only by overseas doctors, but also by the new UK graduate doctors, which often hinders their effective communication within the team and forms a barrier for their learning in the workplace. Using the community language is essential step to communicate effectively within the community and establish working relationship with other team members. Lave and Wenger (1991) highlighted that various resources such as routines and vocabulary carry the accumulated knowledge of the community and are important for a better function of the community. This could be overcome by teaching this language as a teaching session in the induction program and provide them with a handout of the most common used vocabulary and abbreviations, this will help them to be familiar with the culture and practices of the workplace. This can be reinforced during the shadowing period from the consultants and senior trainees. This will help their quick adaptation, bridging the gap between them and the team, and allow them to become a legitimate member within the team. Lave and Wenger (1991) explained that learning process takes place in social participation more than acquisition of knowledge.

New graduate doctors should be encourage to participate in daily clinical work with supervision to alleviate their anxieties in feeling underprepared to undertake clinical skills. It should be explained in advance that learning in the workplace is mainly opportunistic and most of learning takes place in the presence of patients through active participation rather than teaching in a class. S. Kilminster (2001) stated that doctors will not be fully prepared before the transitional period and starting practice, as participation and learning are interlinked in practices. In line with this V R Tallentire (2011) highlighted that situational learning often helps in developing positive learning outcome. It was also proposed by Illing (2008) that experiential learning allows active participation in workplace and skills are better learnt in practice. Situated learning explained more by Wenger (1998) as learning takes place in a community of practice and encompasses active participation in the practices of social communities.

In Tomorrow's doctors (2009) , GMC stated that shadowing period of the FY1 doctors should be at least one week and should not to be interrupted or taken away from the ward. During the shadowing time the new doctors will act as apprentices to learn more about the placement they about to start. Evan (2004) acknowledged the apprenticeship in the learning process where learners will be familiarised with different aspects of job they are about to undertake. Many new doctors felt that one or two weeks of shadowing does not provide them with enough exposure to manage acutely ill patients. As Individual learning varies, a formal assessment should be considered for the new doctors at the end of their shadowing period to reflect on their experiences and learning process during this placement to assess if they ready to start working or more time of shadowing is required to build up their confidence. Perhaps more exposure to on-call and out of hours shifts would be beneficial to allow them to be involved in decision making and learning about managing and prioritising patients care. Legitimated peripheral participation was explained by Lave and Wenger (1991), it allows people initially learn at periphery when join the communities and as they become more confident they will move from legitimate peripheral participants to active full participation and become more involved in that particular community.

Simulation has been the champion in the learning process of the undergraduates and new qualified doctors and helps bridging the gap between theory and clinical practice. Simulation of the medical emergencies and practical skills are of great help in mitigating the stress on exposure to medical emergencies. Regular simulation teaching during the induction program and on joining a new trust, not only helps junior doctors to practicing common clinical scenarios in a structured way without endangering patient care, but also enhances their performance through adequate debriefing on what went well and what could have done better. Savoldell et al (2006) highlighted the importance of feedback and debriefing during simulation to identify and close gaps in knowledge and providing future plans.

Prescribing is a very high order task that difficult to learn in a classroom setting and one of the biggest challenges in particularly for junior doctors first practice. Most of the new graduates feel that they are underprepared in their pharmacological knowledge. Keller et al 2004, Lengford et al 2004, and Coombes et al 2008, described prescribing skills as a weak area in medical practice. More targeted teaching for prescribing is essential to be involved in the induction program for all trainees on commencing a new placement and in particular for FY1 doctors . Reinforce pharmacology teaching and learning about prescribing in a ward setting would ensure its contextualisation in clinical practice. Perhaps providing a workbook to complete on the first two weeks of the placement, led by the hospital pharmacist would refresh junior doctors skills and ensure safe prescribing. This would allow trainees to practice to prescribe the most common used medications in the department, including its dosage and interactions, and to be familiar with writing up the drug charts. More supervision from senior trainees and the pharmacist will be required to continue specially during transition period.

IV. Conclusion

Transitions are intensive critical learning periods during the progress in the medical education continuum, it is a continuous process that starts from the first day at medical school and continues until doctors' retirement. Transition from undergraduate to first clinical practice described as the most difficult transition period and a plethora of new changes. Understanding the challenges of the transitions by the institutions and clinical staff will help smoothing theses periods, enhancing doctors performance and ensuring patients safety. Clinical supervisors and senior trainees should be in the forefront to alleviate predictable stress and provide support for junior doctors. Establishing a supportive network, and building up a supportive relationship between coming doctors and receiving organisations, would help mutual adaptation of doctors and institutions, which might offset any negative impact on a range of stakeholders, maximise afforded learning opportunities and ultimately ensure safer patients.

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Difficulties Encountered In Mathematical Word Problem Solving Of The Grade Six Learners

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Abstract

The study was conducted to determine the difficulties encountered in mathematical word problem solving in Butuan Central Elementary School. Descriptive type of research through survey questionnaire was used in the study. The researchers used quota sampling with a random selection in order to limit researcher's choice of sample. Each selection of Grade 6 class had the number of respondents that were randomly selected with the help of corresponding teachers. The researchers had 100 respondents as a sample size. The difficulties encountered by the pupils were categorized into children's attitude towards problem solving in Mathematics, teaching skills among teachers and instructional materials used by the teacher. Based on the data gathered, the overall mean for the children's attitude towards word problem solving is 3.44 showed that the children should develop a positive attitude in dealing word problem solving. The overall mean of the level of teaching skills among teachers was 2.41and it was found out that the teacher executed teaching skills in teaching word problem solving. For the instructional materials, it obtained the mean of 3.03 which showed that the most instructional materials used by the teachers were the textbooks, worksheets, chalk, and board. In answering word problem solving, the pupils got the correct answer when it was already given in the problem but most of them got the wrong answer when they had to translate word problem into mathematical symbol. Furthermore, it implied that the problem was not with the teaching skills and the instructional materials used, but with the attitude of the pupils towards mathematical word problem solving.

Keyword: Mathematical word problem, teaching skills , attitude , instructional materials

1.0 Introduction

Mathematics plays a big role in developing human thoughts, bringing strategic, systematic reasoning processes used in problem analysis and solving. It helps people to be able to anticipate, plan, decide, and properly solve each problem in daily life. Mathematics is also a tool to study technological sciences and such. Thus Mathematics is useful to our living, helping to improve the quality of life. However, in 2012, the National Council Teachers of Mathematics stated that problem solving skills are the main expectation of Mathematics subject. On the other hand, the main purpose of Mathematics teaching is to enable students to solve daily life problems. Hence, it can be said that Mathematics is a tool to train students to be able to solve problems, and to build thinking processes that lead to further ability to solve non-mathematical problems (Prathana Phonapichat et al., 2014).

Mathematics anxiety is the result of the student's negative attitude or embarrassing experience with their Mathematics teachers in previous years. Such experience can leave a student believing him or her deficient in Mathematics ability. This belief results in poor performance, which serves as a confirming evidence to the student. This phenomenon is known as the "self-fulfilling prophecy". Mathematics anxiety results in poor performance rather than the reverse (Ganal, et.al., 2014). It is in this context that the present study was conceived, to identify the difficulties encountered in mathematical problem solving of Butuan Central Elementary School.

Identifying the problems commonly faced by students is important for teachers to reduce or better eliminate them so that students, in a large and meaningful way, can achieve the competencies in Mathematics as showcased in their

improved performance. As other researchers had pointed out, the teachers were the primary cause of students' failure in Mathematics. It is apparent that teachers can make and unmake a learner. Poor performance in Mathematics can be traced back to teachers' failure to impart the necessary knowledge, skills, attitudes, and values to students. Anything a teacher does and fails to do in the classroom affects the learner. In addition, Sin Son (2003 in Mateo, 2011) confirmed that the teacher is the most critical factor in attaining quality education and the single most potent element in the complete structure of an effective mathematical program. Hence, the teachers should be aware of the problems and difficulties that affect the performance of their students.

2.0 Conceptual Framework

This study was anchored on **Cognitivist Theory of Jean Piaget** which states the factors that affect learning and teaching Mathematics. Reading comprehension skills and the ability to solve mathematical problems could be the difficulties of pupils to solve mathematical word problem.

In relation to the study, pupils find difficulty in Mathematics. For instance, solving word problems require mental representation of the problem and simple arithmetic to transform the word problem into a mathematical equation. As a result, students who are not skilled in formulating a mathematical equation will not be able to solve the word problem which will lead the pupils to the unfavorable attitudes towards Mathematics.

The theory of **Cognitive Psychology Approach** stressed that pupils need to apply cognitive strategies of goal and sequences of mental operation in order to learn and solved worded problems. Teachers should adjust their instructional practices according to the different pre-skills that the students have because these pre-skills play a big part in solving mathematical problems. When students gain more conceptual and procedural skills in Mathematics, they become more competent and efficient in learning mathematics.

The above mentioned theories serve as the framework which directed to the conduct of the study. The pupils' attitude and the teachers learning resources or the teaching skills were considered as difficulties factors encountered by the pupils in solving mathematical word problem solving (Bruning, et. al., (2011). Cognitive Psychology and Instruction (5th ed.). Boston: Pearson Education.)

3.0 Research Methodology

The descriptive research method through the questionnaire as the data gathering instrument was utilized in order to seek answers to the problems which were imposed in the study. This research method was used to determine the difficulties encountered in mathematical word problem solving of Butuan Central Elementary School.

In the conduct of the study, there are one hundred (100) pupils in Grade VI who were randomly selected in every section who enrolled in school year 2016-2017.

This study was conducted in Butuan Central Elementary School, Division of Butuan City. This is a public elementary school located at A.D. Curato Street, Butuan City. Multicabs and tricycles can be used to reach the area of the study from the heart of the city.

The respondents of the study were the three sections of Grade VI students in Butuan Central Elementary School, Butuan City as presented in Table 1.

Table 1 Distribution of Population

SECTION	Population (N)	Sample Size (n)	%
1. Agoncillo	50	42	84
2. Bonifacio	48	40	83
3. Burgos	44	18	40

Total	**142**	**100**	**70.42**

In the selection of participants of this study, the researchers used quota sampling with a random selection in order to limit researcher's choice of sample. Each selection of Grade VI class had the number of respondents/participants that were randomly selected with the help of the corresponding teachers.

A survey questionnaire was the research instrument used in gathering the data. The researchers distributed the questionnaire used to collect data from the pupils. This data included the parts of the questionnaire: Part 1. This part contains in determining the attitudes of the pupils towards mathematical word problem solving, which contains ten items. Part 2. This part is employed to determine the level of teaching skills among teachers, which contains 10 items. Part 3. This part accommodates the instructional materials used for instruction, which contains 10 items. Part 4. This part contains the problem solving to determine the reading comprehension of the pupils, which contains 15 items.

The researchers asked permission from the principal of Butuan Central Elementary School, Butuan City through a letter to conduct a study in their school and to distribute questionnaires for data gathering. After the approval, the researcher had a brief orientation among the participants for the accurate responses. The researcher collected, tallied and tabulated for statistical analysis.

The researcher recorded and tallied the collected data for statistical analysis.

The test questionnaires used in this study were validated by the statistician. The pilot testing was given to Grade VI pupils in J.T Domingo Elementary School. Right after the pilot-testing was conducted, the data were subjected to reliability testing.

The following quantification scales were utilized in scoring and in the quantification of data.

Table 2 Attitudes of Pupils towards Mathematics, Teaching Skills and Instructional Materials.

Scale	Interpretation
5	Always
4	Frequent
3	Sometimes
2	Seldom
1	Never

Table 3 Scale for Word Problem Solving

Scale	Interpretation
0	No Answer
1	Correct Answer
2	Wrong Answer

The weighted mean was utilized to determine the attitudes of pupils towards Mathematics, level of teaching skills among teachers, instructional materials used for teaching, and difficulties encountered in word problem solving towards the academic performance of Grade VI pupils in Butuan Central Elementary School. The frequency percentage was used to determine the reading comprehension of the pupils in solving word mathematical problems.

4.0 Results and Discussion

Problem 1: What are the difficulties encountered in mathematical problem solving in Butuan Central Elementary School in terms of attitude of pupils towards mathematics.

Table 4 Children's Attitude towards Word Problem Solving in Mathematics

Indicator	Mean	Std. Deviation	Verbal Description
1. I find it difficult to understand the problem.	3.15	1.29	Sometimes
2. I practice solving word problems at home.	3.49	1.35	Sometimes
3. I do not know what operations to be used in solving word problem.	2.24	1.33	Rarely
4. Word problem is useful to me outside school.	3.63	1.40	Frequent
5. I do not know the process to be followed in solving word problem.	2.49	1.26	Rarely
6. I tend to guess the answer if I find it difficult to solve.	2.86	1.17	Sometimes
7. I find it difficult to translate word problem into mathematical symbol.	3.04	1.48	Sometimes
8. I do not like to read word problem solving.	2.27	1.29	Rarely
9. I find it interesting in answering word problem solving.	3.61	1.43	Frequent
10. I got low score in our quizzes in word problem solving.	2.92	1.07	Sometimes
11. I find it boring when my teacher discussed word problem solving.	2.45	1.32	Rarely
12. I'm not good in word problem solving.	2.61	1.34	Sometimes
13. I need to improve my skills in word problem solving.	4.18	1.34	Frequent
14. My parents help me in studying word problem solving.	3.46	1.28	Sometimes
15. I like solving word problems in Mathematics.	3.52	1.41	Frequent
Overall	**3.03**	**0.66**	Sometimes

Table 4 shows the children's attitude towards word problem solving in Mathematics. This implies that the pupils rarely do not know what operations to be used in solving word problem, do not know the process to be followed, do not like to read word problem solving, and find it boring when the teacher discussed. However, the pupils sometimes find it difficult to understand the problem and to translate word problem into mathematical symbol. They tend to guess the answer if they find it difficult to solve which results them to get low score in quizzes. Sometimes, they believe that they are not good in word problem solving and practice solving at home with the help of their parents. The data also implies that they frequently find interest in answering and solving word problems and believe that they need to improve their skills in word problem solving because it is useful for them even outside the school.

Overall, this means that the children do not like solving word problems because they find it difficult and they believe that they need to improve their skills in word problem solving. This result was anchored on Cognitivist Theory of Jean Piaget which reveals the factors that affects learning and teaching Mathematics. Students who are not skilled at formulating a mathematical equation will not be able to solve the word problem that will lead the pupils to the unfavorable attitudes towards Mathematics.

It was supported in our related study that was conducted by Wongwanich, et. al., (2015). These findings are important to students' problem solving process and it will lead to the development of mathematical problem solving diagnostic tests. It was also found out in the study of Aclon, et. al., (2013) that pupils lacked positive attitude in dealing

mathematical problem. This implies that pupils continually find problem solving in Mathematics difficult for they have no appropriate attitude to deal with the subject.

Problem 2: What are the difficulties encountered in mathematical problem solving in Butuan Central Elementary School in terms of Teaching Skills.

Table 5 Level of Teaching Skills among Teachers

Indicator	Mean	Std. Deviation	Verbal Description
1. My teacher explained the objectives of the lesson clearly at the start of the period.	4.18	1.25	Frequent
2. My teacher showed smartness, confidence and firmness in teaching word problem.	4.33	1.16	Frequent
3. My teacher has a mastery of the subject matter especially in word problem solving.	4.22	1.16	Frequent
4. My teacher was updated with present trends, relevant to word problem solving.	3.89	1.49	Frequent
5. My teacher uses various teaching aids and PowerPoint presentation in presenting the lessons.	2.22	1.46	Rarely
6. My teacher did not explain word problem solving effectively.	2.17	1.32	Rarely
7. My teacher did not give suited example to the content discussed.	1.96	1.32	Rarely
8. My eacher gave varied activities involving word problem solving. (Board work, assignments, quizzes, etc.)	3.95	1.30	Frequent
9. My teacher was patient in answering our clarification in word problem solving.	3.83	1.47	Frequent
10. My teacher conducted a review before proceeding to next topic.	4.17	1.42	Frequent
Overall	**3.44**	**0.77**	**Rarely**

Table 5 shows the level of teaching skills among teachers. This means that according to the pupils, the teacher rarely uses various teaching aids and PowerPoint presentation in presenting the lessons, does not explain word problem solving effectively, and does not give suited examples to the content being discussed. It also shows the teacher frequently explains the objectives of the lesson clearly at the start of the period, shows smartness, confidence, and firmness in teaching word problem, patient in answering clarifications, has a mastery of the subject matter, and is updated with present trends relevant to word problem solving. The teacher also frequently gives varied activities involving word problem solving, and conducts a review before proceeding to the next topic.

Overall, this result was anchored on the theory of Cognitive Psychology Approach which stressed that pupils need to apply cognitive strategies of goal and sequences of mental operation in order to learn and solved worded problems. Teachers should adjust their instructional practices according to the different pre-skills that the students have because these pre-skills play a big part in solving mathematical problems. When students gain more conceptual and procedural skills in Mathematics, they become more competent and efficient in learning Mathematics.

It was supported in our related study that while evaluating problem solving skills, the steps followed by the student to reach a solution, as well as the critical behaviors expected to be exhibited while following these steps should be considered altogether, as there is no certain way of solving a problem and students may develop their own problem solving strategies (Baykul, 2009).

Problem 3: What are the difficulties encountered in mathematical problem solving in Butuan Central Elementary School in terms of Instructional Materials.

Table 6 Instructional Materials Used in Word Problem Solving

Indicator	Mean	Std. Deviation	Verbal Description
1. Worksheets	3.66	1.38	Frequent
2. Textbooks	3.48	1.57	Frequent
3. Power Point Presentation (Visual aide)	1.84	1.29	Rarely
4. Flashcards	1.92	1.17	Rarely
5. Games	1.80	1.23	Rarely
6. Maps	1.39	1.16	Never
7. Films and Videos	1.23	0.89	Never
8. Models	1.33	1.06	Never
9. Measurement tools	2.00	1.39	Rarely
10. Chalk and board	4.71	0.92	Rarely
Overall	**2.41**	**0.68**	**Rarely**

Table 6 shows the instructional materials used in word problem solving. It means that the teacher never used maps, films and videos, and models. The teacher rarely uses power point presentations, flashcards, games, measurement tools, chalk and board. However, the table shows that the most used instructional materials are textbooks and worksheets.

Overall, this implies that the teacher does not use various instructional materials in teaching word problem solving and use the traditional teaching method.

Problem 4: What are the the difficulties encountered in mathematical problem solving in Butuan Central Elementary School in terms of Level of Difficulties?

Table 7 Pupils Ability in Mathematical Word Problem Solving

	No Answer		Correct Answer		Wrong Answer	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
a. What is asked in the problem?	1	1	74	74	25	25
b. What are given?	2	2	64	64	34	34
c. What operation to be used?	2	2	65	65	33	33
d. What is the answer to the problem?	2	2	65	65	33	33

Table 7 shows the level of difficulties in answering word problem solving. It means that most of the pupils can identify the answer in the question what is asked and what are the given in the problem. Some of the pupils have difficulties in answering what is the operation to be used and what is the answer to the problem.

Table 8 Pupils Ability in Mathematical Word Problem Solving

	No Answer		Correct Answer		Wrong Answer	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
a. What is asked in the problem?	3	3	72	72	25	25
b. What is the number sentence in the problem?	3	3	38	38	59	59

c.What operations to be used?	3	3	45	45	52	52
d. What is the answer to the problem?	6	6	37	37	57	57

Table 8 shows the level of difficulties in answering word problem solving. It implies that in this word problem solving, many pupils get the correct answer in what is asked in the problem and they have difficulties in answering the questions what is the number sentence, what operations to be used, and what is the answer to the problem.

Tables 9 Pupils Ability in Mathematical Word Problem Solving

	No Answer		**Correct Answer**		**Wrong Answer**	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
a. What is asked in the problem?	5	5	73	73	22	22
b. What is the number sentence in the problem?	5	5	27	21.25	68	68
c. What operations to be used?	8	8	52	52	40	40
d. What is the answer to the problem?	8	8	31	31	61	61

Table 9 shows the level of difficulties in answering word problem solving. It implies that in this word problem solving, many pupils get the wrong answer in what is the number sentence and what is the answer to the problem.

Overall, the level of difficulties in word problem solving shows that most of the pupils can answer if it is already given in the problem, like what is asked and what is given. But most of them got the wrong answer when they have to translate word problem into mathematical symbol, like what is the number sentence in the problem, which results them to find it difficult to know what operations to be used and what is the answer to the problem.

Table 10 ***Pupils Ability in Mathematical Word Problem Solving***

Items	**No Answer**		**Wrong Answer**		**Correct Answer**	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
1	0	0	75	75	25	25
2	0	0	46	46	54	54
3	4	4	85	85	11	11

Table 10 shows the level of difficulties in reading comprehension in answering word problem solving. It implies that the pupils have difficulties in comprehending and solving word problem involving distance and multiplication operation, solving word problem involving two operations, and solving word problem involving ratio.

5.0 Conclusion

Based on the findings of the study, the following conclusions were drawn:

On the pupil's attitude towards word problem solving in Mathematics, it has been found out that the pupils should develop positive attitude towards word problem solving. The pupils seldom do not know what operations to be used, the process to be followed, and they do not like reading word problem solving. The pupils found it difficult to solve word problem solving and translate word problems into mathematical symbol. The pupils found it boring sometimes when the

teacher discussed about word problem solving, thus they had low interest, and they only practiced solving at home sometimes. This resulted them to guess the answer and got low scores in their quizzes and exams. They also believed that sometimes they were not good at solving mathematical word problems. The parents helped their children sometimes in studying word problem solving. They frequently liked solving word problem solving, believed that word problem solving is useful in their everyday life and that they needed to improve their skills in word problem solving.

On the level of teaching skills among teachers, it had been found out that the teacher frequently executed teaching skills in teaching word problem solving. While on the instructional materials used by the teacher, it had been found out that the most instructional materials used by the teacher were the textbooks, worksheets, and chalk and board. It implies that the problem is not with the teaching skills and the instructional materials used, but with the attitude of the pupils towards mathematical word problem solving.

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The Effect of Addition of Sweet Wood Extract (*Cinnamomum burmanii*) and Saving Time on Fat Levels, FFA Levels and TBA of Brownies Cork Fish (*Ophiocephalus striatus*)

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Abstract: The cork fish is not liked by the community due to the fishy smell or fishy smell of cork, so it is necessary to diversify the processing of cork fish in order to be able to increase the interesting consumption of the community. The process of cork fish has not yet been optimal, so it is necessary to diversify the process of cork fish into a product that has a higher value, both from nutrition and economics so that the potential of cork fish can be utilized optimally, one of which is by making brownies with cinnamon as an antioxidant. The purpose of this study was to determine the effect of the concentration of cinnamon extract on fat content, free fatty acid levels and steamed cork steamed brownies, knowing the effect of shelf life on fat content, free fatty acid levels and steamed cork steamed brownies, knowing the effect of concentration cinnamon extract and shelf life of fat content, free fatty acid levels and TBA of steamed cork brownies. The research method was using the experimental method, the independent variables in this study were cinnamon concentration and shelf life, while the dependent variables were fat content, FFA levels, TBA levels, protein levels, albumin levels and hedonic organoleptic characteristics and scoring including texture, aroma and taste. The use of different cinnamon concentrations is 0%, 2.5%, 5%, and 7.5% affect the fat content, FFA levels and TBA levels of cork steamed brownies. Long shelf life of 0 days, 2 days, 4 days and 6 days affected fat content, FFA levels, TBA levels of cork fish brownies. The best concentration of cinnamon extract and storage time produced the best cork steamed brownies at 2.5% cinnamon concentration with a shelf life of 0 days with fat content 28.18%, FFA content 0.37%, TBA 0.51%, protein content 13. 22 %, and albumin levels of 1.23% while oraganoleptic skoreing texture 3.91, flavor scoring 6.49, aroma scoring 5.04, hedonic texture 5.84, hedonic flavor 6.67 and hedonic aroma 4.59.

Keywords: cork fish, cinnamon, fat, FFA, TBA.

I. INTRODUCTION

Cork fish or haruan fish (*Ophiocephalus striatus*) is a fish belonging to the family channidae. This fish is also known as murrel fish or serpent-headed. At present there are around 30 species of cork fish found in the world, namely 3 species in Africa and the other in Asia. Cork fish distribution is spread it in the fresh waters such as rivers, swamps and lakes. In a country like Malaysia, cork fish is an economically important fish, besides this fish also plays a role in the field of traditional medicine (Ambak et al., 2006).
Cork fish is not liked by the community due to the fishy smell or fishy smell of cork, so it is necessary to diversify the processing of cork fish in order to be able to increase interest in consumption of the community (Ernawati, 2012). According to (Fatmawati and Mardiana, 2014), cork fish processing to date has not been optimal, so it is necessary to diversify cork fish processing into a product that has a higher value, both from nutrition and economics so that the potential of cork fish can be optimally utilized, wrong the other is by making brownies.

According to Machmud et al., (2012), brownies are bakery products included in the cake category. Bakeri products include bread, cookies and cake which are widely consumed products. This product has a lower water content of 10-20% than bread. There are many brownies enriched with protein and carbohydrates, but until now the source of protein from fish is very rarely used in brownies. Fish protein enrichment in brownies can be used as an effort to increase public consumption of fish.
Along with the motto "back to nature", people's interest in using natural ingredients are increasing. One of them is cinnamon. Processed cinnamon products can be found in various forms such as powder, essential oil, and oleoresin. Most of the compounds contained in cinnamon bark are essential oils. Essential oils can be used in the food, beverage, pharmaceutical, flavor, dye and other industries. The chemical content of cinnamon is able to provide a distinctive flavor and aroma (Anggraini et al., 2015).

Compounds that are widely known to counteract free radicals are antioxidants. One of the plants known to contain compounds with very strong antioxidant activity is cinnamon. Cinnamaldehyde compounds derived from phenol in cinnamon are one of the antioxidants that can effectively fight free radicals including superperoxide and hydroxy-radical anions, as well as other free radicals (Mutiara et al., 2015). Based on these conditions, a study was conducted on the effect of increasing the concentration of

cinnamon extract and shelf life on fat content, levels of FFA and TBA steamed fish cork brownies, so that it is expected to provide information to the public about traditional spices (cinnamon) to extend the shelf life of brownies

II. MATERIALS AND METHODS

2.1 Material

The material used in the study consisted of three parts, namely materials for making cork fish surimi, ingredients for making cork fish brownies, and chemical analysis. The ingredients for making surimi are cork, salt and water. Materials for making cork fish brownies consist of wheat flour, eggs, granulated sugar, vanilla, salt, ovalet, chocolate powder, margarine, chocolate bars and bulk ice. Meanwhile, the material used in chemical analysis is concentrated H2SO4, kjeldahl tablets, aquades, pp indicators, concentrated NaOH, H3BO3, MO indicators, H2SO4, succinate buffer, cresol green bromine, Bij 53, and aquadest.

2.2 Methods

This research is using experimental method. Experiments are studies conducted by manipulating the object of research. Experimental research is an observation under artificial conditions where the condition is made and arranged by the researcher. However, this does not mean that this approach cannot be used in social research, including educational research. Experimental research is a special form of investigation that is used to determine any variables and how the relationship between one another

2.3 Analysis Lemak levels

Analysis of fat content according to Legowo et., Al. (2007), first took the sample and weighed ± 1 g for the finely dried sample or ± 1.5 for the wet sample (Weight A). Place the sample that has been weighed in the middle of the filter paper. After the sample is wrapped in filter paper, then heat the sample into the oven with a temperature between 100-1050 C to a constant weight as in determining the water content. Take the oven and enter the sample into the desiccator for ± 15 minutes, then weigh as weight B. Put the sample into the Soxhlet extraction tool. Then enter the liquid pearut liquid into the extraction tool as much as ± 2.5 - 3 times the volume of extraction flask that has been filled with samples. Install the condenser properly. Heating flask is connected with a heater (enter into a water bath with a temperature of ± 600 C. Open the water tap, do the extraction process for at least 6 hours. After the extraction process has been finished for 66 hours turn off the heating source and remove the sample from the condenser. Air ± 30 minutes open air, dry the sample with an oven ± 1 hour and then enter it into the desiccator ± 15 minutes, followed by weighing (weight C) Analysis of the concentration can be seen in Appendix X. Calculation of fat content can be done as below:

Crude Fat Level = $\frac{WeightB - WeightC}{BeratWeightA}$ X 100 %

2.4 Analysis Free Fatty Acid (FFA)

Acid numbers show the amount of free fatty acids contained in an oil or fat. Acid numbers are expressed as the amount of milligrams of NaOH needed to neutralize free fatty acids contained in one gram of fat or oil. The working scheme of the analysis of free fatty acid levels, among others, the material used must be in the form of liquid added 50 ml of alcohol and 2 ml of phenolphthalein indicator then titrated with 0.1 N NaOH solution until pink and then calculate% FFA or acid number (Sudarmadji , 2007).

The acid number = $\frac{ml\ NaOH\ x\ N\ NaOH\ x\ BM\ NaOH}{w\ sampel\ (gram)\ x\ 1000}$ x 100

2.5 Method Thiobarbituric Acid (TBA)

A total of 10 g of sample, put into the grout, added 50 ml of distilled water and crushed for 2 minutes. Samples were transferred quantitatively into a chili distillation flask washed with distilled water and ± 2.5 ml of 4M HCl was added until the pH was 1.5. Then the solution was distilled with 10 minutes of high heating so that 50 ml of distillate was obtained. Take 5 ml of the distillate solution into a closed test tube, then add 5 ml of TBA reagent and heat it for 35 minutes in boiling water. Made blank using 5 ml of distilled water and 5 ml of reagent. The reaction tube was cooled to hear cold water for 10 minutes. Then the absorbance (D) is measured at a wavelength of 528 nm with a blank solution as a zero point. Cell samples of 1 cm in diameter are used. calculated as TBA, expressed in mg of malonaldehyde per kg sample (Harikedua, 2012) According to Azizah et al. (2016), the determination of thiobarbiturate acid numbers can use the following formula: Number of TBA =
3 Sample weight (gram) A x 7.8 Information:
A = Absorbance at 528 nm
7.8 = Numbers TBA mg malonaldehyde / Kg sample
3 = iodine is the degree of unsaturation of oil / fat

2.6 Analysis Protein Levels

The principle of protein content analysis according to Legowo et al., (2007) with the kjeldahl method is to test the amount of protein empirically based on the amount of N in food. After oxidation, ammonia (the result of conversion of the N compound) reacts with acid and becomes ammonium sulfate. Under alkaline conditions, ammonia is evaporated and then captured with acidic solution.

The amount of N is determined by titrating HCl or NaOH. The kjeldahl method has three stages, namely destruction, distillation and titration. As for calculating the percentage of N by using the formula below:

$$\% N = \frac{HCl\ (sample\text{-}blangko)}{sampleweightl(g) x\ 1000} x\ B$$

Information : B = Normality of HCl 14.008 100%

2.7 Analysis of Albumin Levels (Bromol Cresol Green Method)

Analysis of albumin levels according to Rusli et al., (2006) as follows: first prepared 2 ml of sample added with 8 ml of biuret reagent, then shaken. After that it was heated at 370C for 10 minutes. Then cool and then measure with electronic 20 with a waveform of 550 nm and record the absorbance. Then calculated by the formula:

$$ppm = \frac{absorbance\ sample}{0{,}0000526\ A}$$

$$\% = \frac{ppm\ x\ 25}{g\ samplex10^6} x\ 100\%$$

Making Biuret reagents:
0.1500 g of CuSO4.5H2O + 25 ml of distilled water
0.6000 g Na K-tartate + 25 ml aquades
Mixed reagents 1 and 2 were added with 30 ml of 10% NaOH, stirring and then diluting to 100 ml of the solution. Beat until homogeneous.

III. RESULT AND DISCUSSION

3.1 Phytochemical Cinnamon Extract

Phytochemical tests were carried out to determine the bioactive compounds qualitatively. In this study phytochemical testing of samples was conducted to determine the presence or absence of flavonoids and phenolic compounds in cinnamon extract

Table 1. phytochemical results in Cinnamon Extract

Bioactive Components	Test results	Information
Flavonoid	+	The amyl alcohol layer is red
Fenolik	+	There is green
Tanin	+	It is formed in dark red
Saponin	-	Color changes from red to blue occur

Source: Fishery Product Engineering Laboratory, Faculty of Fisheries and Marine Sciences, Brawijaya University, 2018

3.2 Fat levels

Based on the results of diversity analysis showed that the treatment of different cinnamon concentrations significantly affected the fat content of cork fish brownies. The shelf life has a significant effect on the fat content of cork fish brownies. Then the interaction between the concentration of cinnamon and the shelf life of cork fish brownies did not affect fat content. The highest fat content was obtained at the concentration of cinnamon 0% and the shelf life of 6 days with a value of 36.70%. While the lowest fat content was obtained at 7.5% long cinnamon concentration with a shelf life of 0 days with a value of 22.25%. This is presumably because more and more concentrations of cinnamon can inhibit the occurrence of fat damage. The statement was supported by Arbi et al., (2016), the content of cinnamon which has essential oils in cinnamon containing flavonoids which can reduce hydroxyl radicals, superperoxide and peroxide radicals, so that it can inhibit oxidation and can neutralize free radicals by giving one electrons to free radicals, so they become non-radical.

3.3 FFA levels

Based on the results of diversity analysis showed that the treatment of different cinnamon concentrations significantly affected the FFA levels of cork fish brownies. Long shelf life significantly affected FFA levels of cork fish brownies. Based on diversity analysis shows that the interaction of different concentration treatments and shelf life has a significant effect on FFA levels of cork fish brownies. The highest FFA level was obtained at 0% treatment of cinnamon concentration with a 6-day shelf life with a value of 1.28%. While the lowest FFA levels were obtained at a concentration of 7.5% with a shelf life of 0 days with a value of 0.09%. Free fatty acids begin to form due to oxidation with the outside environment and handlers in the process of making these

brownies. During fat storage there will be flavor and flavor changes accompanied by the formation of unwanted components and marked by the appearance of a rancid odor, also influenced by the state of fat storage environment, namely RH (air humidity) storage space, temperature (temperature), ventilation, pressure and transportation problems. The properties and resistance of fat to damage depends on the constituent components, especially the fatty acid content. Nurhasnawati et al., (2015), that free fatty acids are formed due to the process of oxidation, hydrolysis of enzymes during processing and storage. When storage is open, it can come into contact with air, temperature and dirt. FFA damage will affect the quality and nutritional value of food ingredients

3.4 TBA levels

Based on the results of the diversity analysis showed that the treatment of cinnamon concentration was different significantly affected the levels of TBA of cork fish brownies. Based on diversity analysis shows that the length of shelf life treatment significantly affects the levels of TBA cork fish brownies. The interaction between cinnamon concentration and shelf life of cork fish brownies affected the TBA level. The highest TBA concentration was 0% cinnamon concentration with a shelf life of 6 days with a value of 1.35%. While the lowest TBA level in treatment (A4B1) 7.5% cinnamon with 0 days shelf life with a value of 0.21%. The higher the concentration of cinnamon can inhibit the destruction of the value of TBA and the length of shelf life affects the quality of TBA. This is reinforced by (Christie et al., 2016), testing the shelf life of brownies using the TBA test shows that the higher the value of TBA means the lower the quality of brownies. Products with high fat content such as fish are said to be good if they have a TBA value of less than 3 mg malonaldehyde / kg sample

3.5 Protein Levels

Based on the results of the analysis of diversity shows that the treatment of different concentrations does not significantly affect the levels of protein in cork fish brownies. Based on the results of diversity analysis showed that the shelf life of the treatment had a significant effect on the protein content of cork fish brownies. Based on diversity analysis shows that the interaction of treatment of different cinnamon concentrations and shelf life does not affect the levels of protein in cork fish brownies. The highest protein content was obtained at 5% cinnamon concentration with a shelf life of 0 days with a value of 14.23%. While the lowest protein content was obtained at a 7.5% concentration treatment with a shelf life of 6 days with a value of 4.23%. Protein levels experience setbacks during storage, strengthened by Harris and Fadli (2013), there are factors that can affect the decline in food product quality. There are six main factors that result in a decrease in quality or damage to food products, namely mass oxygen, water vapor, light, microorganisms, compression or slamming and toxic chemicals or off flavor. These factors can lead to further deterioration, such as lipid oxidation, vitamin damage, protein damage, odor changes, browning reactions, changes in organoleptic elements and the possibility of toxic formation

3.7 Albumin levels

Based on the results of diversity analysis showed that the treatment of different cinnamon concentrations did not significantly affect the levels of cork fish albumin brownies. Based on the results of diversity analysis showed that the shelf life has a significant effect on the levels of cork fish albumin brownies. Based on diversity analysis showed that the interaction of the treatment of different cinnamon concentrations and shelf life did not affect the levels of cork fish albumin brownies (P> 0.05). The highest albumin level was obtained in the treatment (A4B1) concentration of 7.5% cinnamon with a shelf life of 0 days with a value of 1.26%. While the lowest albumin level in treatment (A3B4) brownies at a concentration of 5% with a shelf life of 6 days which has a value of 0.24

3.8 LCMS

The LCMS graph of cork steamed brownies can be seen in Figure 1.

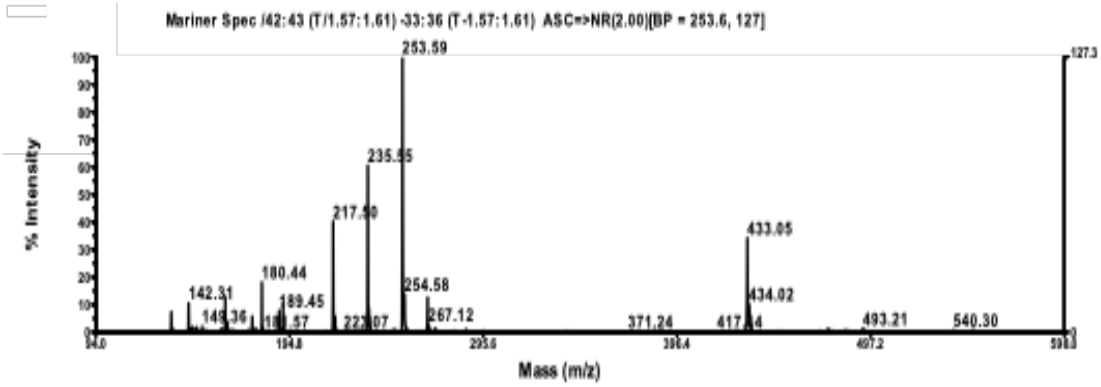

Figure 1. LCMS Test Chart

Identification of cork fish brownies compound added with cinnamon extract using LC-MS, bioactive detected in brownies from the two retention times produced was 7,3 - dihydroxyflavone.

7,3 - dihydroxyflavone is a bioactive compound that can function as an antioxidant, as explained in the study (Bylka et al., 2004) states that dihydroxyflavone is a derivative of flavonoids that can be antioxidants well. Dihydroxyflavone itself is able to inhibit gram-negative bacteria. Bacteria can be inhibited by compounds that have hydroxyl groups in ring B (myricetin> luteolin> quercetin> kaempferol) or with prenylated flavanones. Flavonoids are natural compounds found to be active against bacteria.

3.9 Texture Scoring

Based on the results of the analysis of diversity, it was shown that the different cinnamon concentrations significantly affected the scoring of the texture of cork fish brownies. Based on the results of the analysis of diversity, it was shown that the shelf life had a significant effect on the scoring of the texture of cork steamed fish brownies. Based on the results of analysis of diversity, it shows that the interaction between different concentration treatments and shelf life has a significant effect on the scoring of the texture of cork fish brownies. The highest texture scoring was obtained at 7.5% cinnamon concentration with a shelf life of 2 days with a value of 6.08%. The lowest score was at 0% cinnamon concentration with a shelf life of 6 days with a value of 2.93%. The longer the food product is left open, the quality of the product will decrease. According to (Purwaningsih et al., 2011), Decreasing the value of texture is related to microbial activity during storage which describes macromolecules primarily proteins into derivative products such as peptides and amino acids by producing water molecules (H2O). The decrease in water binding capacity by the ability of degraded proteins causes the texture to become soft.

3.10 Taste Scoring

Based on the results of the analysis of diversity, it was shown that the treatment of different cinnamon concentrations had a significant effect on the scoring of the taste of cork fish brownies. Based on the results of the analysis of diversity, it was shown that the treatment of shelf life had a significant effect on scoring the taste of cork fish brownies. Based on the results of the analysis of diversity, it was shown that the interaction of the treatment of the construction of different cinnamon and the length of shelf life significantly affected the scoring of the taste of cork fish brownies. The highest taste scoring was obtained at 2.5% cinnamon concentration with a shelf life of 0 days with a value of 6.75%. While the lowest taste score was obtained at 7.5% cinnamon concentration with a shelf life of 6 days with a value of 3.12%. This is thought to taste in brownies sourced from additional ingredients and the main ingredients in making brownies such as cinnamon which is too high. The longer the shelf life, the panelists' taste scores for biscuits also declined.

3.11 Aroma Scoring

Based on the results of analysis of diversity, it was shown that the treatment of different cinnamon concentrations significantly affected the scoring of the aroma of cork fish brownies. Based on the results of the analysis of diversity, it was shown that the shelf life did not significantly affect the scoring of the aroma of cork fish brownies. Based on the results of analysis of diversity, it was shown that the interaction of the treatment of different cinnamon concentrations and shelf life had a significant effect on scoring the aroma of cork fish brownies. The highest aroma scoring was found in the treatment of cork fish with a concentration of 7.5% with a shelf life of 0 days with a value of 6.22%. While the lowest aroma score was obtained at the concentration of 0% cinnamon with a shelf life of 4 days with a value of 4.67%. According to (Anggraini et al., 2015), that cinnamon has aromatic compounds, the aroma depends on the substance with different arrangements. The substances contained in cinnamon include sinnamaldehyde, eugenol, safrol or camphor, aceteugenol and a number of other aldehydes in small quantities. The sweet taste and certain odor of the dried bark of cinnamon are mainly determined by the volatile aromatic oil content in the stem

3.12 Hedonoik Texture

Based on the results of analysis of diversity, it was shown that the addition of different cinnamon concentrations significantly affected the hedonic texture of cork fish brownies. Based on the results of analysis of diversity, it was shown that the treatment of shelf life had a significant effect on the hedonic texture of cork fish brownies. Based on the results of analysis of diversity, it was shown that the interaction between different types of cinnamon concentration and shelf life did not significantly affect the hedonic texture of cork fish brownies. The highest texture hedonic was obtained by the addition of 7.5% cinnamon concentration with a shelf life of 0 days with a value of 6.61%. While the lowest hedonic texture is obtained by adding the concentration of cinnamon 0% with a shelf life of 6 days with a value of 3.55

3.13 Hedonic Taste

Based on the results of analysis of diversity, it was shown that the addition of different cinnamon concentrations significantly affected the hedonic taste of cork fish brownies. Based on the results of analysis of diversity, it was shown that the shelf life had a significant effect on the hedonic taste of cork fish brownies. Based on the results of analysis of diversity, it was shown that the interaction between the addition of different cinnamon concentrations and shelf life did not significantly affect the hedonic taste of cork fish brownies. The highest taste hedonic was obtained by adding 2.5% cinnamon concentration with a shelf life of 0 days with a value of 6.67%. Whereas the lowest hedonic taste was found in the addition of 7.5% cinnamon concentration with a shelf life of 6 days with a value of 3.76%.

3.14 Hedonic Aroma

Based on the results of analysis of diversity, it was shown that the addition of different cinnamon concentrations significantly affected the hedonic aroma of cork fish brownies. Based on the results of the analysis of diversity, it shows that the shelf life has a significant effect on the hedonic aroma of brownies. Based on the results of analysis of diversity, it shows that the interaction between the treatment of cinnamon concentration which is different from the shelf life does not significantly affect the hedonic aroma of cork fish brownies. The highest scent hedonic was obtained at the addition of 7.5% cinnamon concentration with a shelf life of 0 days with a value of 5.98%. While the lowest hedonic aroma was obtained in treatment (A1B3) cinnamon concentration of 0% at a 4-day shelf life with a value of 3.59%

IV. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The conclusions that can be given in this study are:
1. The use of different cinnamon concentrations is 0%, 2.5%, 5%, and 7.5% affect the fat content, FFA levels and TBA levels of cork steamed brownies.
2. Long shelf life treatment of 0 days, 2 days, 4 days and 6 days affected fat content, FFA levels, TBA levels of cork fish brownies.
3. The interaction treatment of the addition of cinnamon concentration which is different from the shelf life has an effect on FFA levels and TBA levels but has no effect on the fat content of cork fish brownies

4.2 Suggestions

Suggestions that can be given in the next study the researchers tested the microbial content in each treatment on cork fish brownies to produce quality cork fish brwonies products.

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Structure of the gill monogenean parasites of *Tylochromis jentinki* (Teleostei: Haemulidae) from two sectors of Ebrié lagoon, Côte d'Ivoire

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Abstract- This study compared gill monogenean parasite of *Tylochromis jentinki* from two sectors in Ebrié lagoon during March 2017 to February 2018. Six hundred specimens of *T. jentinki* were necropsied for parasitological analysis. Gills were prepared from each specimen following standard methods for microscopic analysis. Parasitological indices were calculated. The diversity indices were determined using Berger-Parker dominance index, Shannon-Weaver index, Pielou's measure of evenness, Margalef's diversity index and the Simpson index. Three species (*Cichlidogyrus berrebii*, *C. kothiasi* and *C. pouyaudi*) occurred and the parasitic populations varied depending on the sampling sector. All the indices considered showed significant differences among the two sectors of Ebrié Lagoon except for the evenness which showed no significant differences both study areas. The diversity of monogenean seemed to be influenced by environmental conditions.

Index terms- Monogenea, Diversity index, *Tylochromis jentinki*, Ebrié lagoon, Côte d'Ivoire.

I. INTRODUCTION

The parasitism represents an essential part of ecology because parasites are good tools to study the structure and organization of communities (Mouritsen and Poulin, 2002; Koehler and Poulin, 2010). Thus, the knowledge of parasite species diversity and distribution is very important because it indicates the health and stability of ecosystems and is important in the management of wildlife and aquaculture systems (Lim, 1998). Monogenean gill parasites are not exceptional to this rule. These organisms are the most important helminth group parasitizing the external surfaces of the fish. They are found worldwide in freshwater, brackish and marine environments. Their short growth cycle associated with their easy contamination increase the number of monogeneans per host, particularly among the monopisthocotylea (Silan and Maillard, 1990). The consequence is the presence of several specimens on a restricted surface. Monogeneans are of great importance as agents of fish diseases particularly in aquaculture (Rohde, 2011). Diseases caused by these organisms are among the most important for fish farming, and massive mortalities have been observed in farmed fish due to high rates of infestation by these parasites (Portz *et al.*, 2013). In addition, due to their location, monogenean ectoparasites are subject to changes in the environment in which lives their host and their vulnerability to changes in physico-chemical parameters makes them excellent bio-indicators (Ramadan *et al.*, 2014).

Despite this, to date, few studies have been conducted on the Cichlid, *Tylochromis jentinki* which is endemic to western Africa and is distributed from Gambia to Ghana (Paugy *et al.*, 2003). In Côte d'Ivoire, this species is important ecologically and commercially, and is widely exploited and cultured. It is one of the most important fishery resources for the Ivorian artisanal fisheries (Amon-Kothias, 1982 ; Konan *et al.*, 2011). The species is inexpensive and easily affordable by the low-income segment of the population.

Although much has been done on the taxonomy of monogeneans on fish in Africa (Pariselle and Euzet, 2009), there is little information on parasitic infection in Côte d'Ivoire (Blahoua *et al.*, 2015, 2016, 2018 ; Adou *et al.*, 2017a and b). All these investigations were made in freshwaters. The only reports of parasitic infection carried out in Ebrié lagoon are those of Adou *et al.* (2017c). Concerning the monogenean gill parasite of *T. jentinki*, available data was limited to the reports of Pariselle and Euzet (1994), and they have focused on the systematic studies. However, the structure of the monogenean gill parasites of this Cichlid has not been studied.

The present study compared the parasite infracommunities of *Tylochromis jentinki* from two sectors of Ebrié lagoons in Côte d'Ivoire.

II. MATERIAL AND METHODS

A. Study area

The Ebrié Lagoon has an area of 566 km^2 and stretches on 125 km along the coast of Côte d'Ivoire, between 5° 10' N - 5° 50' N and 3° 40' W - 4° 50' W (Dufour, 1982; Tuo *et al*., 2012). It communicates with the Atlantic Ocean by the Vridi channel, drilled in 1951, for the building of Abidjan Port, the most important in West Africa. Ebrié Lagoon waters are simultaneously diluted with marine waters during dry seasons and with freshwaters during the rainy and flood seasons. This lagoon is divided into different zones (Sector I to sector VI).

The survey includes two sectors (sectors I and IV) of the lagoon (Figure 1). The sector I (commonly named Aghien lagoon) is located in South East of Côte d'Ivoire (05° 22' N - 05° 26' N and 3° 49' W - 3° 55' W) near of the city of Bingerville. With a catchment area of 20.2 km^2 and a volume of 25 km^3, the rivers Djibi and Bété are tributaries of this lagoon's sector. It communicates with the Potou lagoon by the channel in which river Mé water flows. The sector IV is between 05° 16' N - 05° 21' N and 4 ° 14' W - 4° 23' W in the city of Dabou. With a catchment area of 107 km^2, this central region of the Ebrié lagoon is influenced by the Atlantic ocean and by the human activities ("Acadja enclos", washing, bathing, agriculture). This region is located near several plantations, including those belonging to local residents.

According to Issola *et al*. (2008), in the sector I, the salinity varied between 0‰ and 9‰ while it ranged from 2‰ to 15‰ in the sector IV.

B. Collection of fish specimens and parasitological analysis

Six hundred specimens of *Tylochromis jentinki* (Two hundred and forty individuals in the sector I and three hundred and sixty individuals in the sector IV) were caught monthly using gillnets from March 2017 to February 2018. Immediately after capture, the fish were stored in plastic bags with lagoon water to avoid loss or mixing of monogeneans among fishes and transported them to the laboratory. Thereafter, the fish specimens were necropsied for parasitological analysis. We examined only freshly killed fish. For each individual host, the gill arches removed, examined and the monogeneans were mounted in glycerine ammonium picrate mixture (GAP) to observe the sclerotized reproductive structures under a compound microscope (Olympus SZ 60). The worms were identified according to Parisellle and Euzet (2009) with a microscope magnification of 400 and 1000X.

C. Physico-chemical parameters

The physical and chemical parameters (water temperature, dissolved oxygen concentration, electrical conductivity, pH and salinity) were measured in situ with a portable multi-parameter probe (HANNA HI 9828010-02) and the transparency with Secchi disk. Water samples were collected with a sterile bottle and preserved for subsequent analyses of nutrients (phosphate, nitrite, nitrate and ammonia) using the spectrophotometry method using to the French Normalization Agency (AFNOR, 1994).

D. Data analysis

Epidemiological parasitological indices (prevalence, mean intensity and range of intensity of infection) were calculated according to Bush *et al*. (1997). The data were analyzed using Dominance index, Berger-Parker dominance index, Shannon-Weaver index, Pielou's measure of evenness, Margalef's diversity index and the Simpson index. Those diversity indices are depicted on annual mean basis and are calculated by the software Paleontological Statistic (PAST) version 2.15 (Hammer *et al*. 2001).

- Dominance index was calculated according to the formula:

$$D_i = n_i \times 100 / N[\%]$$

where : n_i – total number of parasites of a particular species, N – total number of all parasites

The following scale was used to determine species dominance: $D_i > 10\%$ – eudominants; $5.01\% < D_i < 10\%$ – dominants; $2.01\% < D_i < 5\%$ – subdominants; $1.01\% < D_i < 2\%$ – recedents; $D_i > 1\%$ – subrecedents

- Berger-Parker dominance index was calculated according to the formula :

$$d = n_{max} / N$$

where: n_{max}- number of parasites of the most abundant species, N-total number of parasites in the sample

- Shannon-Weaver species diversity index:

$$H' = -\Sigma (p_i \times \log_2 p_i)$$

where: p_i-number of parasites of the particular species/total number of parasites in the sample

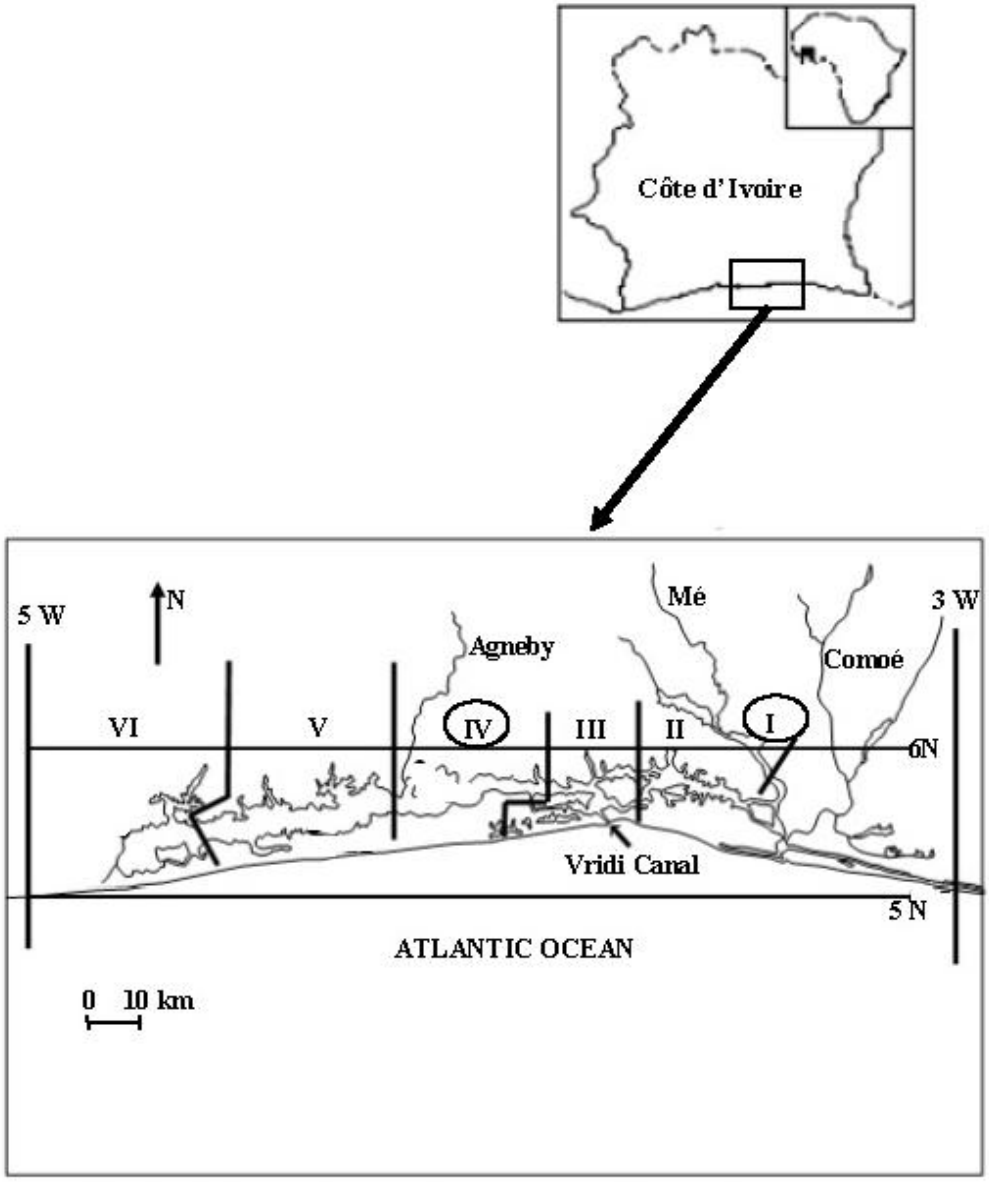

Fig 1. Localization of the sampling sites (sectors I and IV) in the Ebrié Lagoon (Côte d'Ivoire).

- Pielou's measure of evenness

$$E=H'/\log_2(S)$$

where: S-number of observed species, H'-Shannon-Weaver index

- Margalef index, specifying the relative species richness:

$$M = S-1 / \ln N$$

where: S-number of species, N-total number of parasites in the sample

- Simpson index, which is a measure of species diversity in the community:

$$D = \Sigma n_i (n_i-1) / N (N-1)$$

where: n_i-total number of parasites of a particular species, N-total number of parasites in the sample

The Chi Square X^2 test allowed to compare two or more proportions. The Mann Whitney (U) and Kruskal-Wallis (K) tests were respectively used to compare two and several averages. The degree of security for statistical analyses is 95%. Computations were performed using Statistical Package for Social Science (SPSS) 16.0. A non-parametric test was adopted because the values of normality and homoscedasticity did not allow the use of a parametric test.

III. RESULTS

Three monogenean species (*Cichlidogyrus berrebii* Pariselle and Euzet, 1994; *C. kothiasi* Pariselle and Euzet, 1994 and *C. pouyaudi* Pariselle and Euzet, 1994) were recorded on the gills of *Tylochromis jentinki* from the two sectors (sectors I and IV) of Ebrié lagoon.

A. Distribution of parasitic indices and dominance

The distribution of parasitic indices and dominance results are summarized in Tables 1 and 2. Of 240 specimens examined in the sector I, 45, 132 and 6 specimens were sheltered respectively by: 442 *Cichlidogyrus berrebii*, 1701 *C. kothiasi* and 31 *C. pouyaudi*. The prevalences of these parasites were respectively: 18.75%, 55% and 2.5%. Their mean intensities were 4.2 ± 1.1, 6 ± 2.5 and 2.5 ± 0.1 (Table 1). The first two monogenean species were eudominant and the last one was recedent. It appears that *C. kothiasi* occurred the highest prevalence, intensity, mean intensity of infection and dominance, while *C. pouyaudi* with the lowest ones (Table 2).

Of the 360 specimens examined in the sector IV, 300, 180 and 35 specimens were infested respectively by: 6540 *Cichlidogyrus berrebii*, 2214 *C. kothiasi* and 180 *C. pouyaudi*. The prevalence values of monogenean parasites were 83.33%, 50% and 9.72%, respectively. Their mean intensities of infection were 21.8 ± 7.1, 12 ± 3.4 and 5.1 ± 0.2 (Table 1). The species (*C. berrebii* and *C. kothiasi*) also belonged to eudominant and *C. pouyaudi* was subdominant (Table 2). It appears that *C. berrebii* occurred the highest prevalence, intensity, mean intensity of infection and dominance. The lowest values of the above parameters were observed in the case of *C. pouyaudi*.

The results from statistical comparison of infection revealed that there was a significant difference between the rate of infection (prevalence) of monogenean gill parasites of *T. jentinki* from sector I (Aghien) and those from sector IV (Dabou) of Ebrié lagoon (Chi square X^2, $p < 0.05$). Most parasites were mainly isolated from this host fish in the sector IV (Mann Whitney, $p < 0.05$).

B. Diversity parameters of monogenean parasites

The biodiversity index of *Cichlidogyrus berrebii*, *C. kothiasi* and *C. pouyaudi* on the gills of *T. jentinki* from the two sectors of Ebrié lagoon was analyzed (Table 3). The results showed that the number of species (N = 3) caught during the study period was not statistically different in the two sectors ($p > 0.05$). The Shannon's diversity index, the Simpson's diversity index, the Margalef's diversity index and the Berger-Parker's diversity index were significantly greater in the sector IV of Ebrié lagoon ($p < 0.05$). Only the Pielou's evenness index reached a higher value (0.7±0.01) in the sector I.

C. Physico-chemical parameters

The values of the physical and chemical parameters of two sectors (sectors I and IV) of the Ebrié lagoon were analyzed (Table 4). In the sector I, pH ranged between 6.6 and 8.81, water temperature varied from 24.4 to 27.2 °C, dissolved oxygen ranged between 5.9 and 7.8 mg/L and transparency varied from 68.2 to 124 cm. The values recorded for ammonia ranged from 0.01 to 0.06 mg/L, the nitrate varied from 0.16 to 0.37 mg/L, the nitrite and total phosphorus ranged within respectively: 0.001-0.003 mg/L and 0.05-0.12 mg/L. Conductivity varied from 65.4 to 98.1 mg/L and salinity ranged within 0-0.002‰. In the sector IV, the values of pH varied from 6.9 to 7.4, water temperature ranged within 28.62-30.5 °C, dissolved oxygen varied from 5.66 to 6.16 mg/L and transparency ranged between 70.7 and 118.7 cm. The inorganic nutrients ranged (mg/L) within 0.02-0.09 for ammonia, 0.32-0.6 for nitrate, 0.004-0.006 for nitrite and 0.9-1.32 for total phosphorus. Conductivity ranged between 3206.74 and 5756.9 mg/L and salinity varied from 2.11 to 3.3‰. The variations recorded were significant between the two sectors sampling of the Ebrié lagoon ($p < 0.05$), except for dissolved oxygen and pH.

Table 1: Infection parameters of *Tylochromis jentinki* from sites of Ebrié lagoon.

Sites of Ebrié lagoon	Monogenean parasites	Prevalence [%]	Intensity			Number of parasites
			Mean	Range	SD	
Sector I (Aghien)	*C. berrebii*	18.75	4.2	0-12	1.1	189
	C. kothiasi	55	6	0-25	2.5	792
	C. pouyaudi	2.5	2.5	0-3	0.1	15
Sector IV (Dabou)	*C. berrebii*	83.33	21.8	0-52	7.1	6540
	C. kothiasi	50	12.3	0-37	3.4	2214
	C. pouyaudi	9.72	5.1	0-6	0.2	180

C: *Cichlidogyrus*, SD: standard deviation

Table 2: Dominance index (D) and class of domination of monogenean parasites of *Tylochromis jentinki* from Ebrié lagoon.

Sites of Ebrié lagoon	Monogenean parasites	Dominance [%]	Class of domination
Sector I (Aghien)	*C. berrebii*	79.5	eudominant
	C. kothiasi	19	eudominant
	C. pouyaudi	1.5	recedent
Sector IV (Dabou)	*C. berrebii*	73.2	eudominant
	C. kothiasi	24.8	eudominant
	C. pouyaudi	2.01	subdominant

C: *Cichlidogyrus*

Table 3: Biodiversity index of Monogenean parasites of *Tylochromis jentinki* at the sectors I and IV of the Ebrié lagoon.

Host	Richness	Shannon's diversity index	Shannon-based evenness	Simpson's diversity index	Margalef's diversity index	Berger-Parker's diversity index
Sector I (Aghien)	3	2.1±0.2	0.7±0.01	0.41±0.1	0.3±0.02	0.21±0.01
Sector IV (Dabou)	3	3.9±0.01	0.47±0.2	0.8±0.01	0.6±0.004	0.44±0.12

Table 4: Physical and chemical parameters of Ebrié lagoon (sectors I and IV).

	Ebrié lagoon	
Parameters	Sector I	Sector IV
pH	7.6±1.5 (6.6-8.81)	7.1±0.84 (6.9-7.4)
Temperature (^{0}C)	25.8±0.7 (24.4-27.2)	29.6±1.35 (28.62-30.5)
DO (dissolved oxygen) (mg/L)	6.85±0.02 (5.9-7.8)	5.11±0.65 (5.66-6.16)
Transparency (cm)	96.1±16.4 (68.2-124)	84.7±28.3 (70.7-118.7)
Ammonia (mg/L)	0.025±0.1 (0.01-0.06)	0.05±0.07 (0.02-0.09)
Nitrate (mg/L)	0.20±0.07 (0.16-0.37)	0.48±0.2 (0.32-0.6)
Nitrite (mg/L)	0.02±0.01 (0.001-0.003)	0.005±0.007 (0.004-0.06)
Total phosphorus (mg/L)	0.08±0.1 (0.05-0.12)	1.1±0.9 (0.9-1.32)
Conductivity (µs/cm)	81.75±12.5 (65.4-98.1)	4481.82±1787.67 (3206.74-5756.9)
Salinity (‰)	0.002±0.1 (0-0.002)	2.7±0.9 (2.11-3.3)

IV. DISCUSSION

This study has underlined occurrences of three monogenean species parasitizing the gills of *Tylochromis jentinki* from Ebrié lagoon. Such observation has already been reported (Pariselle and Euzet, 1994). The reason for this might be the phylogeny of hosts and parasites (Bush *et al*., 1997; Sasal *et al*., 1997), host (Morand *et al*., 1999) and ecology (Zharikova, 2000). Indeed, all these factors were due to the equal chances of infection of hosts with the monogenean eggs regardless of their location.

However, the distribution of parasites varied according to the site. It appeared that the hosts caught in the sector IV (Dabou) shelter more parasites than those which have been caught in the sector I (Aghien). Factors linked to habitat environmental and biological aspects can affect structure and species composition (Vidal-Martinez and Poulin, 2003; Tavares and Luque, 2008; Violante-Gonzalez *et al*., 2010). In this study, the difference of the prevalence and the intensity of infection of monogenean could be attributed to some different environmental conditions in these two sectors of Ebrié lagoon such as anthropogenic activities that occur in the areas and an increasing discharge of effluents. Indeed, in the sector IV (Dabou), fishermen most use "acadja enclos" as the type of fishing for improving their fisheries productivity. On the one hand, the decomposition of brushwood used in this type of fishing causes the lagoon pollution (Aboya, 2014). Furthermore, all wastewaters (domestic, industrial, agricultural, etc) from its agglomeration are introduced in this sector of the lagoon waters without any treatment or in a best case, after summarily treatment. Such wastes are known as vectors of many pollutants (nutrients, heavy metals, organic components, etc.) (Monou *et al*., 2010; Tuo *et al*., 2012; Tuo *et al*., 2013) which can affect fish health. This situation reduces fish immune capability which favors parasites to build up in the affected fish. On the other hand, the decomposition of "acadja enclos" twigs is expected to increase with suspended materials which will cause the

infective larvae transport on the fish gills. The lagoon pollution combined with the suspended particles may well result in higher infection statistic values recorded during surveys performed in the sector IV (Dabou) of the Ebrié lagoon. This study also agrees with Sulgostowska *et al*. (1987), Cone *et al*. (1993) and Barker *et al*. (1996), that the water pollution can induce an increase in the number of parasites. On the contrary, in the sector I (Aghien), the low levels of host infection could be due to the entry permanent of rivers water Djibi, Bété and Mé in this part of the lagoon. Indeed, the water current can helps fish host get rid of monogeneans (infective larvae and mature individuals), thus reducing the intensity of parasitism because it is often evoked as a factor limiting the recruitment of infective larva stages.

Also, the higher prevalence and mean intensities of parasitism by monogenea occurred in fishes from sector IV of the Ebrié lagoon could be attributed to variations in environmental parameters such as temperature, transparency, salinity, conductivity and mineral salts. Indeed, the stress caused by variations in the aquatic parameters are the main causes of parasitic infections besides the host susceptibility and social hierarchy associated with this fish species as reported (Alves *et al.*, 2001; Gómez-Laplaza and Morgan, 2003). For example, according to Smallbone *et al.* (2016), the high availability of certain nutrients in the water can promote the proliferation of monogenean parasites. Thus, our results suggest that the environmental factors of Ebrié lagoon' sector IV may provide better eco-climatic conditions for the development of these parasites. Furthermore, taking into account consideration of Zharikova (2000), other factors might influence the abundance of specific parasites species.

The low Shannon-Weaver index (H') values obtained in the two sectors of Ebrié lagoon indicate the presence of species predominate. This is much appreciated with the values of Shannon based evenness which are below 1 indicating the poor distribution/organization within the hosts. But, it appeared that gill monogenean species from hosts in the sector IV (Dabou, E= 0.7) are more organized than those in the sector I (Aghien, E= 0.47). The Berger-Parker Dominance index, the Simpson's diversity index and the Margalef's diversity index indicate significant difference in the monogenean species diversity. This variation could be attributed to differences in the level of pollution or anthropogenic activities. Indeed, any ecological imbalance arising from any severe alterations of the factors (water quality, immediate substrates for occupation, food availability etc…) are some important factors governing the abundance and distribution of aquatic communities which could affect the environment and therefore could lead the periodic or permanent elimination of monogenean species.

V. CONCLUSION

The study was the first report on the structure of gill monogenean parasites of *Tylochromis jentinki* and it showed that these parasites had similar parasite infracommunities, characterized by low species diversity, low evenness and species richness. The distribution and diversity of monogeneans can be affected by variations in abiotic factors. Special attention should be given to make aware farmers about the impact of chemical fertilizers in aquatic ecosystem and enhance them to use biofertilizers. This assessment provides useful data for implementation of adequate prophylactic measures to prevent losses caused by monogenean in fish farming.

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Suitability of Tube-Wells Water for Drinking at Lalpur Upazila in Natore District, Rajshahi, Bangladesh

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Abstract- The aim of the study was to observe the suitability of tube-wells water consumed by people of Lalpur upazila in Natore district for drinking purpose in comparison to standard of World Health Organization (WHO) and the standard of Bangladesh. In this study, it was tried to find out the physical and chemical conditions of the drinkable tube-wells water used in the studied region and to observe the presence or absence of total coliform & *Escherichia coli* bacteria. Therefore, a total of 30 tube-well water samples were randomly collected from different households under 10 unions and 1 municipality of the studied upazila. The depths of the tube-wells ranging between 16 to 55 meter (shallow tube-wells). These samples were tested with about 23 parameters including *physical*: Color, Odor, Taste, Temperature, Total dissolved solids (TDS), and Total suspended solids (TSS); *chemical*: Acidity/Alkalinity (pH), Arsenic, Bicarbonate, Calcium, Chloride, Dissolved oxygen, Electrical conductivity, Iron, Magnesium, Manganese, Nitrogen, Phosphate, Potassium, Sodium, Sulfate, and *bacteriological*: Presence or absence of total coliforms and *E. coli* bacteria. All parameters were conducted 2-3 times (replications) for each sample. The found results were compared with the acceptable limits by World Health Organization (WHO) and Department of Public Health and Engineering (DPHE) & Environmental Conservation Rules (1997) in Bangladesh. Especially, Arsenic exceeded the acceptable limit by WHO (0.01 mgl^{-1}) and 1 sample exceeded even the acceptable limit in Bangladesh (0.05 mgl^{-1}). Besides, about 57% water samples are found without coliforms and with the total coliforms are found into the rest 43% of total samples; 13% water samples are found with *E. coli* bacteria. The suitability of the water samples is found for drinking with Water Quality Index (WQI) in terms of 15 parameters viz., Acidity/Alkalinity (pH), Bicarbonate, Calcium, Chloride, Dissolved oxygen, Electrical conductivity, Iron, Magnesium, Nitrate, Phosphate, Potassium, Sodium, Sulfate, Total dissolved solids and Total suspended solids. From the obtained value of WQI it is found that, only 3% of the water samples are good, about 57% samples are poor, 17% water are very poor quality and 23% samples are unsuitable for drinking in the studied region.

Index Terms- Tube-wells, Water quality, Drinking purpose, Physico-chemicals, Bacterial presence, Water Quality Index (WQI), Lalpur upazila, Bangladesh

I. Introduction

Water is essential for the survival of all living organisms and also essential for our health and our economy. Fresh water is the major need of human life. Drinking water quality is a vital concern for mankind since it is directly linked with public health. Drinking water quality has always been a major issue in many countries, especially in developing countries like Bangladesh (Moe and Rheingans, 2006). Although safe drinking water is a basic demand for the people of all over the world, a huge percentage of people of the world are deprived from the pure drinking water including Bangladesh (Chowdhury *et al.*, 2014). Ground water is depleting day by day prominently in Asia, South America, North America and ecosystems are threatened (Gleeson *et al.*, 2012).

In Bangladesh most of the people think that ground water or water from tube wells is free from contamination. For this reason hand pumped tube-well water is used as primarily source of safe drinking water in Bangladesh. Almost 90% of the households use this hand pumped tube-well technology in Bangladesh (Emch *et al.*, 2010).

Since the early 1970s, there has been an enormous effort in Bangladesh by UNICEF and other international donor organizations to install tube wells throughout much of Bangladesh, to reduce exposure of the population to infectious disease transmission via contaminated surface waters. As a result, there are now about 10 million shallow wells, accessed by hand pumps, located in many regions of the country. In some areas, which have saline water in the upper layers of groundwater, there are deeper wells that required much more extensive drilling operations to install.

Bangladesh can reduce poverty and accelerate growth faster by taking urgent actions to improve the quality of water and sanitation, says a new World Bank report. Despite the country's remarkable progress in improving access to water and sanitation, 41% of all improved water sources are contaminated with *E. coli* bacteria, which suggest a high prevalence of fecal contamination. Besides, naturally occurring arsenic in ground water also affects people: about 13 percent of the country's water sources contain arsenic levels above Bangladesh's threshold. The Chittagong and Sylhet divisions suffer most from arsenic contamination. Climate change is increasing the intensity and frequency of natural disasters that disrupt water and sanitation services (Web). In rural area, most of the people are depended on untreated groundwater and tube wells. There is an estimation that about 11% of all deaths in rural area of Bangladesh are caused by diarrheal disease (Streatfield *et al.*, 2001).

Clean drinking water is now recognized as a fundamental right of human beings. Water quality and suitability for use are determined by its taste, odor, color, and concentration of organic and inorganic matters (Rahmanian, *et al.*, 2015). Contaminants in the water can affect the water quality and consequently the human health. It has been estimated that about 80% of all diseases and over one third of deaths in developing countries are caused by the consumption of contaminated water (WHO, 2002).

Generally, groundwater quality varies from place to place, sometimes depending on seasonal changes (Trivede *et al.*, 2010), the types of soils, rocks and surfaces through which it moves (Chandrasekar *et al*., 2014). Naturally occurring contaminants are present in the rocks and sediments. As groundwater flows through the sediments, metals such as iron and manganese are dissolved and may later be found in high concentrations in the water (Moyo, 2013). In addition, human activities can alter the natural composition of groundwater through the disposal or dissemination of chemicals and microbial matter on the land surface and into soils, or through injection of wastes directly into groundwater. Industrial discharges (Govindarajan and Senthilnathan, 2014), urban activities, agriculture, groundwater plumage and disposal of waste can affect groundwater quality. Pesticides and fertilizers applied to lawns and crops can accumulate and migrate to the water tables thus affecting both the physical, chemical and microbial quality of water. Changes in local topography and drainage system directly affect both quality and quantity of the groundwater (Murugesan *et al.*, 2010).

This research is aimed at finding the groundwater (tube-well) quality status in terms of different physical, chemical and bacteriological parameters for drinking purposes at Lalpur upazila in Natore district, Rajshahi, Bangladesh.

The specific objectives of this study are:

1. To find out the physical conditions and the contents of different chemical elements in the tube-well water in comparison to Bangladesh standards and World Health Organization (WHO) standards for drinking purpose.
2. To find out the presence or absence of coliform bacteria (*E. coli*) in the tube-well water to cause harmful diseases in human bodies.

II. MATERIALS AND METHODS

Study Area

Thirty tube-well water samples are collected from different locations within Lalpur upazila under Natore district in Rajshahi division. These locations are arranged as union/municipality wise, shown in Figure 1. There are 10 unions and 1 municipality in the Lalpur upazila. The sampling points are about 2 to 7 from each unions or municipality on the basis of their area. The study area lies between 24°07' and 24°18' north latitudes and in between 88°52' and 89°08' east longitudes.

The area of the Lalpur upazila is about 327.92 sq km. It is bounded by Bagatipara and Baraigram upazilas on the north; Ishwardi, Bheramara and Daulatpur (Kushtia) upazilas on the south; Baraigram upazila on the east; Bagha upazila on the west.

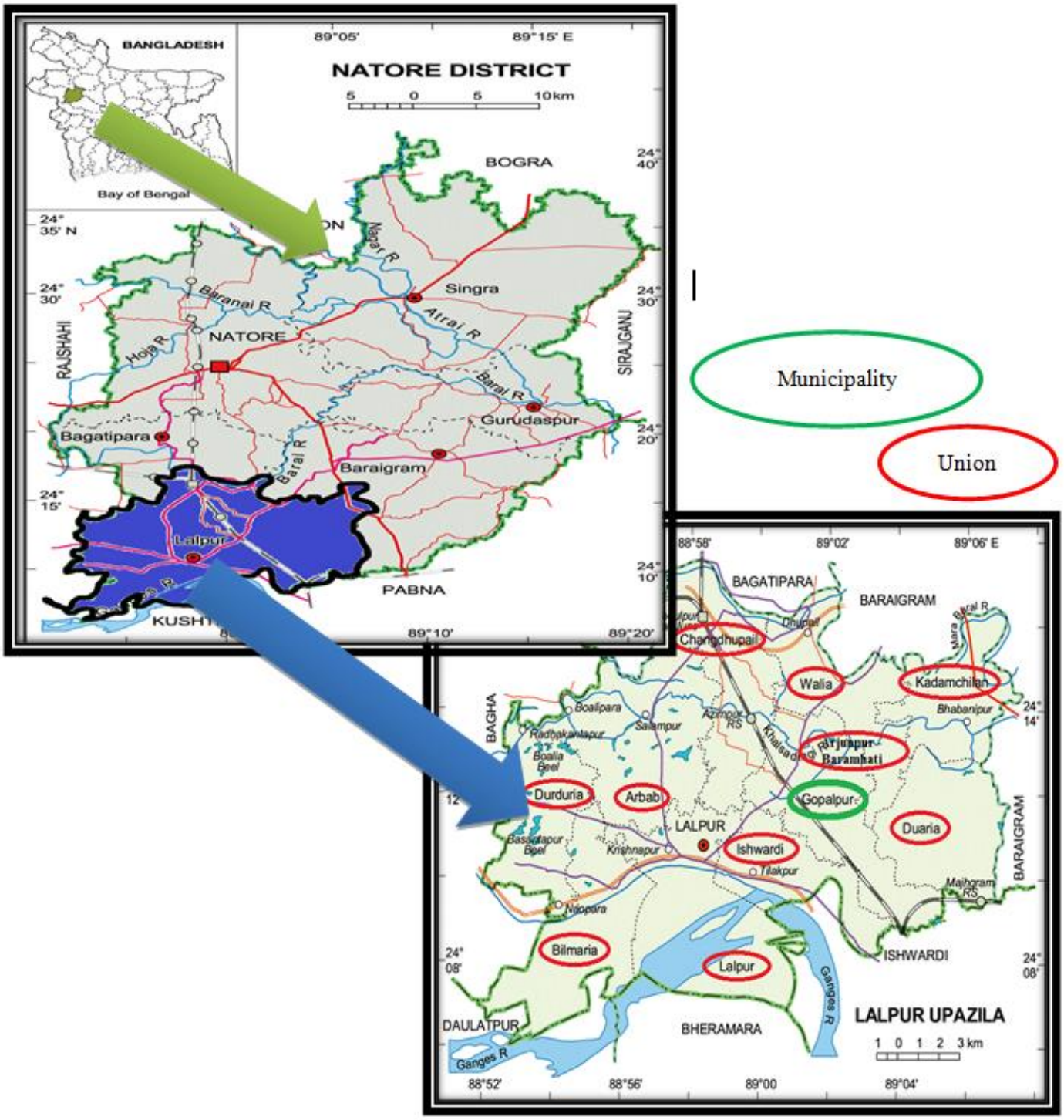

Figure 1: The map of studied area (Lalpur upazila in Natore District)

Sample Collection

Total 30 water samples were collected from 30 tube-wells in different locations within the Lalpur upazila (Table 1). The water-sampling points were chosen randomly. The sampling coordinate points were obtained (Table 1) with Google Maps in laptop on the sampling spots. The depth of each sampling tube-well and its installation time are shown in Table 2.

Table 1: Sampling points with Sample ID

Union/Municipality	Sample ID	Village/Mahalla	latitude	longitude
Arbab (U-1)	S – 01	Boaliapara	24°13'42.3"N	88°53'49.2"E
	S – 02	Keshobbaria	24°14'22.3"N	88°56'51.3"E
Arjunpur-Boromhati (U-2)	S – 03	Boromhati	24°11'42.9"N	89°01'40.8"E
	S – 04	Shriramgari	24°10'13.4"N	89°02'41.9"E
Bilmaria (U-3)	S – 05	Mohorkoya	24°10'24.7"N	88°55'45.6"E
	S – 06	Nakshusha	24°09'42.5"N	88°54'57.5"E
Chongdhupail (U-4)	S – 07	Abdulpur	24°15'34.3"N	88°59'43.8"E
	S – 08	Dairpara	24°13'37.9"N	88°58'31.3"E
	S – 09	Dairpara	24°13'30.7"N	88°58'30.1"E
	S – 10	Dairpara	24°13'41.3"N	88°58'18.9"E
	S – 11	Dairpara	24°13'42.8"N	88°58'37.2"E
	S – 12	Kamarhati	24°15'54.8"N	88°57'07.9"E
	S – 13	Pokonda	24°15'01.0"N	88°58'22.7"E
Duaria (U-5)	S – 14	Koloshnagar	24°12'01.1"N	89°04'18.2"E
	S – 15	Majhgram	24°10'07.2"N	89°05'54.6"E
Durduria (U-6)	S – 16	Durduria	24°10'47.6"N	88°51'36.1"E
	S – 17	Noupara	24°09'58.5"N	88°52'04.8"E
Gopalpur (M*) (Municipality)	S – 18	Biropara	24°12'08.0"N	88°59'57.5"E
	S – 19	Choknajipur	24°13'55.9"N	89°00'47.9"E
Ishwardi (U-7)	S – 20	Gouripur	24°09'54.0"N	89°00'16.0"E
	S – 21	Jukadah	24°08'51.5"N	89°02'50.6"E
	S – 22	Old Ishwardi	24°08'35.0"N	89°02'27.6"E
Kadamchilan (U-8)	S – 23	Hajirhat	24°13'42.5"N	89°04'09.2"E
	S – 24	Kadamchilan	24°14'47.4"N	89°05'38.5"E
Lalpur (U-9)	S – 25	North Lalpur	24°10'38.0"N	88°58'11.2"E
	S – 26	North Lalpur	24°10'34.7"N	88°58'24.2"E
	S – 27	South Lalpur	24°10'33.2"N	88°58'07.3"E
Walia (U-10)	S – 28	Dhupail	24°16'04.7"N	89°00'21.0"E
	S – 29	Nando	24°13'12.5"N	89°03'00.2"E
	S – 30	Nandorayapur	24°12'48.0"N	89°02'59.6"E

The tube-wells were continuously pumped for about one to two minutes to ensure the normal water of those tube-wells. Before taking the water samples, the containers (new mineral water bottles) were rinsed two to three times with sample water for finding the accurate result. The sampling bottles were labeled with sample ID's and the information about the sampling points were collected on an individual basis for every drinking water source during sampling and recorded in notebook including owner names, depth of tube-wells, installation time of tube-wells, facing problems related to drinking water (if any), etc.

All collected samples were carried in the ice box with proper aseptic technique to ensure the lower temperature and to resist various contaminations of the samples and transported to the laboratory immediately for the experimental analysis and were kept in freezing condition (at low temperature, about $4^{O}C$).

Table 2: The depth of each sampling tube-well and its installation time

Sample ID	About depth of tube-well (in meter)	Installation duration (in year)
S-01	36.50	02
S-02	30.50	07
S-03	25.90	16
S-04	30.50	25
S-05	48.80	01
S-06	36.50	01
S-07	30.50	35
S-08	30.50	08
S-09	25.90	10
S-10	35.05	01
S-11	54.90	05
S-12	30.50	20
S-13	25.90	17
S-14	35.05	05
S-15	35.05	25
S-16	45.70	08
S-17	35.05	01
S-18	30.50	07
S-19	36.50	10
S-20	35.05	15
S-21	16.80	02
S-22	45.70	01
S-23	30.50	05
S-24	39.60	01
S-25	30.50	25
S-26	16.80	01
S-27	24.40	01
S-28	30.50	03
S-29	30.50	10
S-30	50.30	02

Analysis

-- Physical analysis

***Color* :** Colors of the water samples were observed by naked eye immediately after collection of the samples.

***Odor* :** The odors were felt through nose feeling by taking smell directly.

***Taste* :** Tastes were felt through drinking of the water samples directly.

***Temperature* :** The temperatures were recorded on the site of sampling by dipping the thermometer (mercury filled centigrade thermometer calibrated from 0°C to 100°C) into the respective water samples (bottles) for about one minute.

***Total Solids (TS)* :** 50 ml water samples (from each tube-well) into 100 ml beakers were placed into oven dry machine for 24 hours at 105°C. The amount of total solids was calculated by differencing the weights of empty beakers and the weights of respective beaker with remaining total solids after removal of water.

***Total Dissolved Solids (TDS)* :** 50 ml water samples (from each tube-well) was filtered (Whatman-42 filter paper) and those filtered water were taken into 100 ml beakers. These were placed into oven dry machine for 24 hours at 105°C. Total dissolved solids was calculated by differencing the weights of empty beakers and the weights of respective beaker with remaining total solids after removal of water.

***Total Suspended Solids (TSS)* :** The values of TSS of those samples were recorded by subtracting the respective TDS value from respective TS value.

-- Chemical analysis

***Acidity/Alkalinity (pH)* :** The pH values were determined by using microprocessor pH meter (HANNA, pH 211) in our laboratory.

***Arsenic (As)* :** The amount of arsenic in each sample was determined by atomic absorption flame spectrometer (Shimadzu, AA-7000) in laboratory of Asia Arsenic Network, Jessore, Bangladesh.

***Bicarbonates (HCO_3^-) and Carbonates (CO_3^{2-})* :** The bicarbonate and carbonate contents were determined by titrimetric method with standardized 0.086N H_2SO_4 solution in our laboratory as mentioned by Jackson (1973).
***Calcium (Ca^{2+})* :** The calcium contents were determined by titrimetric method with standardized 0.01N EDTA solution as mentioned by Schwartzenbach *et al.* (1946).
Chloride (Cl^-) : The contents of chloride were determined by titrimetric method with standardized 0.05N $AgNO_3^-$ solution in our laboratory as mentioned by Jackson (1973).
***Dissolved Oxygen (DO)* :** Dissolved oxygen in the samples was measured by digital DO meter (HANNA, HI98193) in our laboratory.
***Electrical Conductivity (EC)* :** The electrical conductivity values were determined by using conductivity meter (HANNA, EC 214) in our laboratory.
***Iron (Fe)* :** The iron contents were determined by colorimetric method with spectrophotometer (APEL, PD–303 UV) at 510 nm wavelength.
***Magnesium (Mg^{2+})* :** The calcium + magnesium contents were determined by titrimetric method with standardized 0.01N EDTA solution as mentioned by Schwartzenbach et al. (1946). Then, the magnesium contents were determined by subtracting the calcium contents of each sample from the calcium + magnesium contents of the respective samples.
***Manganese (Mn)* :** The manganese contents were determined by Atomic absorption flame spectrometer (Shimadzu, AA-7000) in laboratory of Asia Arsenic Network, Jessore, Bangladesh.
***Nitrogen (N)* :**
Ammonium (NH_4^+) The ammonium contents of the water samples are determined by distillation (kjeldahl) method.
Nitrate (NO_3^-) + Nitrite (NO_2^-) The ammonium + nitrate + nitrite contents were determined by distillation (kjeldahl) method with davarda's alloy (reducing agent). Then, the nitrate + nitrite contents were determined by subtracting the ammonium contents of each sample from the ammonium + nitrate + nitrite contents of the respective samples.
***Phosphate (PO_4^{3-})* :** The phosphate contents were determined by colorimetric (molybdophosphoric blue color) method with spectrophotometer (APEL, PD–303 UV) at 882 nm wavelength as mentioned by Jackson (1967).
***Potassium (K^+)* :** The potassium contents were determined by flame photometer (JENWAY, PFP7).
***Sodium (Na^+)* :** The sodium contents were determined by flame photometer (JENWAY, PFP7).
***Sulfate (SO_4^{3-})* :** Sulfate contents were determined by turbidimetric method with spectrophotometer (APEL, PD–303UV) at 420 nm wavelength as mentioned by Hunt (1980).

-- Bacteriological analysis
Spread plate technique is performed for observing the presence or absence of coliform bacteria in the water samples (APHA, 2003). The eosin methylene blue agar (EMB) is used a selective and differential medium to observe the presence of coliform bacteria (gram-negative bacteria). This experiment is conducted with two replications for each sample.
***Total coliforms* :** Each 1 ml of water (from each sample) was transferred by the sterilized pipette and spread on the EMB agar plates. All the plates were inoculated at 37°C for 24 hours. The agar plates were transferred to laminar air flow chamber. The red or pink colored colonies on the agar plates indicated the presence of total coliforms in the respective water samples.
Fecal coliform (Escherichia coli bacteria*)* : Each 1 ml of water (from each sample) was transferred by the sterilized pipette and spread on the EMB agar plates. All the plates were inoculated at 44.5°C for 24 hours. The agar plates were transferred to laminar air flow chamber. The blue black with green metallic sheen colored colonies on the agar plates indicated the presence of *E. coli* (fecal coliforms) in the respective water samples.
All analyses were conducted with 3 replications for each sample.

III. RESULTS AND DISCUSSIONS

The findings of the experiment are mentioned with relative discussions in the below.
---- Physical parameters
The physical parameters for the experiment are color, odor, taste, temperature, total solids (TS), total dissolved solids (TDS) and total suspended solids (TSS). Summary of these findings are shown in Table 3.
Color
It is found that, 3 samples (S-13, S-22, and S-30) among 30 are relatively yellowish, shown in Table 3. It may cause due to excessive amount of iron (Fe) as found in their determination.
Odor and Taste
The tube-well waters collected from various locations have no bad odor and its tastes are favorable in all samples, shown in Table 3.
Temperature
The measured temperatures of the water samples range in 24-26°C at the time of collection, shown in Table 3. This range shows that the found temperatures of water samples are valid under standard value for drinking water which is recommended by WHO and Bangladesh standard (ECR, 1997).
TS, TDS and TSS
The TS, TDS and TSS values in the studied area varied between 400-1100 mgl^{-1}, 350-950 mgl^{-1} and 5-300 mgl^{-1} respectively, shown in Figure 2.

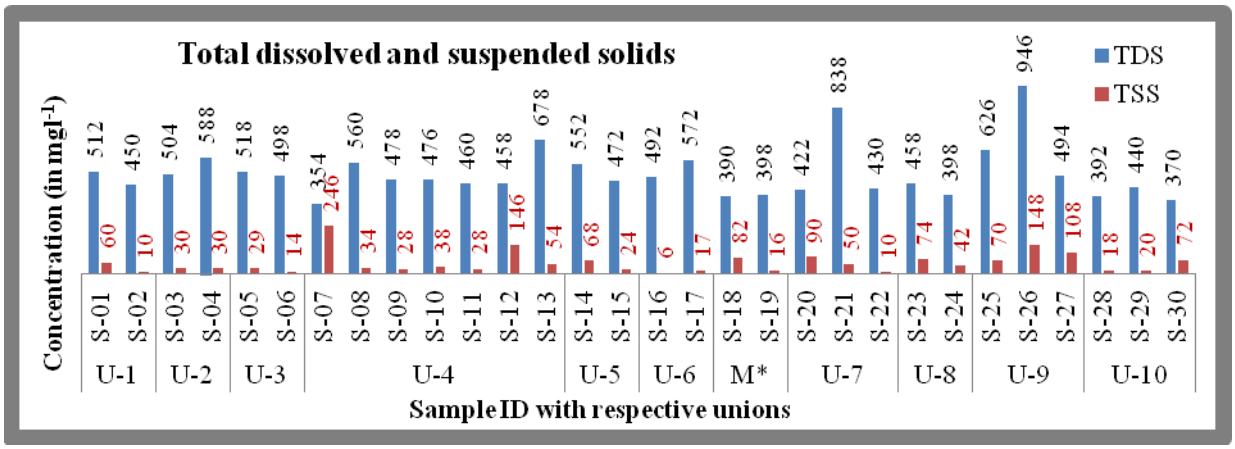

Figure 2: Measured TDS and TSS values of the water samples

The Bangladesh standards for the TDS and the TSS values are about 1000 mgl^{-1} and 10 mgl^{-1} respectively. According to the standard, the majorities of the samples have the TDS values within optimum range but have higher TSS values. The relatively optimum values of TDS may ensure the resistance of different types of disease like cancer, coronary heart disease, arteriosclerotic heart disease and cardiovascular disease, etc.

Table 3: Summary of measured physical parameters of water samples

Sample ID	Color	Odor	Temperature (^{O}C)	TS (mgl^{-1})	TDS (mgl^{-1})	TSS (mgl^{-1})
S – 01	Colorless	Odorless	25.0	572	512	60
S – 02			25.0	460	450	10
S – 03			25.0	534	504	30
S – 04			25.0	618	588	30
S – 05			24.5	547	518	29
S – 06			25.0	512	498	14
S – 07			25.0	600	354	246
S – 08			25.0	594	560	34
S – 09			25.0	506	478	28
S – 10			25.0	514	476	38
S – 11			25.0	488	460	28
S - 12			24.5	622	458	146
S – 13	Yellowish		25.0	732	678	54
S – 14	Colorless		25.0	620	552	68
S – 15			25.0	496	472	24
S – 16			24.5	498	492	06
S – 17			25.0	589	572	17
S – 18			25.0	472	390	82
S – 19			25.0	414	398	16
S – 20			25.5	512	422	90
S – 21			25.0	888	838	50
S – 22	Yellowish		25.0	440	430	10
S – 23	Colorless		25.0	532	458	74
S – 24			24.5	440	398	42
S – 25			24.5	696	626	70
S – 26			25.0	1094	946	148
S – 27			24.5	602	494	108
S – 28			25.0	410	392	18
S – 29			24.5	460	440	20
S – 30	Yellowish		25.0	442	370	72

---- Chemical parameters

Acidity/Alkalinity (pH)

The pH values in the studied area varied between 7.14-7.45. In all samples the pH value is found within the prescribed limit (6.5-8.5) by WHO guideline and Bangladesh standard, shown in the Figure 3.

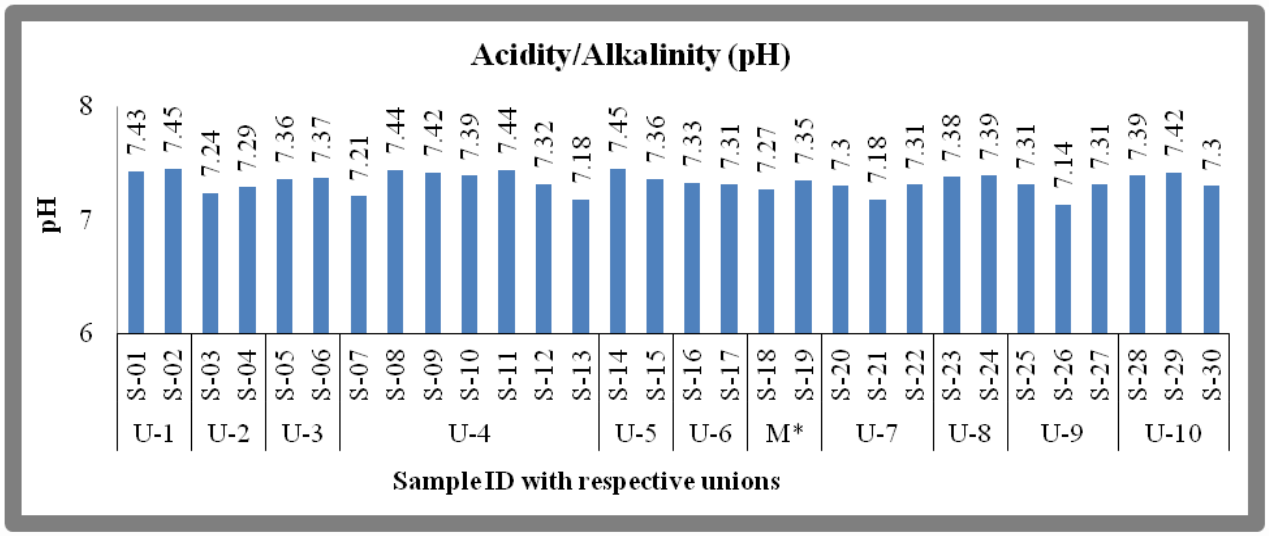

Figure 3: Measured pH values of the water samples

Arsenic (As)

Most of the tube-wells in the studied area contain arsenic (As) under acceptable limit, 0.01 mgl^{-1} (recommended by WHO, 2011). But, three samples (S-13, S-22 and S-30) contain the higher amount of As than the limit. The sample S-22 (Old Ishwardi) contains about 0.23166 mgl^{-1} of As that exceeds even the acceptable limit in Bangladesh (0.05 mgl^{-1}), shown in Figure 4. It may have remain arsenic problems and may cause different chronic diseases in human body like as nausea, vomiting, diarrhea, burning of mouth and throat, arsenicosis, etc. The continuous consumption of the tube-well water (S-22) should be avoided to protect from these chronic diseases.

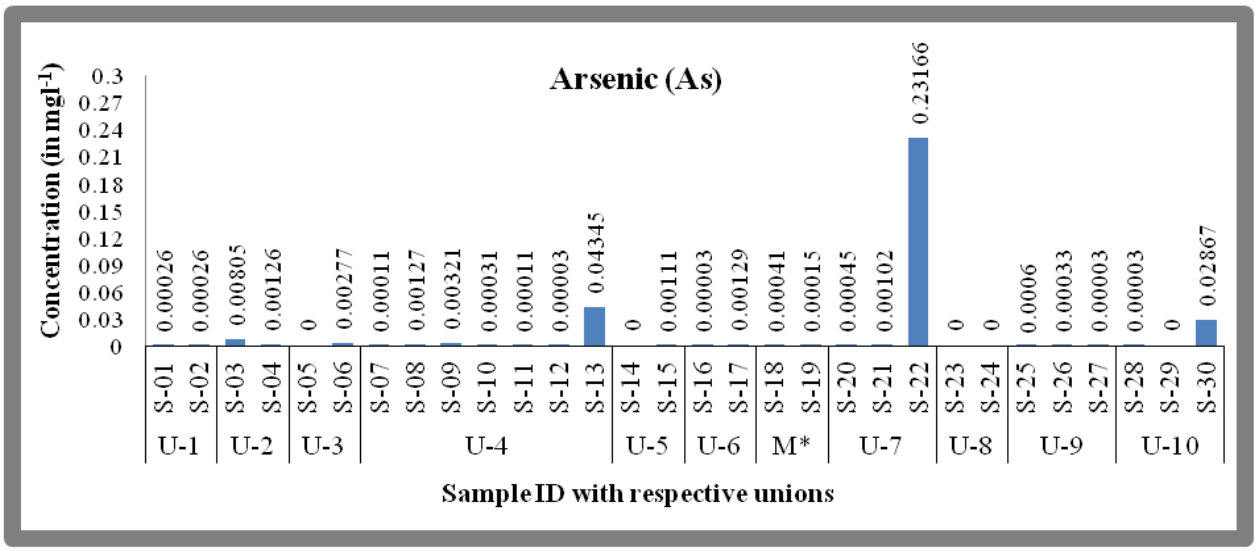

Figure 4: Measured As contents of the water samples

Bicarbonates (HCO_3^-)

The carbonate form is not found in any sample. Bicarbonate in the samples varied between 525-1102 mgl^{-1}, are shown in the Figure 5. Among the measured samples about 30% samples ranging in 500-700 mgl^{-1}, 60% samples ranging in 700-900 mgl^{-1} and 10% ranging in 900-1100 mgl^{-1}.

Majority of samples showed bicarbonate amounts around the prescribed standard 600 mgl^{-1} by Bangladesh standard (ECR, 1997). The optimum or relatively higher bicarbonate amounts may help in reducing gastric acidity finally helpful for digestion and may have prevention effect on dental cavities in human bodies.

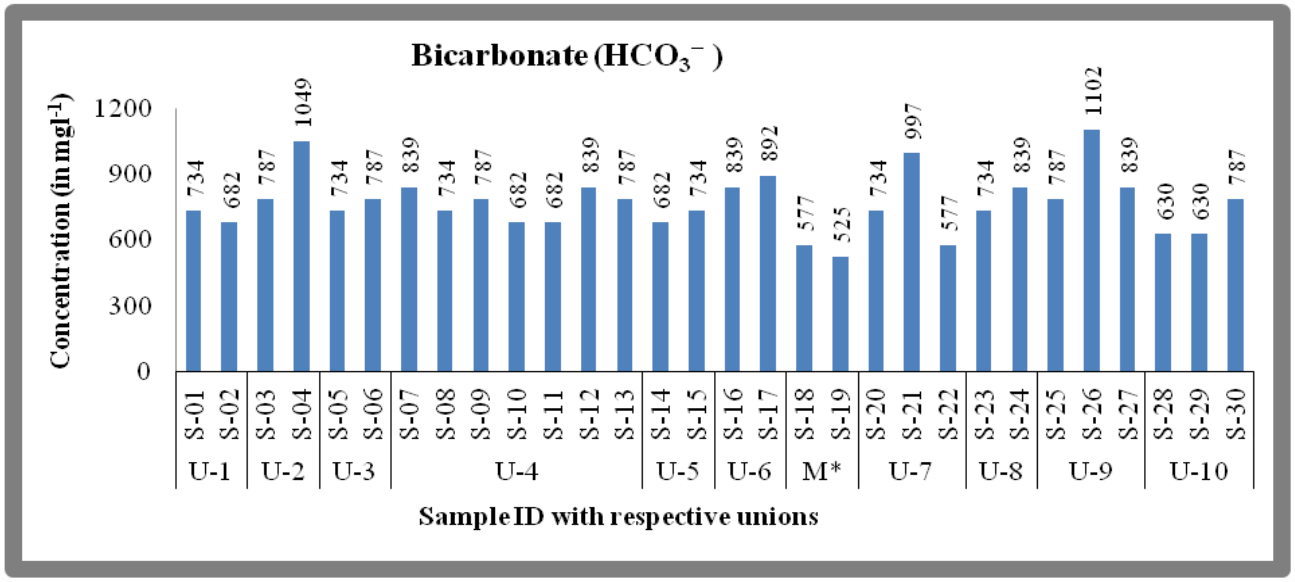

Figure 5: Measured HCO_3^- contents of the water samples

Calcium (Ca^{2+})

Calcium contents varied between 50-160 mgl^{-1}, shown in Figure 6. Majority of the samples showed calcium concentrations around the prescribed standard 75 mgl^{-1} by Bangladesh standard. In human body, the cell's formation and mechanism may not be affected due to the deficient or the excess of Ca^{2+}.

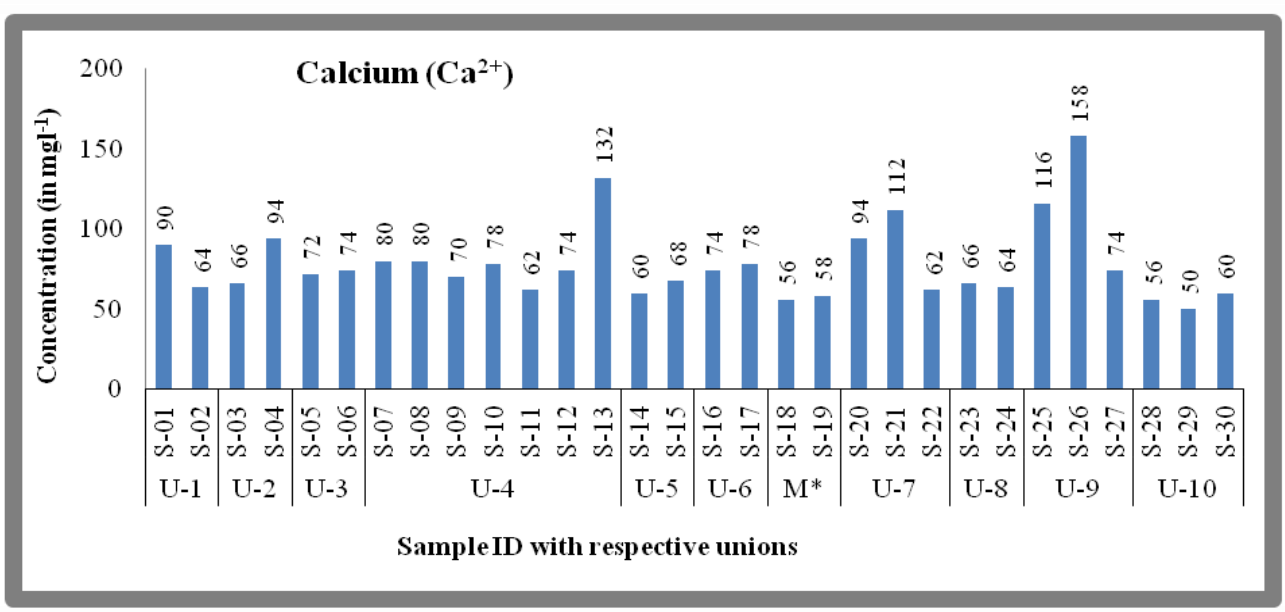

Figure 6: Measured Ca^{2+} contents of the water samples

Chloride (Cl^-)

Chloride contents of the samples in the studied area varied between 17.75-142 mgl^{-1}, shown in Figure 7. Within the range about 83.33% samples contain about less than 50 mgl^{-1} and only 16.67% samples contain 50-142 mgl^{-1}. All the samples showed much lower chloride contents than the prescribed standard (250 mgl^{-1}) by WHO and below the standard range (150-600 mgl^{-1}) provided by Bangladesh standard. There is no salty tasted water may be due the lesser amount of the chloride.

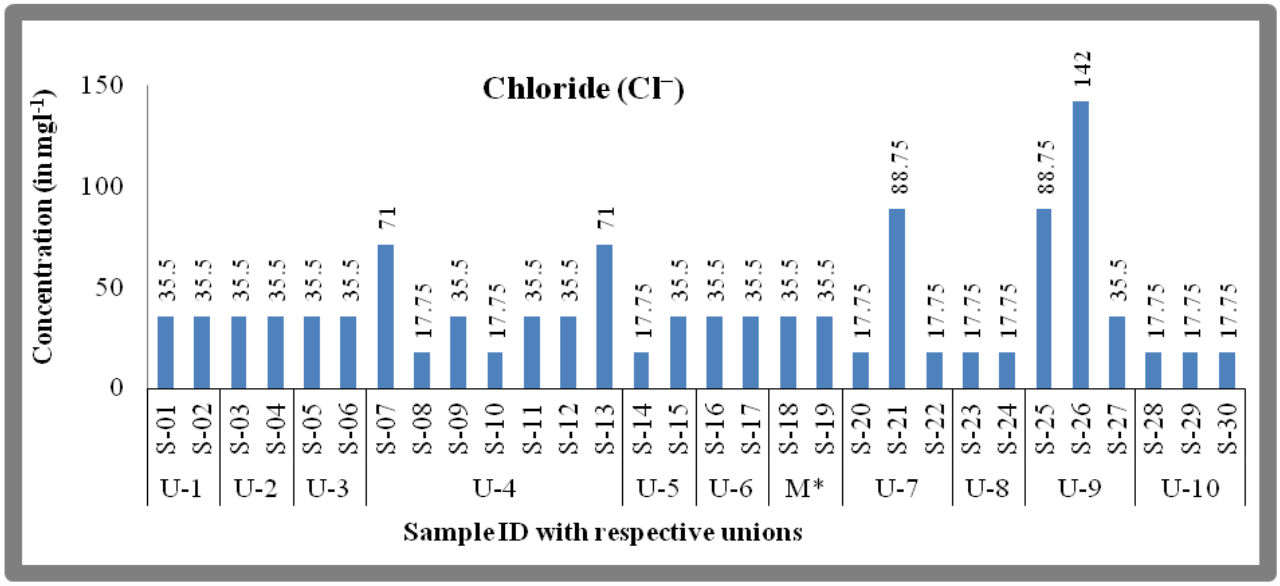

Figure 7: Measured Cl^- contents of the water samples

Dissolve Oxygen (DO)

DO values varied between 6.20-7.40 mgl^{-1}, shown in Figure 8. All the samples showed DO contents around or more than the prescribed standard (6 mgl^{-1}) by Bangladesh standard (ECR, 1997). The relatively higher or optimum amount of the DO may indicate decreased amount of reduced elements (S^{2-}, CH_4, etc.), less organic contents (to decompose), oxic environment, good tastes of water.

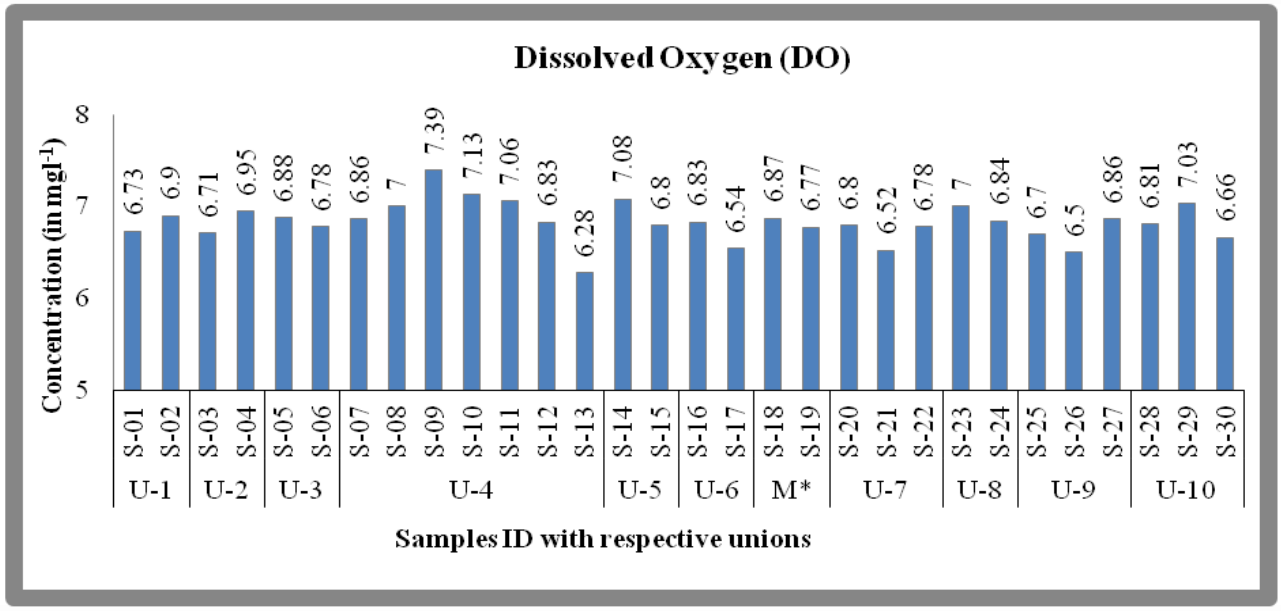

Figure 8: Measured DO contents of the water samples

Electrical Conductivity (EC)

Conductivity values in the studied area varied between 540-1460 µS/cm, shown in Figure 9. Within the range about 70% samples have EC within 700-1460 µS/cm and 30% samples have EC within 540-700 µS/cm. Majority of the samples (70%) showed higher EC than the prescribed standard 700 µS/cm by Bangladesh standard (ECR, 1997). The drinking water with conductivity indicates the presence of dissolved inorganic substances in ionized form.

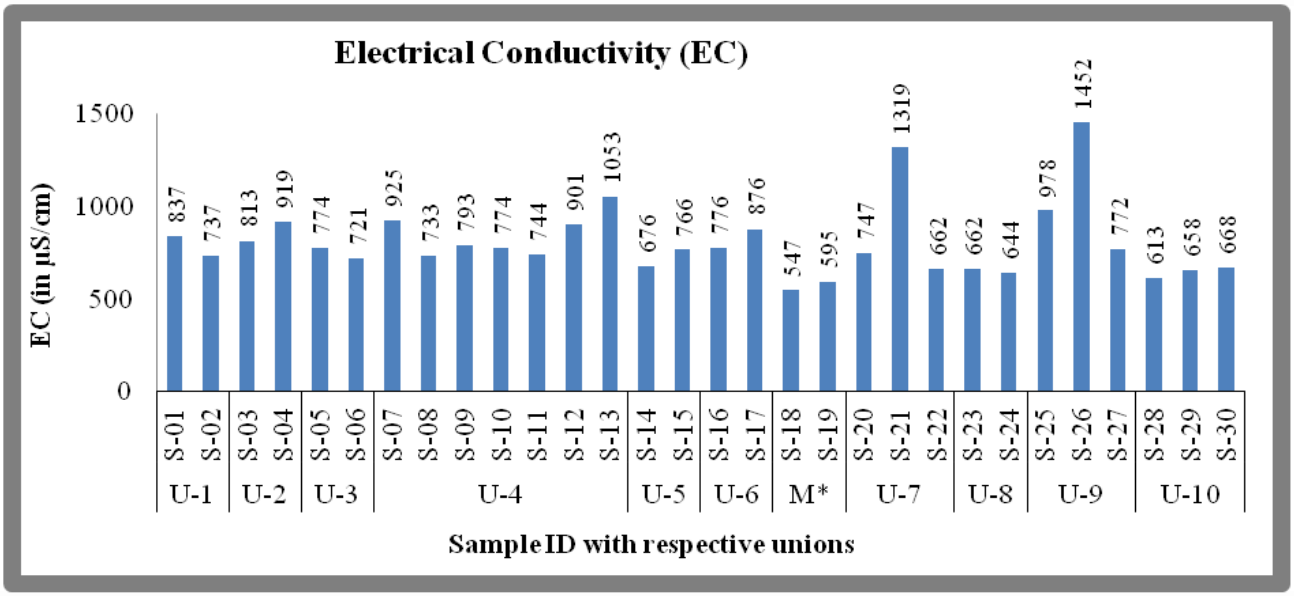

Figure 9: Measured EC values of the water samples

Iron (Fe)

Iron content of the samples in the studied area varied between 0.21-2.45 mgl^{-1}, shown in Figure 10. Within the range about 86.67% samples (26 out of 30 samples) contain less than 1 mgl^{-1} and only 13.33% samples (4 out of 30 samples) contain 1-2.45 mgl^{-1}. Majority of the samples (70%) showed Fe contents within the range of 0.1-0.3 mgl^{-1} provided by Bangladesh standard (ECR, 1997). The found relatively excessive amount of Fe in the three samples (S-13, S-22 & S-30) may be reason of their yellowish color.

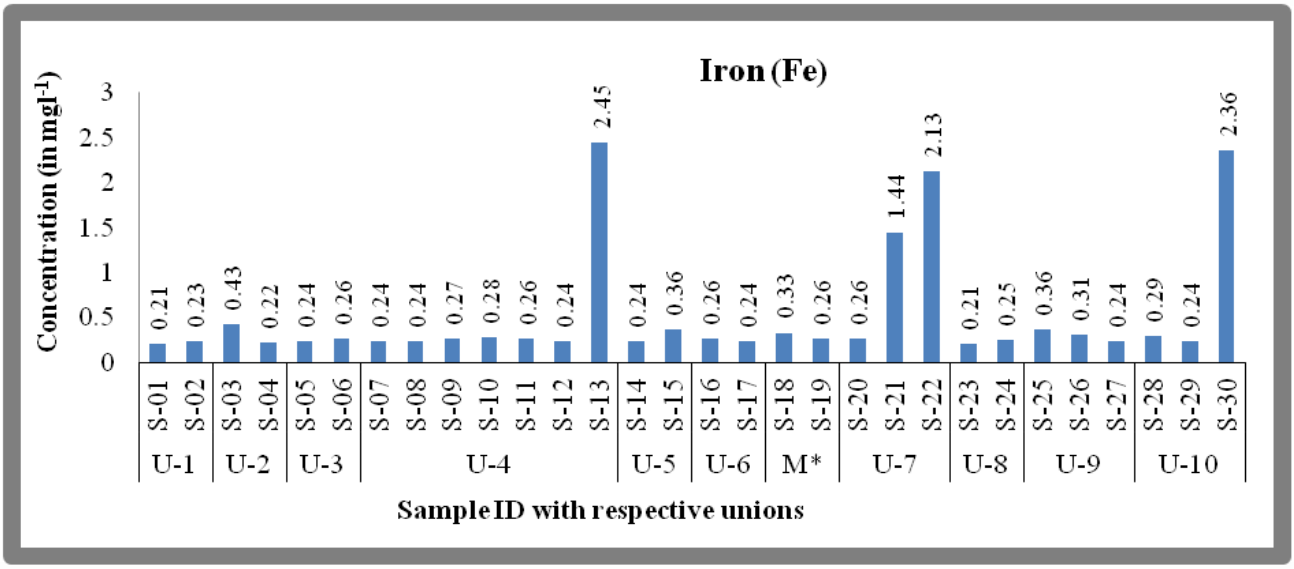

Figure 10: Measured Fe contents of the water samples

Magnesium (Mg^{2+})

Magnesium contents varied between 13.2-51.6 mgl^{-1}, shown in Figure 11. Within the range about 43.33% samples (13 out of 30 samples) contain in range of 30-35 mgl^{-1} (Bangladesh standard), about 30% samples (9 out of 30 samples) contain in range of 13-30 mgl^{-1} and about 26.67% samples (8 out of 30 samples) contain in range of 35-52 mgl^{-1}.

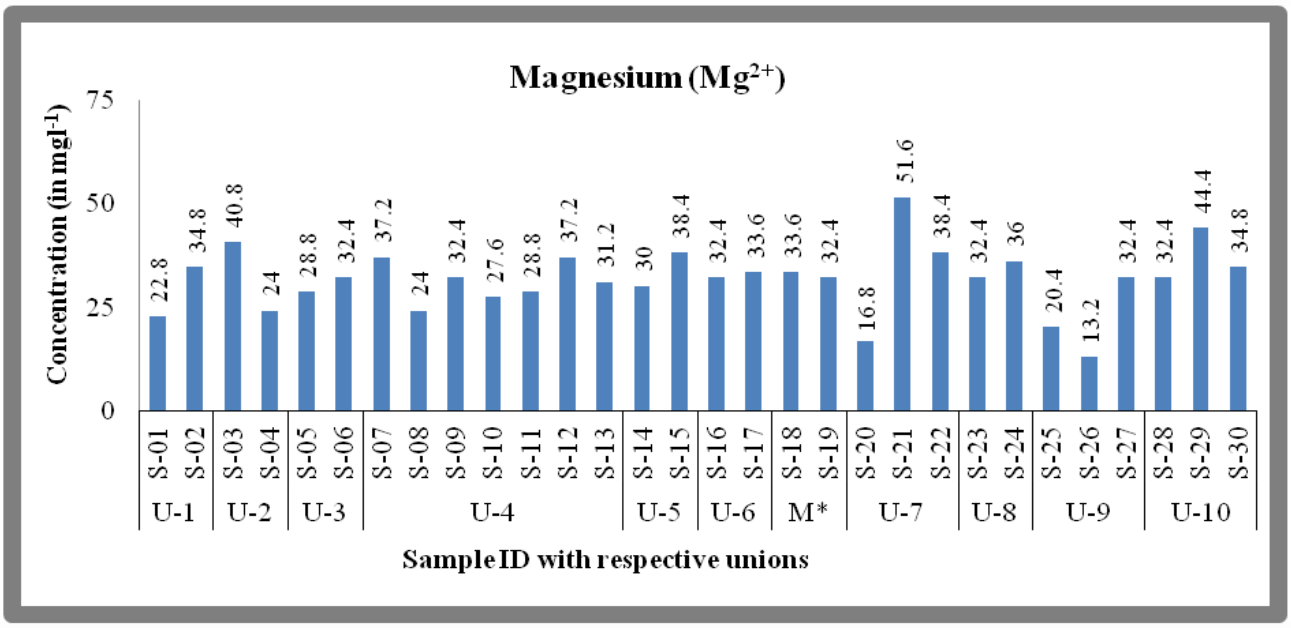

Figure 11: Measured Mg^{2+} contents of the water samples

Manganese (Mn)

Manganese contents varied between 0.25-3.41 mgl^{-1}, shown in Figure 12. It is found that, all samples contain higher Mn content than 0.1 mgl^{-1} (Bangladesh standard). Within the range about 83.33% samples (25 out of 30 samples) contain more than 0.5 mgl^{-1} (WHO standard). This high concentration of Mn in drinking water may cause different acute health problems like brain damage, neurological disorders, kidney and liver damage etc.

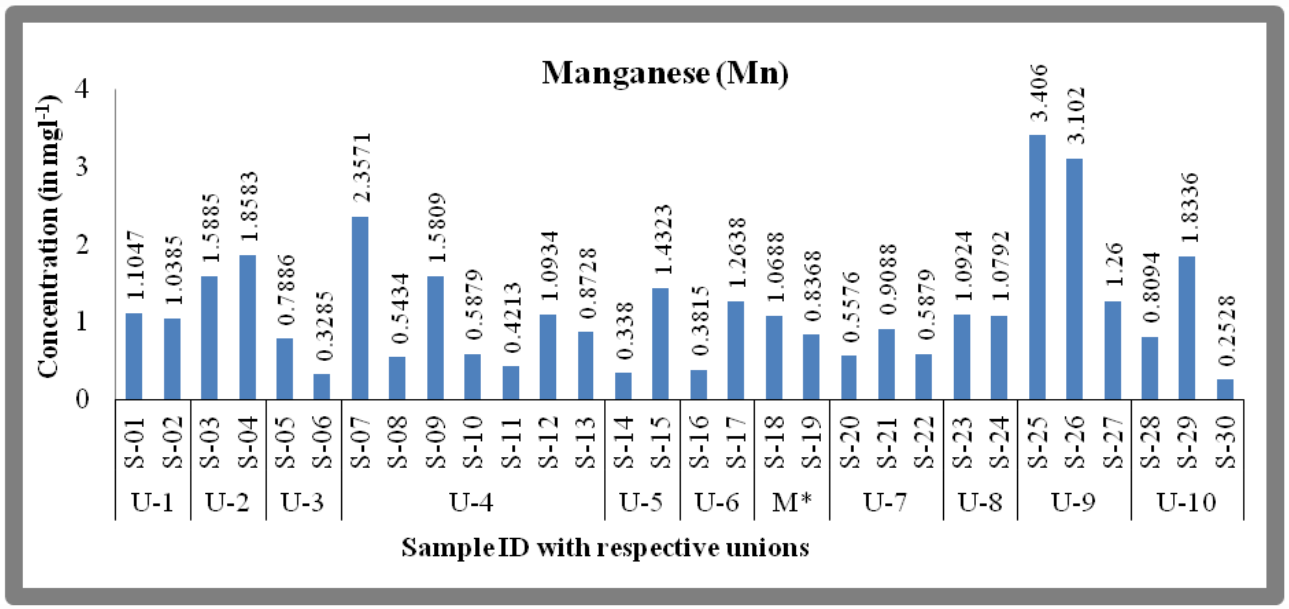

Figure 12: Measured Mn contents of the water samples

Nitrogen (N)

NH_4^+ and NO_3^- contents varied respectively between 18.48-50.82 mgl^{-1} and between 0-14 mgl^{-1}, shown in Figure 13. It is observed that, all samples contain relatively higher NH_4^+ contents than the standard (1.5 mgl^{-1}) by WHO. But, relatively lower NO_3^- contents compared to WHO's standard (50 mgl^{-1}) and around optimum condition in case of Bangladesh standard (10 mgl^{-1}).

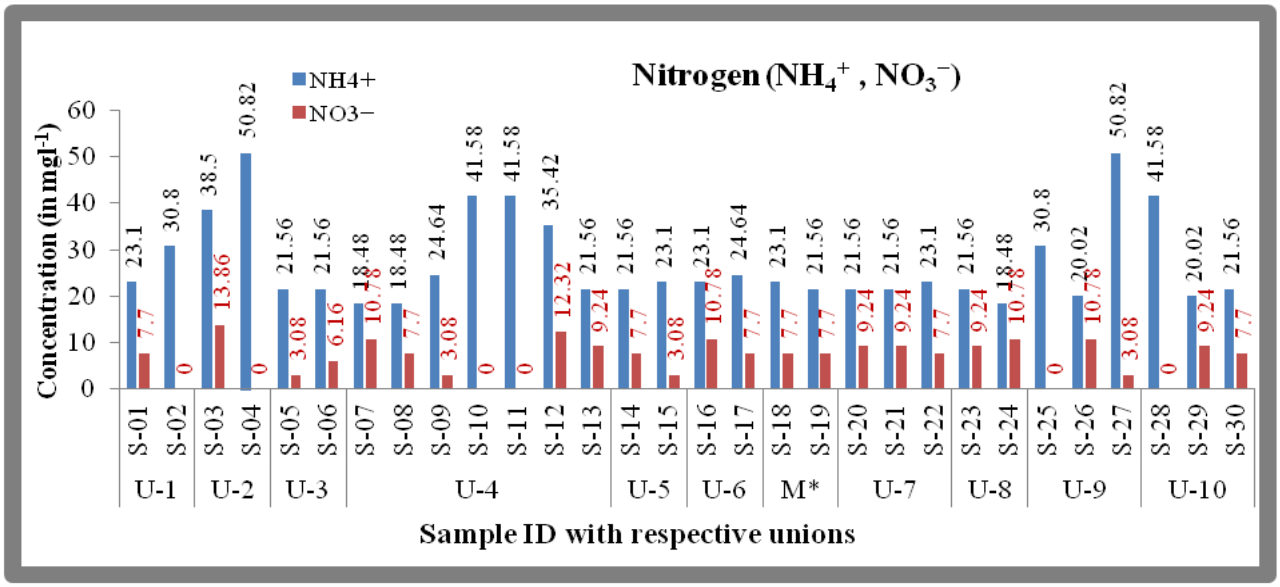

Figure 13: Measured N (NH_4^+ and NO_3^-) contents of the water samples

Phosphate (PO_4^{3-})

The found phosphate content of the samples varied between 0.230-0.900 mgl^{-1}, shown in Figure 14. All the samples showed much lower PO_4^{3-} contents than the prescribed standard (6 mgl^{-1} as phosphate) according to Bangladesh standard (ECR, 1997).

The less amount of P in the water samples may lead to less supply of P to human body with drinking water, and may cause malfunctioning of cells with its imbalanced structures. Therefore, we should uptake more P containing foods to fill the P requirement in our body.

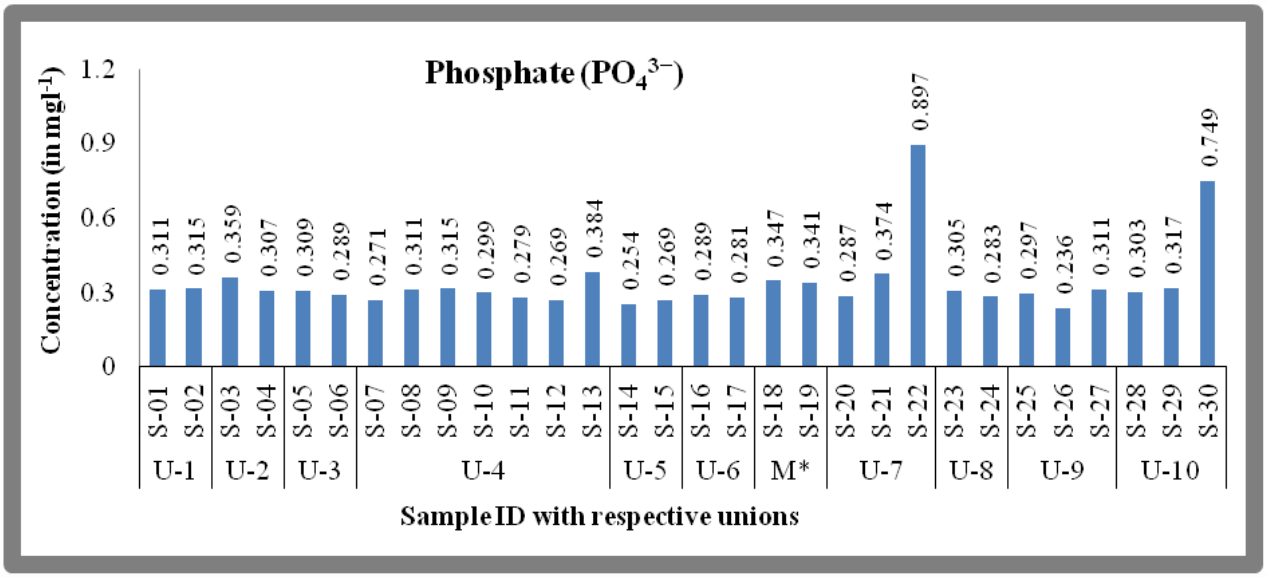

Figure 14: Measured PO_4^{3-} contents of the water samples

Potassium (K^+)

Potassium content of the samples in the studied area varied between 24-100 mgl^{-1}, shown in Figure 15. All the samples showed relatively more K concentrations than the prescribed standard (12 mgl^{-1}) by Bangladesh standard (ECR, 1997). The high amount of potassium may cause the hyperkalemia disease (high K in blood), tiredness, chest pain, etc.

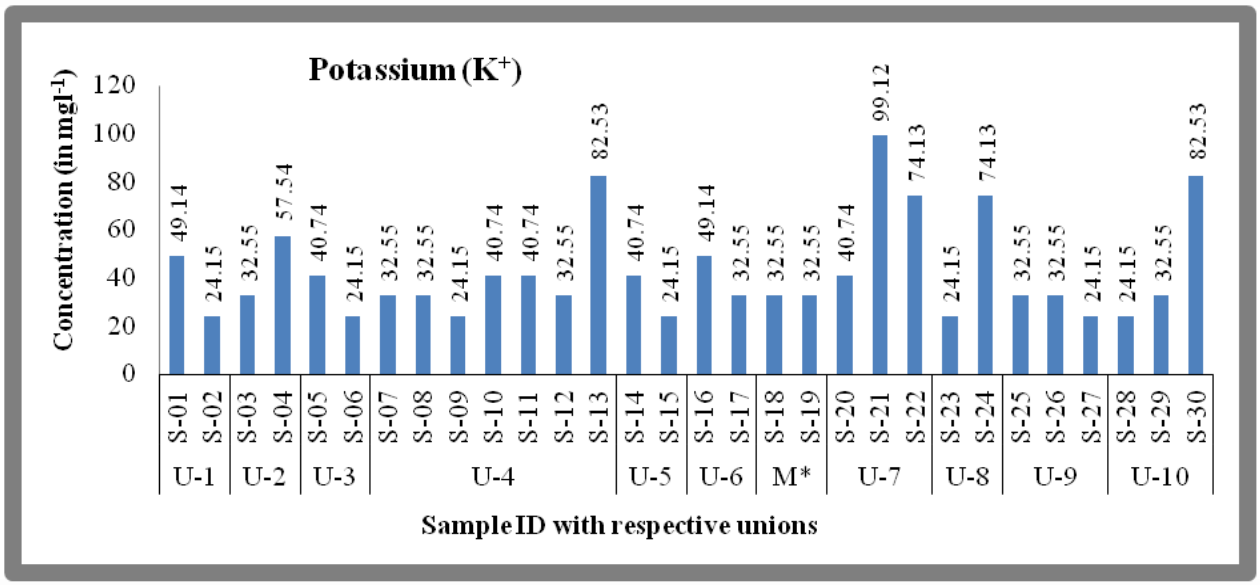

Figure 15: Measured K^+ contents of the water samples

Sodium (Na^+)

The sodium content of the samples in the studied area varied between 139-264 mgl^{-1}, shown in Figure 16. Within the range about 66.67% samples (20 out of 30 samples) have Na in range of 139-200 mgl^{-1} and only 33.33% samples (10 out of 30 samples) contain in range of 200-264 mgl^{-1}. It is found that, most of the samples having sodium contents around the prescribed standard 200 mgl^{-1} provided by WHO and Bangladesh standard (ECR, 1997).

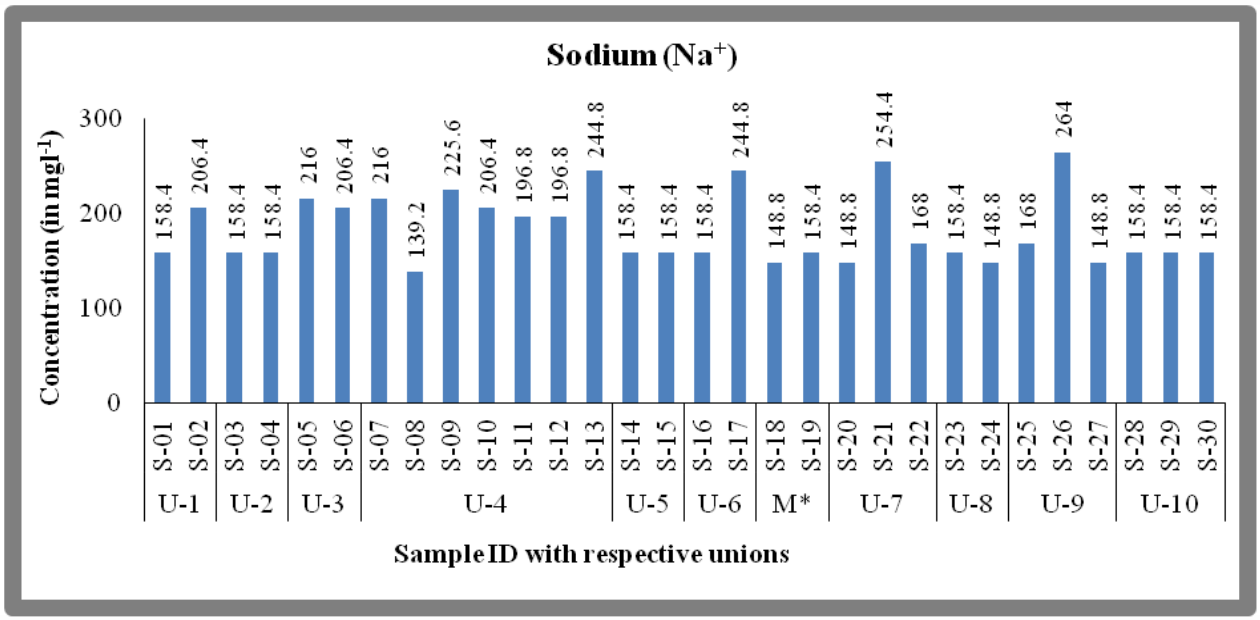

Figure 16: Measured Na^+ contents of the water samples

Sulfate (SO_4^{3-})

Sulfate content of the samples in the studied area varied in 1.33-20.07 mgl^{-1}, shown in Figure 17. All the samples showed much lower SO_4^{3-} contents than the prescribed standard (400 mgl^{-1}) by Bangladesh standard (ECR, 1997). The sulfur deficiency may contribute to cell damage and to joint pain and disease in human bodies. Therefore, we should uptake more S containing foods as daily diet to cover the deficiency from drinking water.

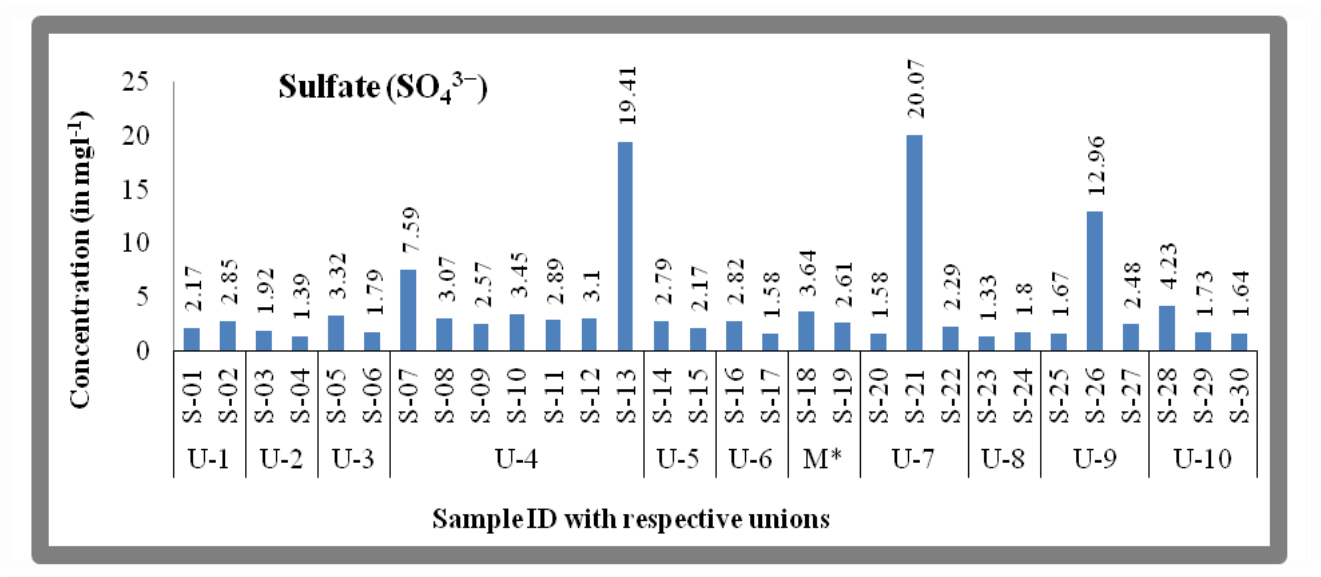

Figure 17: Measured SO_4^{3-} contents of the water samples

---- Bacteriological analysis

Majority of samples are free from coliform bacteria. But, the presence of *E. coli* bacteria is observed in 9 out of 30 samples, shown in Figure 18, and some samples contain relatively in higher contents (visually observation). The presence of *E. coli* in drinking water causes very harmful diseases like acute diarrhea, abdominal cramps, nausea, headache, vomiting and fever. Relative high concentration may cause death of human life. In here, the *E. coli* is found in about 30% samples of studied. Some have relatively higher amount of the *E. coli*. It may be caused due to the less depth of tube-well, improper sanitation system (like, closed distance to tube-wells), poor soil quality (to filtrate the bacteria during deep percolation of groundwater), etc.

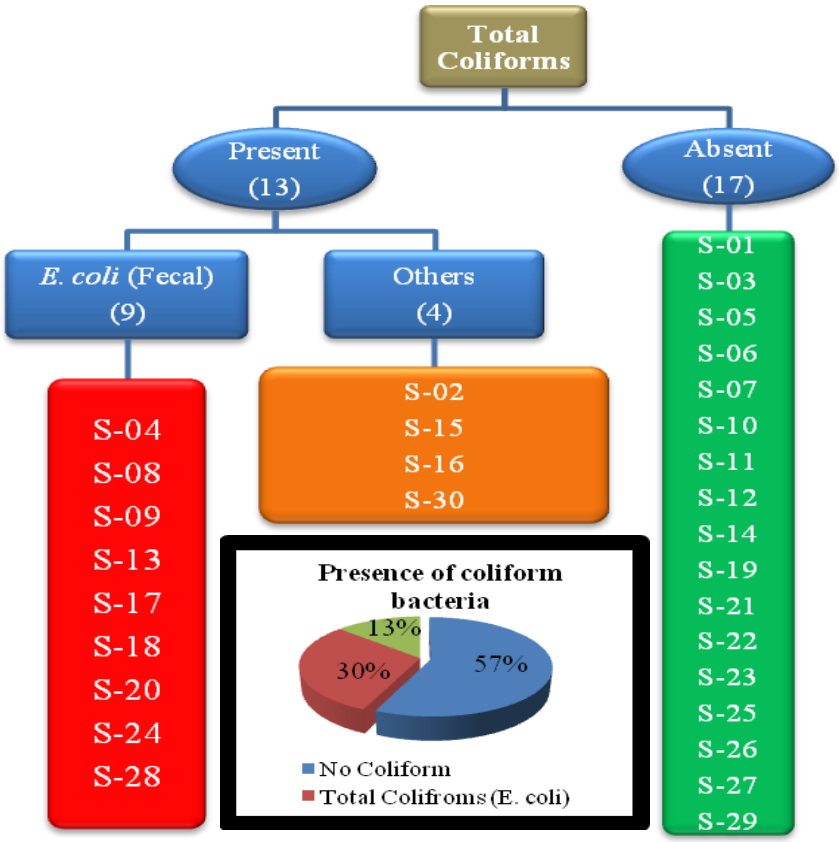

Figure 18: Presence / absence of total coliform and *E. coli* bacteria in studied samples

■ **Water Quality Status**

In terms of pH, EC, DO, TDS, TSS, Na^+, K^+, Ca^{2+}, Mg^{2+}, Fe, Cl^-, NO_3^-, HCO_3^-, SO_4^{3-} and PO_4^{3-} (15 parameters) the studied water samples are placed into four categories (status) according to water quality index. The found water quality status with relative percentages in the studied area is shown in the Figure 19.

The result of the water quality status shows that, more than 50% of the studied samples may be relatively poor (57%) and about 17% of very poor quality for drinking purpose. Only about 3% may good and 23% of unsuitable for drinking purpose (in case of the considered 15 parameters).

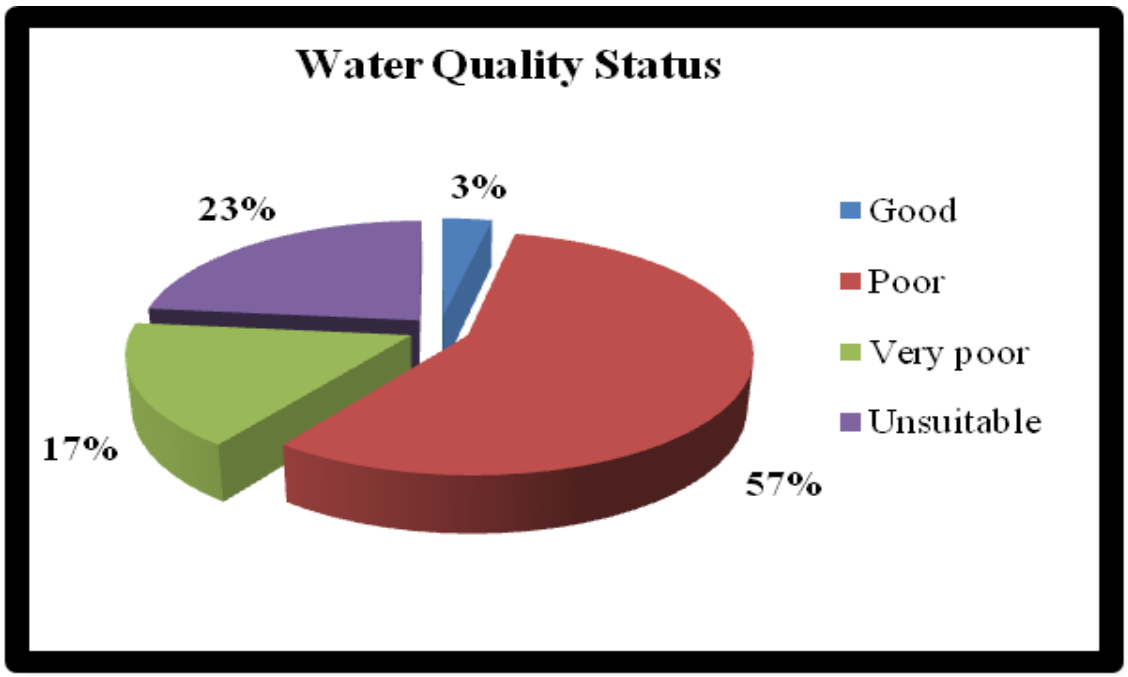

Figure 19: Water quality status in the studied area for drinking purpose

From the whole experiment, it is found that, from the average viewpoint, the studied physical parameters color, odor, taste, temperature, are in acceptable conditions, TDS contents varies within the standard value and TSS of relatively higher concentrations in relation to standard range for drinking purpose. Among chemical parameters pH, bicarbonate, calcium, DO, EC, iron, magnesium, nitrate, potassium and sodium belongs to around the optimum limit (acceptable). But, the Chloride, Phosphorus and Sulfur are relatively lower contents on average from the standard conditions. In some part of the upazila arsenic (highest in S-22) is found above the acceptable limit 0.01 mgl^{-1} recommended by WHO. A noticeable percentage of *E. coli* contamination is found in tube-well water of the studied area.

IV. CONCLUSION

The experiment is conducted to observe the suitability of tube-well water with different physical (color, odor, taste, temperature, TS, TDS and TSS), chemical (pH, As, HCO_3^-, Ca^{2+}, Cl^-, DO, EC, Fe, Mg^{2+}, Mn, N, PO_4^{3-}, K^+, Na^+ and SO_4^{3-}) and bacteriological (total coliforms and *E. coli* bacteria) parameters in Lalpur upazila of Natore district. Therefore, total 30 tube-well water samples from different unions/municipality under the upazila are collected on August, 2018. The findings of the experiment can be summarized and concluded as in the followings.

- ⇨ The measured temperatures of the water samples belong to the standard range at the time of collection. Most of tube-well waters are found colorless. Among 30 about 3 samples are relatively yellowish. There are no bad odor and bad taste (tasteless in terms of various offensive tastes) of the water samples. A large number of total samples have the TDS value within the optimum range but have a relatively higher TSS values than the Bangladesh standard (ECR, 1997).

- ⇨ The pH values are found within the standard range for drinking purpose. The carbonate form was not found in any sample. According to Bangladesh standard, the DO and electrical conductivity values belong to around the optimum condition (in case of drinking purpose).

- ⇨ Most samples don't contain arsenic in such amount to cause different acute disease (problems). But, from old Ishwardi (under the Lalpur upazila), a water sample show much higher concentration of As than the acceptable limit according to WHO guidelines and Bangladesh standard (ECR, 1997). Most of the samples have optimum and relatively higher concentration of bicarbonate with reference to Bangladesh standard. About 3-4 samples (S-13, S-21, S-25, S-26) contain relatively higher amount of calcium than that of Bangladesh standard. Chloride contents are much lower than the standard. About 70% of the studied samples have iron within the standard range (ECR, 1997), but S-13, S-21, S-22 and S-30 contain higher iron content. Magnesium ions remain in around optimum concentrations in the studied water samples. Most of the samples contain much higher content of manganese than the acceptable limit by Bangladesh standard (ECR, 1997) and WHO guidelines. Relatively higher amount of NH_4^+ and lower amount of NO_3^- are found in these water samples from the standard values, it may be caused due to the depletion of dissolved oxygen after pumping from tube-wells. Much lower amount of phosphates is found in all samples in relation to the standard value. The potassium ion is found in higher concentrations in the different samples. Sodium ion has in around optimum range in these water samples. There is much lower concentration of sulfur is found in all the water samples.

- ⇨ About 57% of studied samples don't contain coliform bacteria. But, 30% of *E. coli* and 13% of other coliform bacteria in respect to total samples are found.

In case of pH, EC, DO, TDS, TSS, Na^+, K^+, Ca^{2+}, Mg^{2+}, Fe, Cl^-, NO_3^-, HCO_3^-, SO_4^{3-} and PO_4^{3-} (15 parameters) more than 50% of the studied samples may be relatively poor (58%) and about 17% are of very poor quality for drinking purpose.
It should be used the relatively deep tube-well water for drinking purpose in the region in terms of coliform (*E. coli*) bacteria problems. Otherwise, the various fetal diseases may occur acutely for the consumption of the contaminated water. Even, it may cause the death of human beings. Besides, it should a further experiment for As at the old ishwardi (part of Lalpur upazila) to identify the levels As problems for human life and should be stopped the use of those tube-wells water. It can be found other arsenic-free deep aquifers for human consumption in this place.

There are some limitations to conduct the experiment completely and properly. Some important limitations are –

1. All parameters (trace and toxic elements like Cu, Zn, Pd, Cd, etc.) are not studied in this analysis.

2. Limited facilities in laboratories to conduct the experiment properly to get the more accurate results in case of some elements.

3. The nitrate determination is delayed about 5 days from the prescribed holding time due to over loaded pressure in laboratories through poor facilities.

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Role of Imaging Techniques in Evaluating Mastalgia at a Tertiary Care Hospital

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***Abstract*- BACKGROUND:** Breast pain may be cyclic or non-cyclic,focal or diffuse. Cyclic pain is thought to be due to hormonal changes, is usually bilateral and more in the upper and outer quadrants.Non-cyclic,focal pain is due to breast diseases,mostly benign. Role of imaging techniques like mammography and ultrasonography, in palpable breast lumps have been proven, however their role in cases of mastalgia alone is still a matter of research.

This study was to determine the value of breast imaging in patients with localised or diffuse pain in the breasts with no palpable abnormalities.

MATERIALS AND METHODS: This prospective, cross-sectional ,observational study was conducted in 96 patients suffering from mastalgia after informed consent. Females in the age group of 15-65 years suffering from mastalgia, in absence of pregnancy, palpable lump,nipple discharge,family history of carcinoma breast,hormonal pill use or history of breast implant, were included.After taking menstrual history and asking about type of pain, diffuse or focal,cyclic or non-cyclic and thorough breast examination, breast imaging was offered according to age. Those less than 40 years underwent sonomammogram while those above 40 years, mammography.Radiological appearances were classified on the basis of Breast Imaging Reporting And Data System(BIRADS).

RESULTS: 96 patients fulfilling the inclusion criteria underwent radiological imaging. Mean age was 31.9+_5 years. Mastalgia was non cyclic in 33(34.3%) and cyclic in 63(65.6%), unilateral in 72(75%) and bilateral in 24(25%). 40 women were parous(41.6%) and 46 nulliparous(47.9%).Imaging findings were normal/negative in 64(66.6%), benign in 20(20.8%), probably benign in 7(7.29%), suspicious in 4(4.16%) and only 1(1.04%) female it was malignant. The p-value was 0.0403 in those with BIRADS 2 and 0.0438 in those with BIRADS 4. Both these findings are statistically significant ($p<.05$).

CONCLUSION: Breast imaging, either sonomammography or mammography, helps in evaluating females suffering from only mastalgia and a normal report helps in reassuring them. Usually no abnormalities are detected in the painful areas. Benign radiological findings do not have major conseuence and prevalence of malignancy is very low. However biopsy should always be done in suspicious cases.

***Index Terms*-** Mastalgia, Mammography,Sonomammography, BIRADS

I. Introduction

Female breasts undergo physiological changes, beginning at puberty[1].After 30 years , the process of involution begins in most females, particularly the nulliparous ones. Fat content increases, so the female breast tissue becomes less dense. Glandular changes lead to fibrosis, microcyst formation and adenosis.

Of the various breast diseases, painful breasts or mastalgia have been reported since 1829[2].

Around 65% of the women in the age group of 30-50 years visit their doctor for mastodynia in western population[3] .Mastalgia, in the absence of any lump and in younger women is a rare symptom of breast cancer[4]. Unilateral, intense and constant breast pain is more likely to be due to cancer [5].Mastalgia or breast pain may be cyclic or non-cyclic, focal or diffuse. Quantifying breast pain is often difficult due to variability from person to person [6-7].

Cyclic pain is thought to be due to hormonal changes. It is obvious in the secretory phase, i.e. premenstrually and resolves after the onset of menstruation.15% of premenopausal women on combined oral contraceptive pills and 20% of postmenopausal women on hormonal replacement therapy experience similar pain. In such patients, pain is usually bilateral and more in the upper and outer quadrants[8].

Non-cyclic breast pain may be due to trauma, post-surgical, mastitis, duct ectasia, cyst or rarely breast cancer. Breast cancer causes pain in only 1.2-6.7% of cases[9] . Tietze syndrome, epigastric pain and angina pectoris may mimic mastalgia and should be ruled out.

There may be mechanical problems that may cause mastalgia like ill-fitting undergarments and big breasts.

Increasing awareness and fear of breast cancer often leads to gynaecological consultation. Mastalgia also affects the quality of life in many females[9]. Breast screening procedures i.e sonomammography and mammography is useful tools in detecting breast cancer early[10] .

Ultrasonography of breast helps in ruling out any pathology and reassuring the patient[11]. Mammography is very

sensitive in detecting breast carcinoma[12]. However it is less useful in women less than 35 years due to dense breast tissue in younger women.

Though the role of imaging techniques in women with palpable breast lumps have long been established, the value of breast imaging is not well known in those with mastalgia only. In our set-up, many patients consult gynaecologists for any problem related to their breasts, and there is no study in our state to assess the efficacy of imaging techniques in mastalgia without any palpable abnormalities. With this thought in mind, this study was carried out, to assess the utility of breast imaging techniques in patients suffering from mastalgia alone and to allay the fear of breast cancer in them.

II. AIMS AND OBJECTIVES

To assess the role of breast imaging techniques in women suffering from mastalgia alone,in whom there were no palpable abnormalities.

III. MATERIALS AND METHODS

A prospective cross-sectional observational study was conducted in the Department of Obstetrics & Gynecology, IGIMS, Patna in collabaration with Department of Radiology, IGIMS, Patna between October2016 to September 2017, after getting approval from Institutional Ethics Committee.

96 female patients suffering from mastalgia were enrolled after informed consent according to inclusion and exclusion criteria.

Inclusion Criteria
Age 15-65 years
Mastalgia

Exclusion criteria
Pregnancy
Palpable lump
Nipple discharge
Carcinoma breast
H/o breast implant
H/o OCPs or HRT

All consenting women, suffering from mastalgia, after taking menstrual history and asking about type of pain -nagging or stinging , diffuse or focal, cyclic or non-cyclic and thorough breast examination, were offered breast imaging .

Breast imaging was in the form of Mammography or Sonomammogram. Those less than 40 years underwent sonomammogram while those above 40 years underwent mammography. Ultrasonography was performed using Samsung USG machine with frequency of 8-13 Hz. The mammography machine used was Siemens NOVA3000. Radiological appearances were classified on the basis of Breast Imaging Reporting And Data System (BIRADS).

Breast Imaging and Reporting Data System (BIRADS) Categories:
0. Assessment incomplete, Need additional imaging evaluation / review prior studies for comparison.
1. Negative/normal, continue routine screening.
2. Benign finding, continue routine screening.
3. Probably benign finding (<2% malignant), initial short interval follow up suggested.
4. Suspicious abnormality (2 – 95% malignant), biopsy should be considered.
5. Highly suspicious of malignancy (>95%), appropriate action should be taken, (Biopsy and treatment, as necessary).
6. Known biopsy-proven malignancy, treatment is pending, assure that treatment is completed.

Main outcome to be assessed was the presence of any abnormal radiological finding and its nature if any. Fine Needle Aspiration Cytology was done in those with BIRADS 3 and above. Statistical analysis was done for descriptive statistics like mean of age and numbers. Percentage along with p-value for normal and abnormal findings was calculated using regression statistics (ANOVA).

IV. OBSERVATIONS

Of the 96 patients enrolled in the study , 70 underwent breast imaging, by ultrasonography and 26 by mammography, depending on their age . Figure I depicts distribution of patients according to their age. The mean age of the patients in the study was 31.9±5 years.

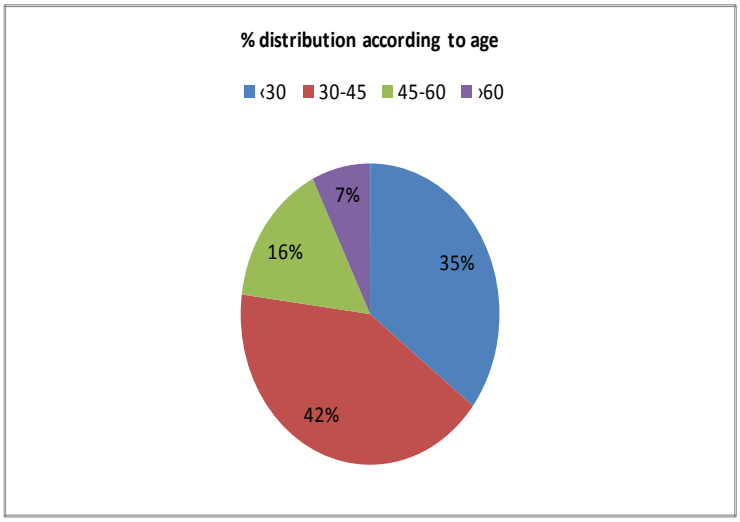

FIGURE 1

Table I shows that among 96 patients 33 had non cyclic mastalgia (34.3%) whereas in 63 it was cyclic (65.6%). 40 women were parous (41.6%) and 56 were nulliparous (58.4%). In 72 (75%) females, pain was unilateral, while 24(25%) were suffering from bilateral pain.

TABLE I

PARITY	CYCLIC MASTALGIA(63)	NON-CYCLIC MASTALGIA(33)
Nulliparous(56)	40	16
Parous(40)	23	17

Imaging findings were normal or negative in 64(66.6%), benign in 20(20.8%), probably benign in 7(7.2%), suspicious in 4(4.16%) and only in 1(1.04%) it was malignant (Fig-II).

Using regression statistics, p value were calculated according to BIRADS. The p-value was 0.0403 in those with BIRADS 2 and 0.0438 in those with BIRADS 4. Both these findings are statistically significant (p<.05) (Table II & III).

TABLE II

	<30 yrs	30-45 yrs	45-60 yrs	>60 yrs	P-VALUE
NORMAL	26(76.4%)	27(67.5%)	8(53.3%)	3(42.8%)	0.295
BENIGN	8(23.5%)	7(17.5%)	4(26.6%)	1(14.2%)	0.040*
PROBABLY BENIGN	0	4(10%)	2(13.3%)	1(14.2%)	0.876
SUSPICIOUS	0	2(5%)	1(6.6%)	1(14.2%)	0.043*
MALIGNANT	0	0	0	1(14.2%)	1

TABLE III

RADIOLOGICAL FINDING	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
BIRADS 1	-0.028634	0.203968	-1.403868	0.2954938	-0.116395	0.0591258
BIRADS2	3.733333	0.77316	4.828662	0.040313*	0.406690	7.059976
BIRADS3	0.22857	1.29929	0.175919	0.876557	-5.36183	5.818979
BIRADS4	2	0.433012	4.618802	0.043817*	0.136896	3.863103
BIRADS5	2.56395E-1	1.154700	2.22045E-1	1	-4.968275	4.96827

FNAC was performed in those with BIRADS 3 and above. One patient with heterogenous , ill defined hypoechoic lesion, who was 34 years old, had positive FNAC findings and was referred to general surgeon for further evaluation and carcinoma in situ was diagnosed on biopsy.

Of the 20 patients with benign findings, 8 had fibrocystic disease of breast, 5 had fibroadenoma and 3 had cysts. 2 each had lymphadenitis and ductal ectasia (FigIII).

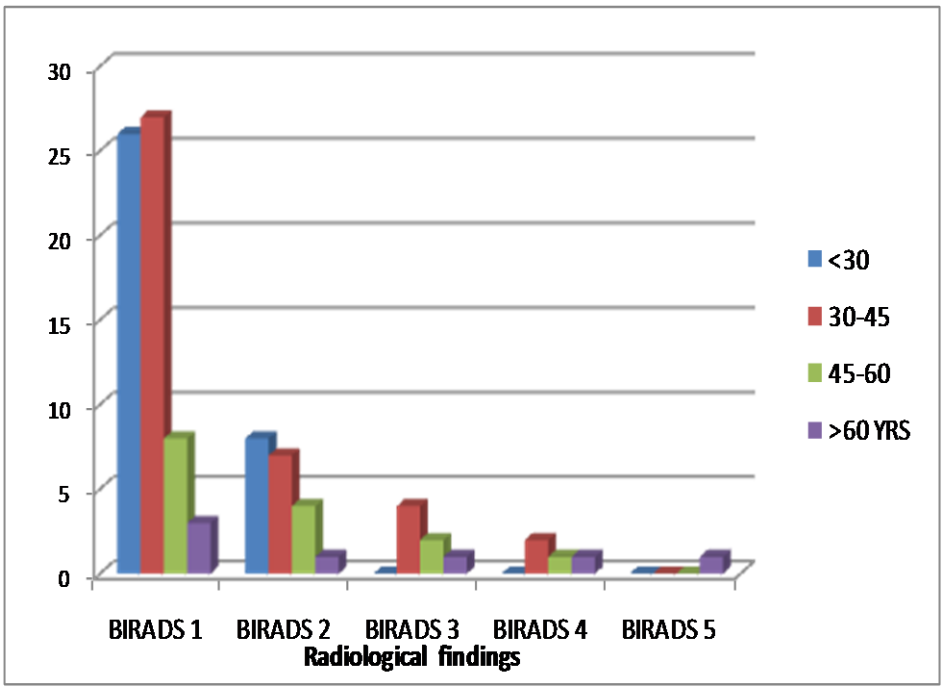

FIGURE 2.

V. DISCUSSION

Mastalgia is a common symptom females often complain of. Gynaecological consultation is rising due to increasing awareness among the female population regarding cancer of the breast. As breast cancer is one of the commonest cancers among females, women suffering from pain in breasts seek early consultation. Fear of cancer leads to a lot of anxiety and depression. Though a thorough history and meticulous clinical examination most of the times point towards no cause or a benign lesion like fibroadenoma is detected, most of the females opt for breast imaging to feel more assured. Breast imaging recommendations are made according to their age, the presence or absence of a lump and the nature of breast pain. The combined value of mammography and sonography in focal breast pain without palpable breast lesion is 100%[13].Triple test ,which includes, physical examination, mammography and biopsy is commonly practiced in those with palpable lumps[14]. Those without palpable lumps, similar to our study, undergo sonomammography if they are <40 years and mammography if they are >40 years. The present study is one of earliest in evaluating the role of various imaging techniques in females suffering from mastodynia without any palpable lump in our part of the country. This study proved to be statistically significant in patients with BIRADS 2 and BIRADS 4.

Most of the females in our population prefer to be examined by female doctors, hence compared to western countries; most females of mastalgia seek consultation from a female gynaecologist. With widespread availability of trained radiologists and good-quality imaging equipments, breast imaging procedures are commonly offered. Due to cost-effectiveness, they are often opted by the patients. The combined negative predictive value of mammography and sonomammography in focal or diffuse breast pain without a palpable mass is very high[15].In this study, prevalence of breast cancer was 1.04%. Locker et al have reported a prevalence of breast cancer as 2.4%[15]. The frequency of breast cancer by Saba et al is 1.1%[16], which corresponds to our study.

Study	Normal	Benign	Probably benign	Suspicious	Malignant
Present study	66.6%	20.8%	7.04%	4.16%	2.08%
Nazneen et al	65.1%	24.5%	6.8%	2.2%	1.1%
Mebrahtu G et al	72.4%	25.7%	1.9%	-	-

Noureen S et al	38.1%	45%	15.5%	-	1.4%

Mastalgia is less reported in Asian women[17]. Diffuse breast pain is less serious than focal breast pain[18]. The most important feature which was noticed in this study is that pain can be an early symptom of cancer of breast as opposed to previous thought that pain is the last symptom in any cancer. However, interpretation of such cases should be done very cautiously, without evoking fear amongst the patients.

In our study, 66.6% females complaining of mastodynia, had normal or negative radiological finding. Most of them were young, premenopausal women. 20.8% of them had benign lesions on imaging. The commonest benign finding was that of fibrocystic disease of breast found in 8 women i.e. 40%. Similar findings have been reported by Khanzada et al[19].Fibrocystic diseases are more common in premenopausal women[20].In our study too, 6 out of the 8 women(75%) suffering from fibrocystic disease of breast were <30 years of age.

Mammary duct ectasia clinically mimics invasive carcinoma[21]. In our study, 2 (10%) females had ductal ectasia. Benign cyst <3mm were found in 3 (15%). Fibroadenoma was detected in 5 women(25%).Two(10%) had lymphadenitis on imaging. Fine needle aspiration cytology was done in all these cases to confirm their benign nature.

The limitation of this study was selection bias, as those with family history of breast carcinoma, or palpable breast lump were not enrolled for this study. Also, sample size was small, so the results do not reflect the findings in the general population. Follow up was not done.

However the study was able to justify the usefulness of imaging techniques in mastalgia and allay the fear of breast cancer in young women. Role of biopsy in suspicious cases cannot be undermined and it should not be delayed so as to achieve early diagnosis of cancer and thereby improve the prognosis.

VI. CONCLUSION

Breast cancer is a deadly disease which is responsible for increasing number of deaths among females. Mastalgia is a common symptom amongst females. Due to the increasing awareness and fear of breast cancer, early consultation is sought nowadays. Breast imaging, either by sonomammography or mammography, helps in evaluating females suffering from mastalgia and a normal report helps in reassuring the patient as well as the clinician.

Conflict of interest: None

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MOISTURE SUSCEPTIBILITY OF SISAL-PLASTIC MODIFIED OPEN GRADED ASPHALT

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Abstract

This study was done to determine how to improve moisture susceptibility of Open Graded Asphalt Concrete mix through the use of sisal fibre and waste plastics. The indirect tensile strength is an indicator of tensile properties of the Open Graded Asphalt (OGA) mixture. This test is generally associated with cracking behavour of the road pavement. The higher the results, the stronger the pavement to resist crack development. Further, the tensile strength ratio of asphalt concrete shows its ability to resist moisture susceptibility. The test is also a measure of water sensitivity of the asphalt mix. Cleaned waste plastics were shred into sizes such that they passed through 2-3mm sieve using shredding machine. Aggregates size 12/6mm were heated and mixed with shredded waste plastics. The heating and mixing were done until the plastics effectively coated the aggregate. Sisal fibre was treated using sodium hydroxide solution and cut into 5mm length fibres prior to mixing with hot bitumen. The plastic-coated aggregate was mixed with mixer of treated sisal fibre and bitumen and the resultant mix was analyzed for tensile strength and moisture susceptibility. It was observed that when 0.3% sisal fibre is mixed with 5% waste plastics to modify open graded asphalt, the indirect tensile strength improved to

1.23 MPa as compared to control samples. The tensile strength ratio of 99.9% of the Sisal-Plastic modified samples shows that the sample is resistant to moisture susceptibility.

Keywords: Waste plastics, sisal fibre, open graded asphalt (OGA), sisal-plastic modified open graded asphalt (SPMOGA), Marshall test, stability, flow, voids, drain down. Indirect tensile strength (ITS), tensile strength ratio (TSR).

1.0 Introduction

Tensile strength of asphalt mix is an indicator of cracking resistance. Therefore, the test is important in road construction to evaluate the failure phenomena as a result of cracking. Indirect tensile strength test (IDT) is evaluated to assess the tensile strength of the sisal-plastic modified asphalt mix (Zhang et al., 2001). This would help in assessment of cracking properties of a pavement.

IDT can be calculated as indicated in the equation below.

$$S_t = \frac{2000P}{\pi t D}$$

where

S_t = IDT strength, kPa

P = maximum load, N

t = specimen height immediately before test, mm

D = specimen diameter, mm

Indirect tensile strength is used to evaluate the performance behavior of asphalt mix to resist cracking and moisture damage. Higher tensile strength values indicate a stronger cracking resistance. Samples which produce high strain values before failure are likely to resist cracking (Tayfur et al., 2007). Many experimental have been done on the performance of bituminous mixes to evaluate the tensile strength (Behbahani et al, 2009). High values of tensile strength show that the mix is highly resistance to low temperature cracking phenomena (Huang et al. 2004). Indirect tensile strength test gives indication on pavement material characteristics of per on fatigue, permanent deformation and tensile strength.

Asphalt concrete mix resistance to fatigue cracking depend on its tensile properties. These properties are tensile strength and extensibility. Asphalt concrete fatigue is the characteristic of

fracture under repeated or fluctuating stresses (Anderson et al., 2001). Flexible pavement roads are exposed to continuous flexing as a result of the traffic loads, which result into tensile stresses and strains at the bottom layers. Therefore, the indirect tensile strength test is done on bitumen mixtures since it expresses pavement strength and resistance against fatigue, rutting and cracking. The test is generally a performance indictor for pavements made of modified open graded asphalt, since simulates the tensile stresses at the lower section of the surface course when under load.

Indirect tensile strength results are used to determine the quality of asphalt mix, assessing cracking and moisture resistance of the pavement when results are obtained on both waters conditioned and unconditioned samples (Kandhal,2002; Ibrahim, 2000).

Pavement moisture damage refer to the loss of serviceability due to the presence of water. This damage due to moisture is known as moisture susceptibility. It is measured by performing tensile strength ratio (TSR) test which indicates water sensitivity. TRS is ratio of the tensile strength of water conditioned samples to the tensile strength of unconditioned samples. High TSR value shows that the mix samples are resistance to damage by water. Higher TSR values shows that there is less reduction of the pavement strength which ultimately indicates higher water-resistant. the control mix for the subsequent studies.

2.0 Materials and Methods

2.1 Materials

Materials used were bitumen grade 80/100, graded aggregate of nominal size 12/6 mm, treated sisal fibre of diameter 0.1 to 0.4 mm, 5mm long and shredded waste plastics of 2-3 mm. The optimum binder content adopted in this research is 5.5%.

2.2 Laboratory Test Procedure

The test was performed in accordance with standard test method as outlined in AASHTO T 283-14. This was done to determine the moisture susceptibility of modified mixtures utilizing indirect tensile strength (ITS) and retained tensile strength ratio (TSR) after vacuum saturation and moisture conditioning. Six cylindrical samples of each modified bituminous mixes were prepared and divided into two groups to determine the tensile strength values. The first group was preconditioned by vacuum saturation, 55–80% of the air voids were filled with water. The samples were wrapped in plastic bags and put in a freezer for 16 hours at -18°C. Thereafter were

put into a water bath for 24 hours at 60°C. They were finally placed in a water bath for 2 hours at 25°C. Each cylindrical modified bituminous sample was loaded with vertical compressive loads to failure, at 25°C and 50.8 mm/min deformation rate.

Tensile strength ratio (TSR), $TSR = \frac{ITS_{Con}}{ITS_{uncon}} x100$

where

ITS_{con} is the indirect tensile strength of conditioned samples

ITS_{unco}n is the indirect tensile strength of unconditioned samples

3.0 Moisture Susceptibility of Sisal Plastic Modified OGA

The results of modified open graded asphalt for both conditioned and unconditioned samples are given in Table 1.

Table 1: Modified Open graded asphalt Indirect tensile strength results

Additive	**%**	**ITS Unconditioned (MPa)**	**ITS Conditioned (MPa)**	**% TSR (MPa)**
Nil	0	0.8335	0.4350	52.19
Sisal Fibre (SF)	0.1	0.8273	0.6876	83.12
	0.2	1.0624	1.0112	95.18
	0.3	**1.1035**	**1.0739**	**97.33**
	0.4	1.0503	1.0113	96.29
Waste Plastics (WP)	1	1.0140	0.8951	88.27
	3	1.1810	1.1409	96.61
	5	**1.2036**	**1.1769**	**97.78**
	7	1.1806	1.1407	96.62
Sisal Fibre and Waste Plastics (SP)	0.3% SF 5% WP	**1.227**	**1.2270**	**99.94**

The results shown in table 1, shows improve tensile strength. The samples modified with sisal fibre or waste plastics showed higher tensile strength compared to control mixtures. This could be associated with enhanced stiffness of modified OGA samples compared to the non-modified samples. Modifier additives added to OGA, the bonding between the aggregate particles and bitumen are reinforced. This makes the mix sample strong by forming a stiffened matrix. As the

modifier content was increased, the tensile strength increased until the maximum value was achieved. Thereafter, there was decrease in strength as modifier content was increased. When the samples were conditioned, the tensile strength decreased when compared to unconditioned samples. This is associated with wetting of the samples which weakened the bond that held the particles together. Strength reduction as a result of conditioning was nearly 48 % for control sample, 3% for waste plastics and 2% for sisal plastics at optimum contents. However, the decrease in strength for modified samples using combination of sisal fibre and plastics at optimum contents was 0%.

3.1 Sisal Fibre Stabilized OGA

Figure 1, shows results for indirect tensile strength of modified asphalt mixtures with different of contents of sisal fibre. The indirect tensile strength results for unconditioned modified mix samples, show high values, compared to conditioned sample. This is associated with weakened bond by wetting as a result of conditioning. Weak bonds are as a result of reduced cohesion when friction between particles reduces. For both conditioned and conditioned samples, the strength increased as sisal fibre content was increased up maximum content of 0.3%. when more sisal fibre content was added beyond 0.3%, the indirect tensile strength started declining. The aggregates particles are held together by bitumen as a binder and sisal fibre acts as a reinforcing agent in stiffening the mix. Hence tensile strength is dependent on binding properties of bitumen and reinforcement ability of sisal fibre. When sisal fibre reinforces the bond formed by bitumen and aggregates, a stiff matrix is formed. However, addition of sisal fibre beyond 0.3%, the fibre weakens the sample as a result of reduction of grain to grain contact of the aggregates. Increase in sisal fibre results in more absorption of bitumen leaving little bitumen to coat and bind the aggregates together. This results into weakened bond and adhesion between the aggregates thus having weakened bond.

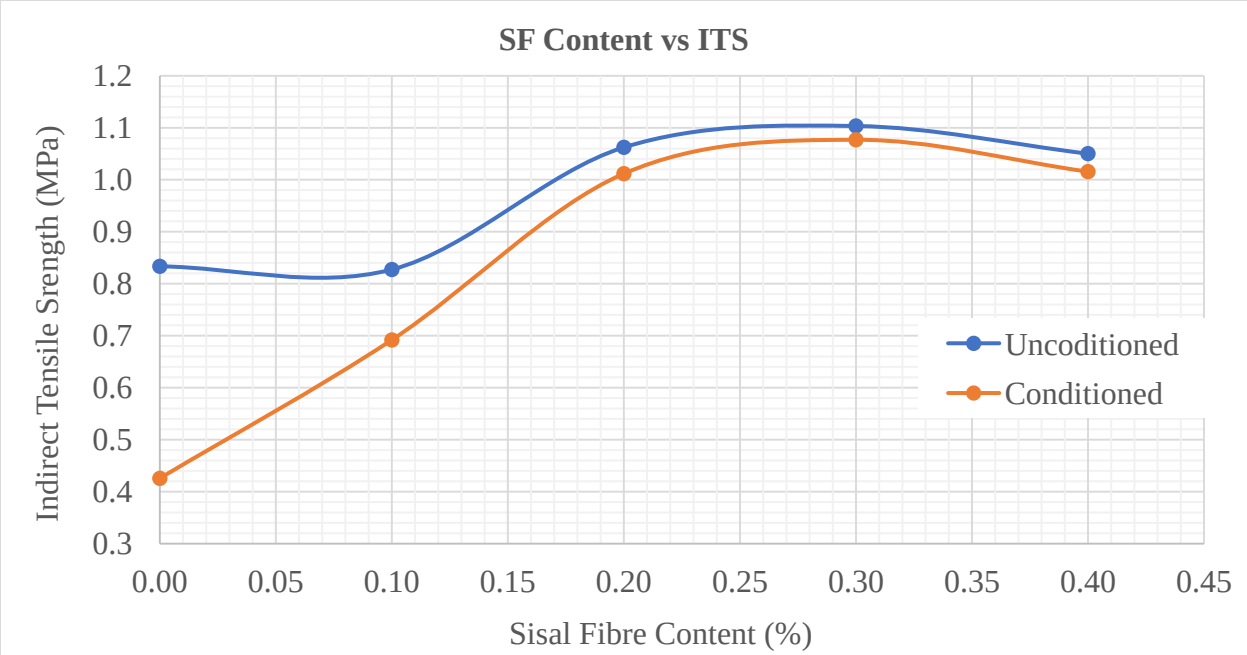

Figure 1: Indirect Tensile Strength of sisal fibre modified open graded asphalt concrete

3.2 Waste Plastic modified open graded asphalt

Figure 2 shows indirect tensile strength results when open graded asphalt was modified with Waste plastic. The indirect tensile strength results for unconditioned modified mix samples, show slightly high values, compared to conditioned sample. This is as a result of weakened bond by wetting when conditioning took place. Wetting reduced the friction between particles and thus reducing cohesion. For both conditioned and conditioned samples, the strength increased as waste plastic content increased up maximum content of 5%. When more waste plastic content was added, the indirect tensile strength decreased. Waste plastics used to modify OGA increases the adhesion between aggregate and bitumen. The plastics coat the aggregates and together with bitumen binds the particles together. This ultimately leads to a decrease in the stripping of particles, thus resulting in increased tensile strength. The addition of waste plastics improves the cracking résistance of pavements since if can withstand higher tensile strains.

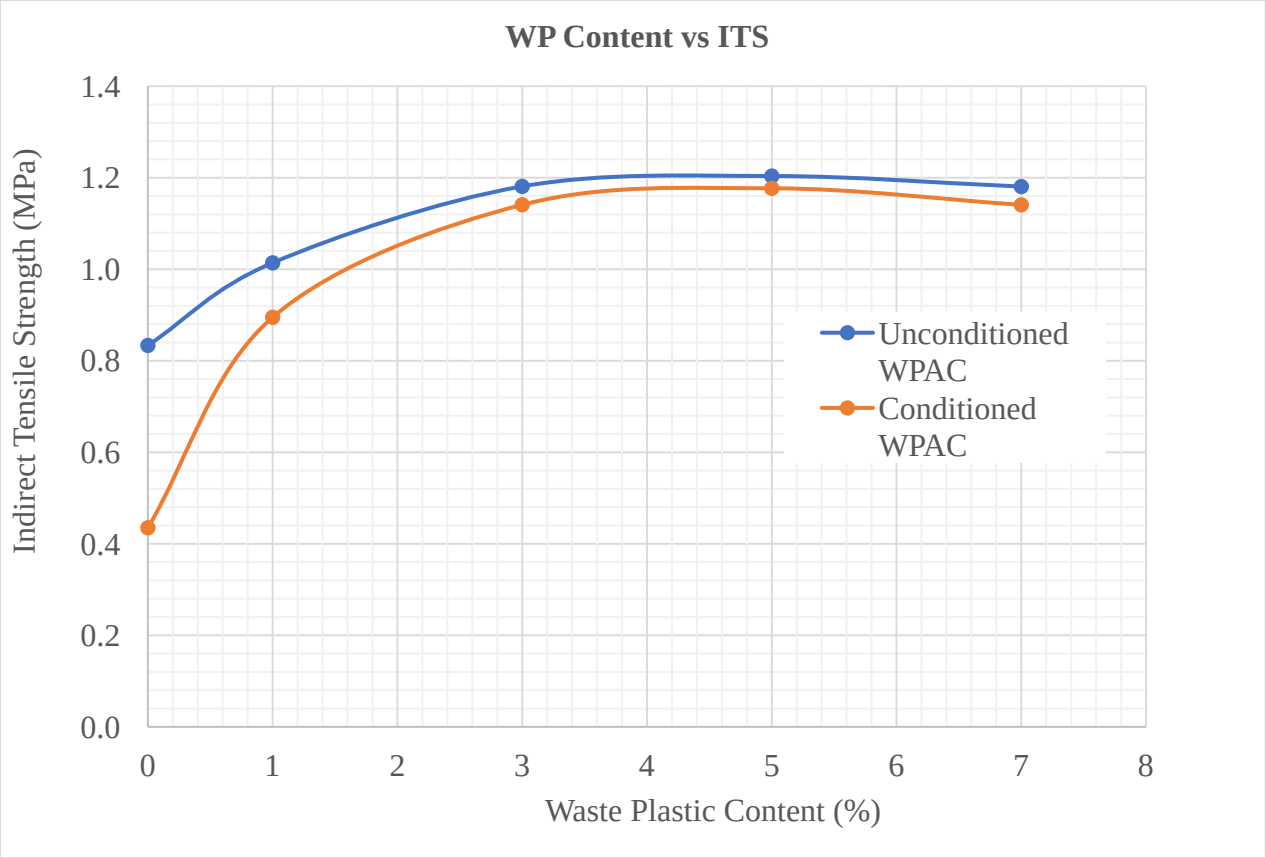

Figure 2: Indirect Tensile Strength of waste plastic modified open graded asphalt concrete

3.3 Sisal-Plastic Modified OGA (SPMOGA)

Figure 3, shows indirect tensile strength results of open graded asphalt when modified with combination of sisal fibre and waste plastics at optimum contents. The change in indirect tensile strength for control samples when conditioned and unconditioned shows a reduction by 48%. The reduction in indirect tensile strength was 3% for sisal modified, 2% for plastic modified and 0% for sisal-plastic modified samples. For none control sample, the conditioning weakened the bond between the particles more when compared with modified samples. These means that sisal fibre held the particles together by forming a stiff matrix. However, the plastic modified samples were more impermeable to water. Hence less reduction in strength. The tensile strength value for specimens with combination of 0.3% sisal fibre and 5% waste plastics is higher as compared to that with sisal and waste plastics only. The sisal-plastic modified samples had no reduction in indirect tensile strength. This is associated with a combination of firm matrix formed as a result

of fibre reinforcement and water impermeable properties of waste plastic modified samples. This resulted into strengthened bond between the aggregates.

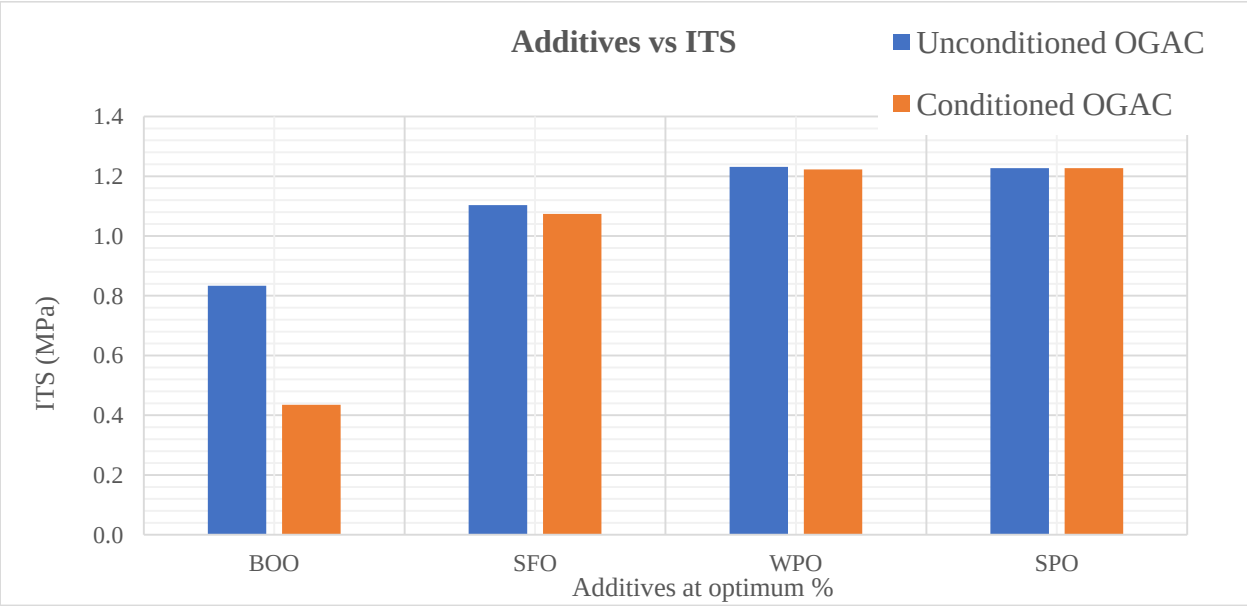

Figure 3: Indirect Tensile Strength of sisal -plastic modified open graded asphalt concrete

Sisal plastic modified asphalt concrete (SPMAC) samples had the highest percentage increase in strength at both unconditioned and conditioned samples as compared to sisal fibre or waste plastics stabilized samples. This is associated with the fact that the samples with sisal-plastic are more firm and stronger due to fibre reinforcement and waste plastic coating that form stiffer matrix samples compared to use of plastic or sisal fibre alone. It can be concluded that sisal-plastic additive demonstrates a slightly better cracking resistance as compared to sisal fibre and waste plastics modifiers only.

3.4 Moisture susceptibility of modified open graded asphalt

Figure 4, shows test results for moisture susceptibility of modified open graded asphalt. The tensile strength ratio (TSR) results of the control sample was 52 %, less than minimum TSR value set forth by AASHTO T283 of 70%. This means that the control mix has more moisture susceptibility, which would result into pavement damage by water. However, the tensile strength ratios for the samples with sisal fibre, waste plastics and sisal-plastic modifiers have TSR greater than the specification limit. The sisal-plastic modified asphalt has the highest TSR of 99.9 %.

Therefore, the presence of sisal and waste plastic additives greatly reduces water-induced damage to the pavements. The decrease in TSR at higher fibre content beyond the optimum content is associated with balling effect of the fibres in the mix. For waste plastic modified samples with more than 5% plastics, the reduction in TSR is associated with weakening of the bond between the aggregate and binder as more waste plastics coat the aggregates particles.

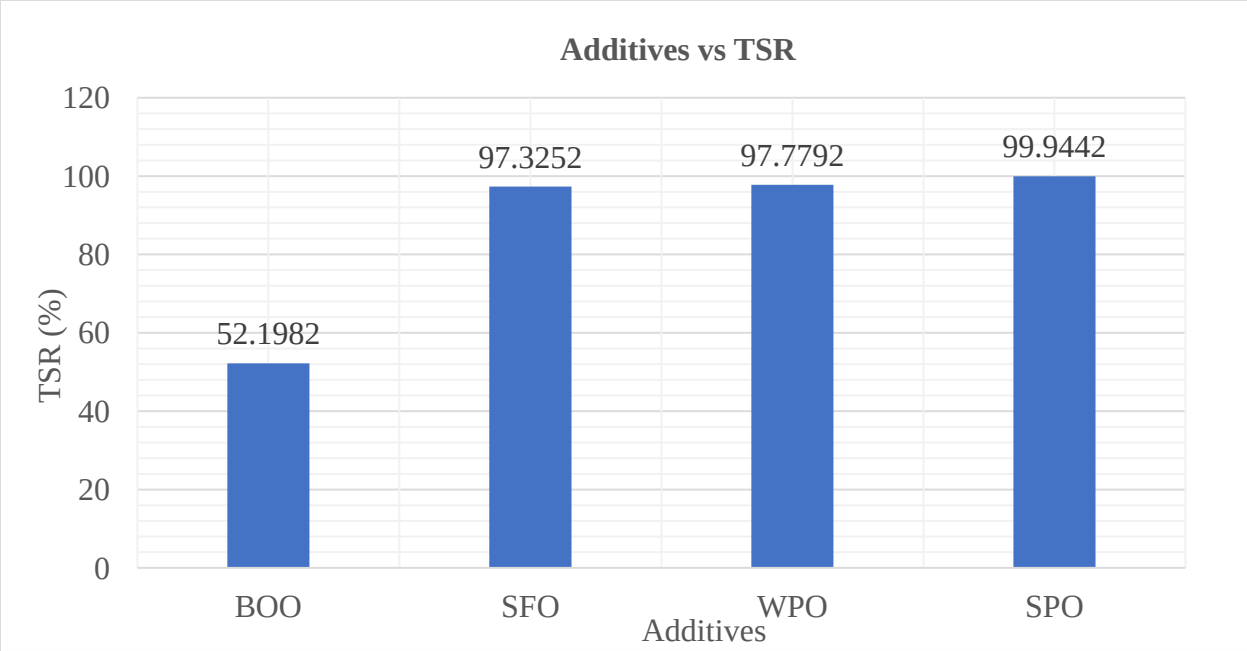

Figure 4: Variation of tensile strength ratios of modified open graded asphalt with different additives.

4.0 Conclusion

In can be concluded that the modification of OGA with sisal fibre and waste plastics improves the cracking resistance of pavements due to high results of TSR of 99.9%. Indirect tensile strength values of sisal-plastic modified samples were much higher compared to control samples. Tensile strength decreases by conditioning the sample from 0.8335 MPa to 0.435 MPa for control specimen. Strength reduced from 1.1035Mpa to 1.0739 MPa for sisal fibre modified samples and from 1.2036MPa to 1.1769MPa for waste plastic modified samples after conditioning. However, there was no reduction in strength for sisal-plastic modified samples after conditioning. The sisal-plastic samples indirect tensile strength remained at 1.227% after conditioning. The decrease in strength of control mixture below the specification limits when conditioned substantiates the need for use of additives in the modification of open graded asphalt. Sisal-plastics modified samples had the highest strength followed by the mix with waste

plastics and sisal fibre modified mix. Therefore, modifying open graded asphalt with combination of 0.3% sisal fibre and 5% waste plastics gives an excellent water resistance characteristic able to resist moisture induced damage to pavements.

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The Effect of Addition Different HCl Concentrations on The Physico-Chemical Properties of Cork Fish (*Ophiocephalus striatus*) Skin Gelatin

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Abstract- Gelatin is a collagen derivative compound found in the skin, bones, and connective tissue of animals that are hydrolyzed using acidic or basic solutions. The industry that uses gelatin the most is the food industry. Cork fish skin has a very high protein and is rich in albumin so that it can be used by people with hypalbumin (low albumin) and accelerate wound healing. The process of making gelatin has 2 extraction methods, namely the acid and base method. The extraction process using the acid method is faster than using the base method, because the acid solution hydrolyzes collagen to gelatin more be faster. For this reason, HCl solutions are used in research to determine the effect of adding concentration on the process of making gelatin. Giving different concentrations during the manufacturing process is expected to produce the best quality gelatin concentration in chemical and physics. The HCl concentration used in the extraction process is 0.03 mol; 0.04 mol; 0.05 mol; 0.06 mol and 0.07 mol with 5 replications. Analysis of the results of the research used were physico analysis (viscosity and gel strength test), chemical analysis (protein content, fat content, ash content, moisture content, yield and pH) and overall acceptance based on the De Garmo method. The research data were analyzed using ANOVA (Analysis of Variance) to determine the effect of treatment on the parameter response performed, with the F test at the level of 5% and if the results were significantly different then the Tukey test was carried out at the level of 5%.

Index Terms- Gelatin, Cork Fish Skin (*Ophiocephalus striatus*), HCl Solutions, Proximate analysis, Viscocity, Gel Strength.

I. Introduction

Fish cork (*Ophiocephalus striatus*) is fish army, which is quite big can grow up to long 1m, large headed somewhat flattened resemble the heads of a serpent with scales large on his head. Elongated rounded body, like a bullet control. A long dorsal fin and caudal fin globase at the tip. The upper side of the body from head to tail of dark colored, brownish, black or greenish. The under side of the body white, from the chin to the back (Suprayitno, 2014). Cork fish is usually used for public consumption because it has very high protein and is rich in albumin sources. According to Setiawan (2013), albumin is useful for helping the process of healing postoperative wounds and hypoalbumin sufferers. Inside the cork fish skin also contains protein and albumin.

Gelatin is a protein obtained from animal collagen tissue found in the skin, bones and connective tissue (Karim and Bhat, 2008). Gelatin from pig skin is 46%, cow skin 29.4%, beef bone 23.1%, and other sources 1.5% (Harianto et al., 2008). The use of pig skin is less acceptable because of halal status, while the quality of cow skin is of doubtful quality due to the widespread issue of mad cow disease. So that gelatin extracted from cork fish is used as an additive alternative that can be guaranteed of halal status and accepted by the whole community.

Quality gelatin production depends on the use of the right extraction method such as the acid and base method. The difference between the two methods lies in the immersion process. Acids are able to convert triple helix collagen fibers into single strands, while base immersion solutions are only able to produce double strands (Ward and Courts, 1977). This causes at the same time the amount of collagen hydrolyzed by more acidic solutions than base solutions (Tazwir et al., 2008). HCl has advantages over other types of acids because HCl is able to decompose collagen fibers more and more quickly without affecting the quality of the gelatin produced (Kurniadi, 2009).

II. MATERIALS AND METHODS

2.1 Materials

The raw material used in the study was dead cork fish skin obtained from fishermen in Jember Regency. Other materials used are: aquades, pro analysis acetic acid, sodium hydroxide pro analysis, hydrochloric acid pro analysis obtained from the Makmur store, and materials used for testing include: Na2CO3, NaOH, Na2S2O3, HCl, K2SO4, HgO , H2SO4, HClO4, HNO3, distilled water, acetone, and H3BO3, petroleum ether, sodium acetate and 41 whatman filter paper from the Panadia store.

2.2 Method of Research

The method used was experimental method. The analysis of data used in this research was through Completely Randomized Design (RAL) with five replications. There are five concentratios employed 0,03 mol; 0,04 mol; 0,05 mol; 0,06 mol and 0,07 mol. The proximate analysis of gelatin product was also conducted, yield, water content, ash content, protein content, fatty content, gel strength, viscosity and pH.

2.3 Yield Analyze

The yield was obtained from a comparison between the weight of dry gelatin flour produced with the weight of fresh ingredients (skin that has been washed clean).

2.4 Water Content Analyze

The procedure for determining water content is done by weighing 5 grams of gelatin cork fish skin and placed in an empty cup that has been weighed heavily, the cup and lid have been dried in the oven and cooled in the desiccator. The cup containing the sample was then closed and put into an oven with a temperature of 100-102 ºC for 6 hours. The cup is then cooled in a desiccator and after the cold the cup is weighed.

2.5 Ash Content Analyze

The procedure for determining the ash content is carried out by weighing gelatin cork fish skin as much as 5 grams of sample and put into an ignition dish that has been weighed and burned in a furnace at a temperature of 600 ºC and cooled in a desiccator. The cup containing the sample is inserted into the ignition furnace and burned to obtain grayish ash. This ignition is carried out in two stages, namely first at a temperature of around 400ºC for 1 hour and second at a temperature of 550ºC for 5 hours. The cup containing the ash was cooled in a desiccator and then weighed.

2.6 Protein Content Analyze

Determination of protein content was carried out by the micro-kjeldahl method. The sample was weighed as much as 0.2 grams and put in a 30 ml kjeldahl flask. Then add 2 g K2SO4, 50 mg HgO and 2.5 ml H2SO4. The samples are destroyed for 1-1.5 hours until the liquid is clear green and then cooled and added with distilled water slowly. The contents of the flask are transferred into a distillation device, plus 10 ml of concentrated NaOH until it is blackish brown and then distilled. The distillation results are stored in 125 ml erlenmeyer containing 5 ml of H3BO3 and titrated with 0.02N HCl until the color changes to pink.

2.7 Fatty Content Analyze

The gelatin cork fish skin of 2 grams is weighed and wrapped in filter paper and then covered with fat-free cotton and put in a fat flask. After that the sample placed into a Soxhlet extraction tool, with the condenser tool above and the fat pumpkin underneath. Petroleum benzene is added to the fat flask then extracted for ± 6 hours at a temperature of 40 ° C until the solvent that drops back to the fat flask becomes clear. The solvent in the fat flask is distilled so that all the fat solvents evaporate. The extracted fat flask is then dried in an oven at 105 ° C. After that the flask is cooled in a desiccator and weighed.

2.8 Gel Strength Analyze

Gelatin solution with a concentration of 6.67% (b / b) was prepared with distilled water (7.5 grams of gelatin plus 105 ml of distilled water). The solution is stirred using a magnetic stirrer until it is homogeneous then heated to a temperature of 80 oC for 15 minutes. The solution was poured in Standard Bloom Jars (bottles with a diameter of 58–60 mm, height 85 mm), closed and left to stand for 2 minutes. Then incubated at 10 ° C for 17 ± 2 hours. Gel strength was measured using the STEVEN-LFRA brand Texture Analyzer. This tool uses a probe with an area of 0.1923 cm2. The sample was placed under the probe and pressed with a load of 97 grams. The curve height is then measured by using the calipers.

2.9 Viscosity Analyze

Gelatin solution with a concentration of 6.67% (b / b) was prepared with distilled water (7 grams gelatin plus 105 ml of aquades) then the solution was measured for viscosity using a Brookfield Syncro-Visric Viscometer. Measurements were carried out at 60ºC with a shear rate of 60 rpm using a spindle. The measurement results are multiplied by the conversion factor. This test uses spindle no.1 with the conversion factor being 1, the viscosity value is expressed in units of centipoise (cP).

2.10 pH

An example of 0.2 gram is dispersed in 20 ml of distilled water at 80ºC. The example is homogenized with a magnetic stirrer. Then measured the degree of acidity (pH) at room temperature with a pH meter.

III. RESULTS AND DISCUSSION

Based on the proximate results of the physico-chemical properties of gelatin in cork fish skin with HCl concentrations of 0.03 mol; 0.04 mol; 0.05 mol; 0.06 mol and 0.07 mol, commercial gelatin, standard gelatin based on SNI and standard gelatin based on GMIA can be seen in Table 1.

Parameter	Concentrations					Deviation Standart	Commercial Gelatin	Standart Gelatin (SNI, 1995)	Gelatin (GMIA, 2012)
	0,03 mol	0,04 mol	0,05 Mol	0,06 mol	0,07 mol				
Yield (%)	13,97	14,74	16,65	18,98	20,63	0,023	-	-	-
Water Content(%)	11,85	11,56	11,12	10,83	10,49	0,029	12,937	Maks.16	10,5-12
Ash Content (%)	3,61	3,53	3,44	3,32	3,26	0,034	1,633	Maks. 3,25	0,3
Protein Content(%)	68,54	70,11	76,84	84,12	82,01	0,062	87,707	-	-
Fatty Content (%)	0,96	0,83	0,77	0,65	0,57	0,029	0,23	Maks.5	-
Gel Strength (Bloom)	89,64	86,06	80,25	73,01	70,95	0,036	318,300	-	50-300
Viskosity (cP)	9,68	10,62	12,05	13,21	15,83	0,022	9,75	-	15 - 75
pH	3,54	3,49	3,41	3,37	3,32	0,025	4,00	-	3,8 -5,5

Based on Table 1, the results of the analysis proximate can be read thatthe quality of gelatin produced is not much different from the quality standards required by SNI, GMIA and commercial gelatin. The highest yield and fat content at HCl concentration was 0.07 mol. Water content, gel strength and highest pH at HCl concentration of 0.03 mol. The highest protein content at a concentration of 0.06 mol.

3.1 Yield

The results showed that the highest yield was obtained at 0.07 mol HCl concentration with a value of 20.66%, while the lowest yield was at 0.03 mol HCl concentration with a value of 13.94%.So as the higher concentration of HCl, the higher yield produced. This is because the higher the concentration of acid, the more the structure of collagen fibers is broken down and binds to water so that more gelatin produced. The tendency to increase yield with increasing acid concentration is possible because of the large number of H+ ions that interact with the structure of the trophagenagen. The triple helical collagen structure loses its triple helical structure because the hydrogen bonds in collagen and the bonds between the tropochagen are weakened, so that collagen is converted and becomes an ideal form for extraction (Martianingsih et al, 2009)

3.2 Water Content

The results showed that the highest water content was obtained at 0.03 mol HCl concentration with a value of 11.90%, while the lowest water content at HCl concentration was 0.07 mol with a value of 10.45%. So as the higher HCl concentration, the lower water content will be produced. This is due to the high concentration of HCl which causes the binding power of the water to become weaker in gelatin, so that the water evaporates easily when drying. Increasing the concentration in the acid solution causes a decrease in the gelatin water content. This is due to the more acid (H+ ions) in the soaking solution, causing the structure of collagen to be more open, thus the less water is physically trapped in the structure of the collagen matrix which causes the water content to be lower (BSN, 1995).

3.3 Ash Content

The results showed that the highest ash content was obtained at 0.03 mol HCl concentration with a value of 3.65%, while the lowest ash content was at 0.07 mol HCl concentration with a value of 3.22%.So as the higher HCl concentration, the lower ash content will be produced. This is due to the large amount of minerals that are dissolved during the washing process. The high ash content of the gelatin of cork fish skin is suspected because there are still many amounts of minerals that are not dissolved in the washing process. According to Yuliani (2014), the process of immersion in an acid solution in addition to aiming to convert collagen into collagen which is ready to be extracted in water, also to dissolve minerals such as calcium and other salts. Thus the higher the concentration of acid used causes more dissolved minerals. This causes the lower mineral content in ossein, which means the lower the mineral content in the gelatin produced.

3.4 Protein Content

The results of the study that the highest protein was obtained at 0.06 mol HCl concentration with a value of 84.15%, while the lowest protein content was 0.03 mol HCl with a value of 68.43%. So as the higher HCl concentration, the higher value of the protein to be produced. This is because during the extraction process more and more compounds are extracted, causing the resulting gelatin to become purer so that the protein produced is higher. In addition, it is also related to other proximate compositions such as ash content and fat content of gelatin from dry fish skin lower than fresh fish skin. The high level of gelatin protein is due to the low non-gelatin component such as ash content and other non-gelatin components (Peranginangin, 2005).

3.5 Fatty Content

The results of the study that kadar lemak tertinggi didapatkan pada konsentrasi HCl 0,03 mol dengan nilai 1,01%, sedangkan kadar lemak terendah pada konsentrasi HCl 0,07 mol dengan nilai sebesar 0,53%. So as the higher concentration of HCl, the lower value of the fat to be produced. The fat content of gelatin in low cork fish skin makes it possible to store gelatin in a long time without causing significant changes in quality and odor. Fat content in gelatin is very dependent on the treatment during the gelatin making process. The manufacturing process starts from the skin cleansing stage until the filtration stage is extracted. Good treatment at each stage of the gelatin making process will reduce the fat content in the raw material (Trilaksani et al., 2012).

3.6 Gel Strength

The results showed that the highest gel strength was obtained at 0.03 mol HCl concentration with a value of 89.66 gr bloom, while the lowest gel strength was 0.07 mol HCl concentration with a value of 70.93 gr bloom. So as the higher concentration of HCl, the lower value of the gel strength produced. This is because the higher the concentration of acid, the amino acid chain produced is getting shorter so that the strength of the gel gets lower. Gel strength values decrease with increasing concentration and long duration. Increased acid concentration means an increase in the number of H+ ions in solution and will cause the collagen protein to undergo further hydrolysis so that the collagen protein polypeptide chain gets shorter. Shorter polypeptide chains not only can increase their solubility, but can also reduce the ability to thicken (Kusnandar, 2010).

3.7 Viscosity

The results showed that the highest viscosity was obtained at 0.07 mol HCl concentration with a value of 15.86 cP, while the lowest viscosity at 0.03 mol HCl concentration with a value of 9.65 cP. So as the higher concentration of HCl, the higher viscosity produced. the value of viscosity or thickness of gelatin solution is very closely related to the water content of dry gelatin. The smaller the gelatinous water content is dry, the higher ability to bind water (to form a gel). The more amount of water bound by the gelatin, make solution will become thicker, which directly affects the higher value of the measured viscosity.

Gelatin viscosity is influenced by gelatin pH, temperature, gelatin concentration and the addition of other electrolytes in the gelatin solution. The lower the temperature of the gelatin solution (maximum 40ºC) and the higher the concentration of gelatin, the higher the viscosity ($p < 0.05$). The viscosity value of this gelatin will affect the final product of a product (Karim 2009).

3.9 pH

The results showed that the highest pH was obtained at 0.03 mol HCl concentration with a value of 3.58, while the lowest pH was at 0.07 mol HCl concentration with a value of 3.28. So as the higher HCl concentration, the lower value of pH produced. This is because the higher concentration of acid during immersion, the higher content of H+ ions produced, this results in a lower pH value in the solution.

According to Stainsby, (1977) the concentration of acid is getting higher, causing more acidic cations trapped in the ossein, so that the measured pH is lower (acid) and the hydrolysis of collagen will continue in the decomposition process of collagen polymer. HCl during immersion (demineralization) acid cation is trapped in collagen protein so that the gelatin produced has a lower pH.

IV. CONCLUSION

Based on the results of this study, conclusions were obtained that physical based observations were not much different from the quality standards required by SNI. Different HCl concentrations (0.03 mol; 0.04 mol; 0.05 mol; 0.06 mol and 0.07 mol) significantly affected the physico-chemical properties (yield, water content, ash content, protein content, fat content , gel strength, viscosity, pH). The yield and viscosity of gelatin in cork fish skin using different HCL concentrations showed higher values with increasing concentration. Whereas the moisture content, ash content, fat content, gel strength, and gelatin pH of cork fish skin using different HCL concentrations showed lower values with increasing concentration. The best HCl concentration was located at a concentration of 0.07 moles. This result was obtained from water content, ash content, fat content, gel strength and viscosity which produce the best value of the other HCl concentrations (0.03 mol; 0.04 mol;
0.05 mol and 0.06 mol).

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Detection of Voids on Concrete Surface Using Deep Learning Model

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Abstract

This paper outlines a study on the effectiveness of deep learning techniques at detecting voids given photographs of concrete surfaces. The proposed deep learning model makes use of a convolutional neural network (CNN) and an artificial neural network (ANN). The model was trained on a dataset of 4,032 images of sizes 32x32 and 128x128, and subsequently obtained a training accuracy of 92.08% and a validation accuracy of 89.08%. Furthermore, the trained model was used to develop an automatic detector for detecting and locating voids on the surface of the concrete using the sliding window technique. The performance of the detector was then evaluated on 8 new images that the model had not encountered during training. It was found that a large window size was more effective at detecting large voids but at the expense of detecting smaller voids. Also, a small window size was effective at detecting small voids but struggled at detecting large voids. Finally, the detector was used to determine if there was a relationship between the percentage area occupied by voids and actual porosity. It was found that the relationship between the percentage area covered by voids and actual porosity was unclear.

Key words: Voids, Concrete Surface, Porosity, Convolutional Neural Network (CNN), Artificial Neutral Network (ANN), Sliding Window Technique

Introduction

Concrete and concrete-like materials have been used for hundreds of years by humanity to build structures ranging from small houses to mega projects such as aqueducts and royal palaces. Concrete is useful as it is workable during laying, strong and durable during the design life of the structure. However, concrete needs to be regularly inspected to be able to detect and track any issues that arise. With adequate information, technicians and engineers can thereafter recommend an appropriate strategy to restore the concrete.

One of the factors that influence the strength and durability of concrete is its density (Iffat, 2015). The concrete of high density has fewer voids and hence lower porosity. The consequence of this is that the concrete is permeated to a much lower extent by water and soluble substances, thus obtaining a more durable concrete. Furthermore, increasing density of concrete also increases strength. Therefore, the density of concrete is an important property. Additionally, it has been found that void volume fraction plays a significant role in tensile strength of concrete (Lei Xu and Yefei Huang, 2017).

Since porosity plays a part in the density of concrete, it is important to quantify it. Current methods require having a sample and submerging it in water. However, this may be tedious and is not suitable for situations where a sample is not available. A possible solution to this problem is using image processing techniques to analyse the concrete surface for the presence of voids.

Surface voids, also known as bug holes or pitting, are defined by ACI 347-04, “Guide to Formwork for concrete”, as small regular or irregular cavities, usually less than 15mm in diameter resulting from entrapment of air bubbles on the surface of concrete during placement and consolidation of concrete (ACI Committee 347, 2004). This study focused on voids that are visible to the eye and can be captured using a digital camera. The primary effect ofsurface voids is the loss of aesthetics and durability. The presence of pitting can be unsightly. ACI 301-10 specifies that if cavities larger than 38.1mm wide or 12.7mm deep are found, action through repair should be taken as they are considered to be defects (ACI Committee 301, 2010). Surface voids could also be a way for water to permeate the concrete. This is risky as water that gets into the pitting will expand under freezing conditions, thus enlarging the hole or cause cracks.

Examples of visual techniques that can be used to detect surface voids include the Sobel edge detector and Canny edge detector which are all examples of four edge detection methods. However, edge detection methods have been found to suffer from noise, from lighting and distortion, and the difficulty of creating a detection solution that performs well under varying conditions (Ziou

and Tabbone, 1998). To overcome the problems of edge detection methods, newer techniques have employed the use of convolutional neural networks (CNNs) which belong to the family of machine learning techniques. CNNs are designed to mimic the visual cortex of animals (Cireşan et al., 2011) and have been found to be able to detect many different classes of objects (Krizhevsky, 2012). A well designed CNN, given adequate data, can be able to generalise effectively to be able to accurately detect objects from new images it hasn't encountered before.

In this study, the CNN model was used to create a detector that can detect voids on the surface of the concrete. In addition to detecting voids, the detector was also designed to give the location of the voids in the images tested. The detector also acted as an object detection algorithm.

Object detection refers to the identification and localisation of objects belonging to certain classes using computer-visual techniques. For example, an object detection algorithm may be written to detect smiling faces from photos and videos. In recent times, the most popular methods of object detection have employed the use of machine learning techniques, particularly CNNs. Example of CNN based object detection methods include region proposal technique,(Girshick *et al.*, 2014) (Girshick, 2015) (Ren *et al.*, 2015) You Only Look Once (YOLO) (Redmon et al., 2016) and Single Shot Multibox Detector (SSD) (Liu et al., 2016).

A study by Yokoyama and Matsumoto (Yokoyama and Matsumoto, 2016), set out to build an automatic detector that could identify cracks from photographs of concrete structures. They collected photos of cracks, joints, plain surfaces chalk letter parts and other parts, thereby having 5 classes. It was found by the authors that the detection rate for crack was high for concrete with no stains. However, the performance of the detector greatly degraded when it was given concrete with stains.

Another study by Cha et al. (Cha et al., 2017), had a similar objective of building a detector for detecting crack from photos of concrete. They, however, used 2 classes and a different CNN model. The authors found that validation accuracy was 98%. However, what was more astonishing was that they achieved an accuracy of 97% when they tested the detector on images not used during training and validation. This showed that the CNN did not degrade in performance when even when given completely new images. Additionally, the CNN showed that it was adaptable to adverse lighting conditions. When they tested an image that had a crack which was partly covered by a dark shadow, it scored an accuracy of 97%.

The authors also compared the performance of the CNN against traditional methods which used edge detection as opposed to machine learning approaches. These traditional methods were Canny edge detection and Sobel edge detection. It was found that the CNN consistently outperformed the edge detection methods by a huge margin. In fact, Canny edge detection was found to not provide any meaningful information while Sobel method did give some information regarding the cracks. The performance of the edge detection methods was found to be susceptible to the condition of the images fed to them. The CNN was unaffected by such conditions due to the training it had undergone.

Methodology

Collection of Images for Training

Photographs of exposed concrete surfaces were taken from the ADD Building of the University of Nairobi. The Images were captured using a smartphone camera (Samsung Galaxy A7 (2017)). Each image had a resolution of 264×1836 pixels. Majority of the photos were taken under good lighting conditions in an afternoon.

Table 1: Examples of photos collected

Image	**Comments**
	• Taken under good lighting conditions. • The surface had a lot of surface voids.

	• Taken under good lighting conditions. • The surface had few voids.
	• The surface had a shadow cast on it. • The surface had few voids.

Image Preprocessing and Dataset Creation

Preprocessing

Some of the raw photos were cropped into smaller 32×32 pixel images while the rest were cropped into 128x128 pixel images. This was done so that both the small and large void could be adequately captured. Cropping was done using the Pillow[1] and the sliding window technique. To make the process of cropping faster, the native python multiprocessing library was used.

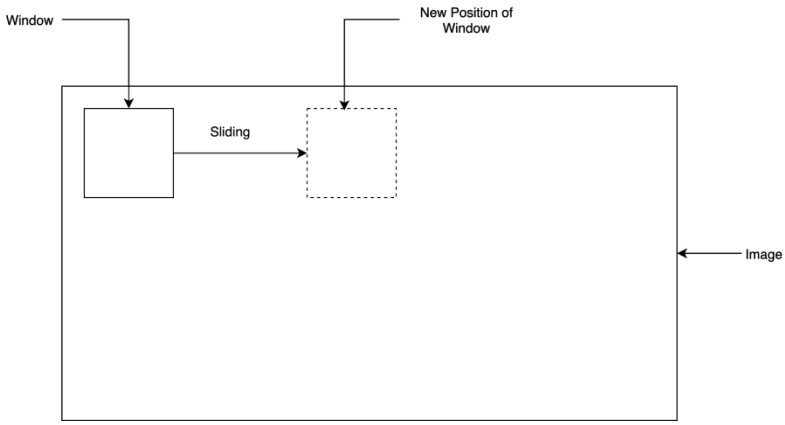


Fig 1: Sliding Window technique

Source: Author

The sliding window technique is illustrated in Fig 1. Whenever the window slid to a new position, that portion of the image covered by the window was cropped and saved as an image file. The 32x32 images were obtained by using a 32x32 sliding window size, while the 128x128 images were obtained using a 128x128 sliding window size. Cropping was done on all the images until a databank of cropped images was produced.

Dataset Creation

From the databank of cropped images, 2,016 images, showing voids, were chosen while an equal number of images, showing no voids, were also chosen. These two datasets were further split into training and validation datasets. The training data had a total of

[1] Pillow is a python library for image processing

3,218 images while the validation data had a total of 814 images. The data were arranged in a folder structure that is summarised in Fig 2.

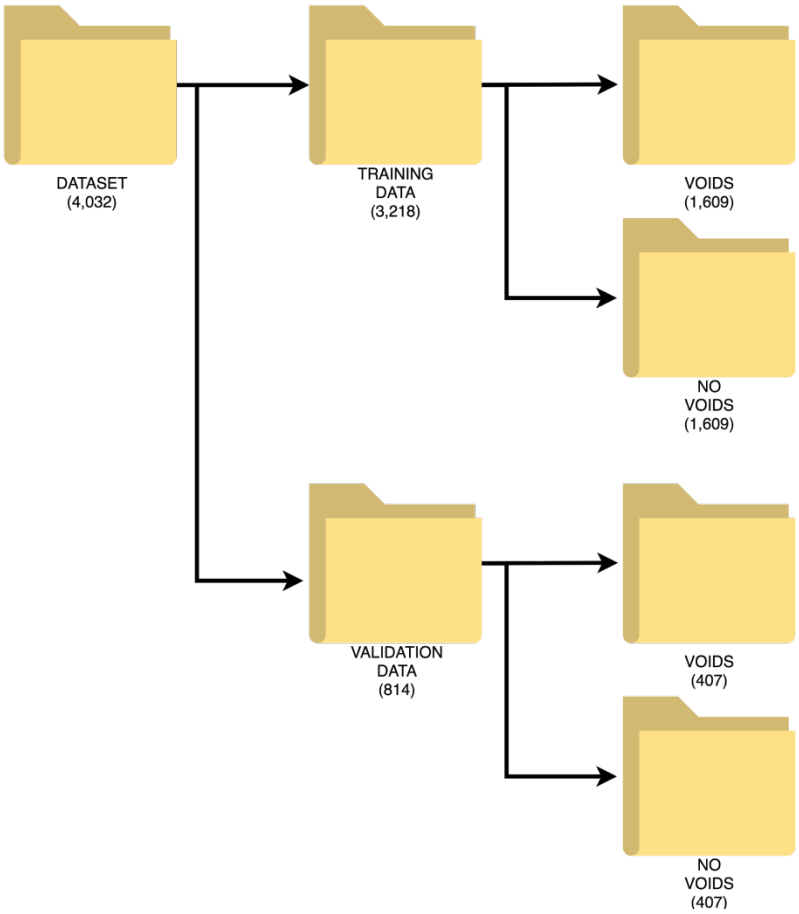


Fig 2: Dataset folder structure

Source: Author

Architecture and Parameters of the Model

Architecture

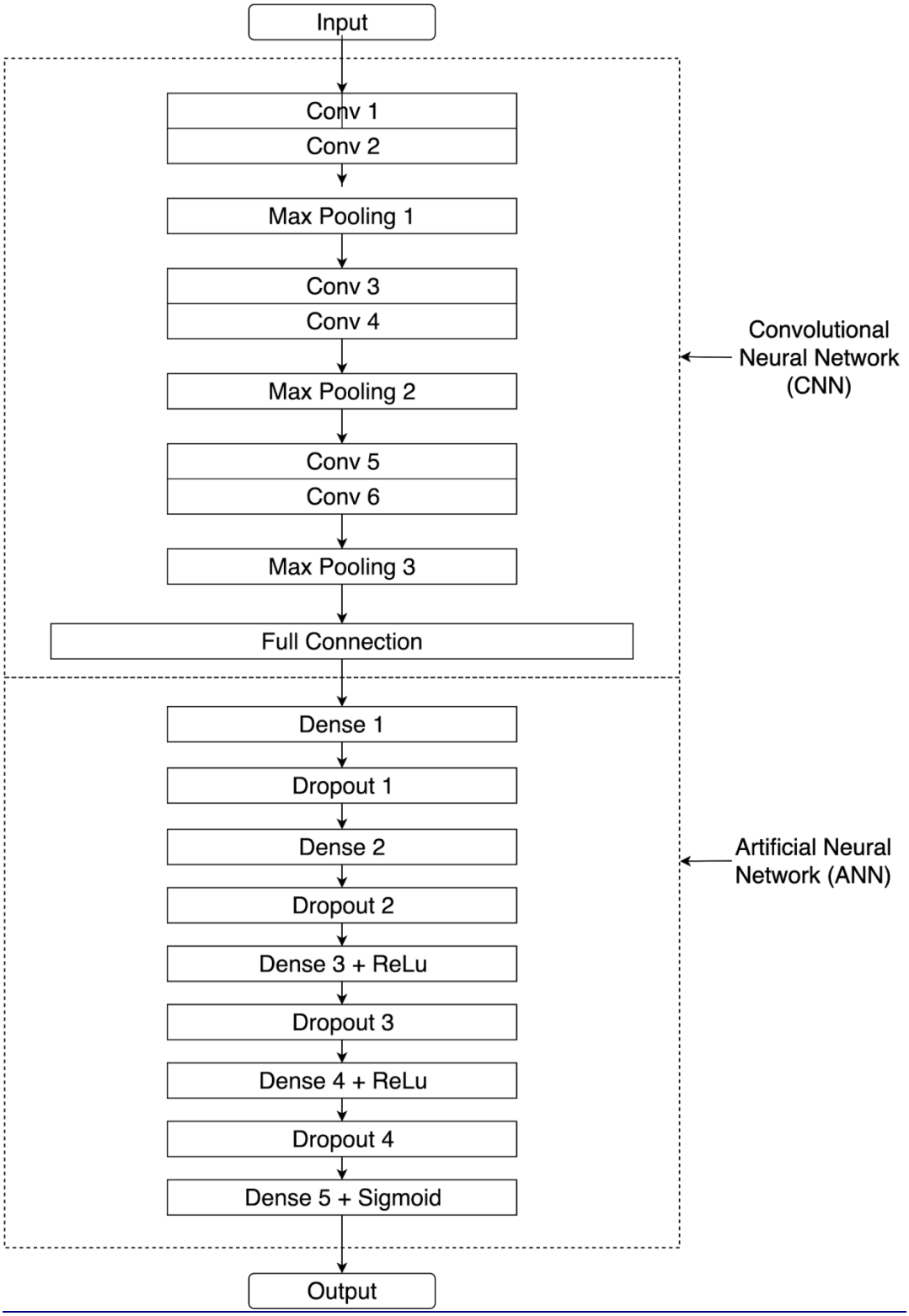


Fig 3: Architecture of the Model
Source: Author

Model Parameters

Table 2: Model Parameters

Layer	Height	Width	Operation	Height	Width	Number	Stride	Rate

Input	32	32	Convolution	3	3	64	1	
2	29	29	Convolution	2	2	64	1	
3	14	14	Max Pooling	2	2	-	1	
4	12	12	Convolution	2	2	128	1	
5	11	11	Convolution	2	2	128	1	
6	5	5	Max Pooling	2	2	-	1	
7	4	4	Convolution	2	2	256	1	
8	3	3	Convolution	2	2	256	1	
9	1	1	Max Pooling	2	2	-	1	
10			Full Connection					
11			Dense			2048		
12			Dropout					0.5
13			Dense			1024		
14			Dropout					0.2
15			Dense			512		
16			ReLu					
17			Dropout					0.2
18			Dense			256		
19			ReLu					
20			Dropout					0.4
21			Dense			1		
12			Sigmoid					

Fig 3, represents the architecture with which the model was created. The model takes in an image of 32×32×3 pixel resolution. Each dimension indicates the height, width and colour channel respectively. The image passes through 3 convolutional layers, 6 ReLu(Nair and Hinton, 2010) layers, and 3 max pooling layers before being fully connected to the artificial neural network. The ANN consists of 5 Dense layers, 2 ReLu functions, 4 dropout layers and a Sigmoid function for classification.

Model Hyperparameters

The dropout rate for the dropout layers 17 and 20 are 0.2 and 0.4. The model made use of the binary cross entropy loss function which was optimised using mini-batch gradient descent. The gradient descent optimisation algorithm that was chosen was Adam (Kingma and Ba, 2014) whose hyperparameters were a learning rate (α) of 0.001, β_1 of 0.9, β_2 of 0.999 and an epsilon (ε) of 1e-07. Also, a batch size of 64 was used.

Workstation

Preprocessing and training were done on a workstation of the following specification:
CPU: Intel i7-700HQ
RAM: 16GB
GPU: Nvidia GTX 1060 6GB VRAM

Training and validation

The number of epochs that the CNN was trained for was 60. During each epoch, the CNN was fed with the training and validation datasets along with their correct labels. The training dataset was fed in first, followed by validation dataset. The training dataset was split into batches of 64 images which were then fed to the CNN in cycles. After each complete cycle, the training loss and accuracy were computed and recorded. The loss obtained was then used by Adam to update the weights. After the entire training data has been used by the CNN, the validation dataset was likewise split into batches of 64 images and fed into the CNN in cycles. With each complete cycle, the validation loss and accuracy was computed and recorded. It was not used to update the weights of the CNN. After the 60th epoch, the CNN was ready.

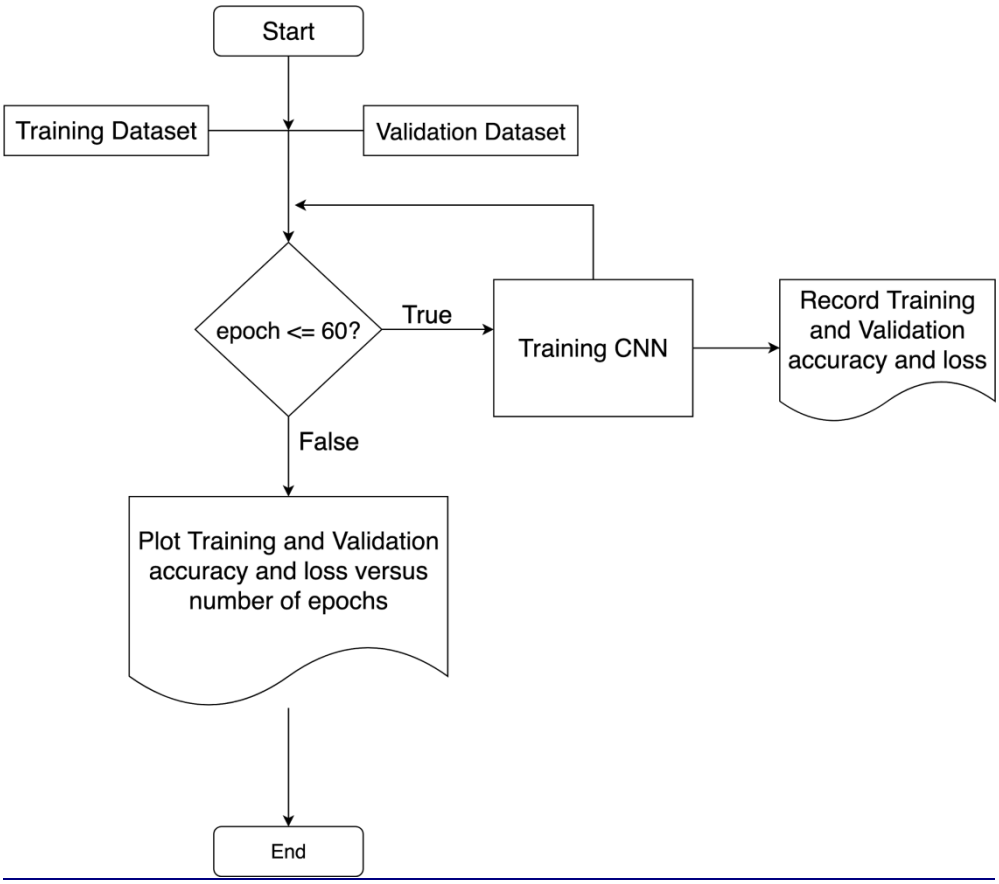


Fig 4: Overview of training and validation

Source: Author

Creation of the Detector

The trained CNN was used to create a detector that could traverse an image larger than 32x32. This was implemented using Pillow, sliding window and the trained CNN. When the window slid to a new location, it cropped that part of the image, converted it to a NumPy[2] array, and then passed it to the CNN for prediction. When the prediction came by negative for a void, the window slid to the next position. When the prediction came back positive for a void, the detector drew a rectangle around the perimeter of the sliding window before the sliding window moved to the next location.

[2] NumPy is a python library used for scientific and mathematical operations.

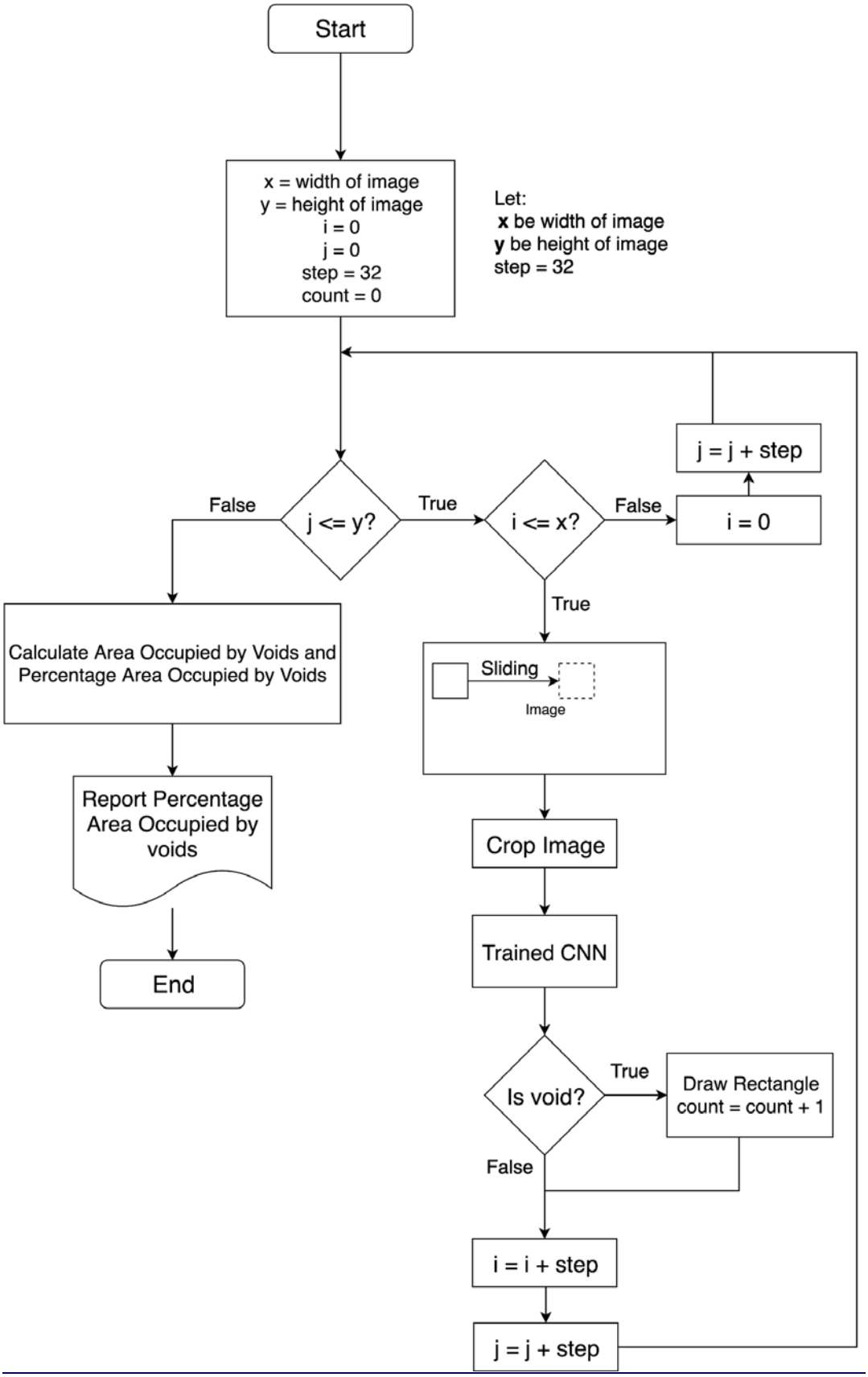


Fig 5: Overview of Detector
Source: Author

Testing the Model

5 images from two different structures were taken with the aim of access the performance of the detector. 2 images were of a footbridge across University Way near the University of Nairobi main campus, which had a surface riddled with voids. The other 3 images were of a wall, near the American wing of the University of Nairobi, main campus, whose surface was visually intact.

Fig 6: Example of photo collected from the footbridge across University Way near the University of Nairobi main campus
Source: Author

Fig 7: Example of photo collected from the wall of a building near American Wing of the University of Nairobi, main campus
Source: Author

3 additional photos of the surface of concrete cubes were taken from the concrete laboratory. The concrete was of a porous concrete mix.

Fig 8: Example of a photo of a cube made with a porous concrete mix
Source: Author

These images were used to perform 3 tests:

1. An image from the footbridge was used to determine the effect of varying the size of the sliding window on the detection of voids. This was accomplished by varying the steps (see Fig 5) variable in the detector's algorithm. The window sizes that were used were 32x32, 64x64 and 128x128.

2. The images from the footbridge and the wall were used to gauge the accuracy of the CNN at detecting the voids.
3. The results from the images of the cubes were used to check whether there was a relationship between the percentage area occupied by voids and actual porosity.

Results and Discussion

Testing and Validation Results

During training, it took the model up to the 50th epoch to consistently hit a training accuracy of 90% and above. Before that, it would hit 90% accuracy sporadically with the first one occurring at the 38th epoch. The validation accuracy hit 80% accuracy as early as the 3rd epoch but would randomly fluctuate between the high-70s and mid-80s most of the time. The highest training accuracy obtained was 92.08% during the 58th epoch while the highest validation accuracy was 89.08% during the 46th epoch. This training and validation accuracies were adequate to provide a good foundation to build a performant void detector.

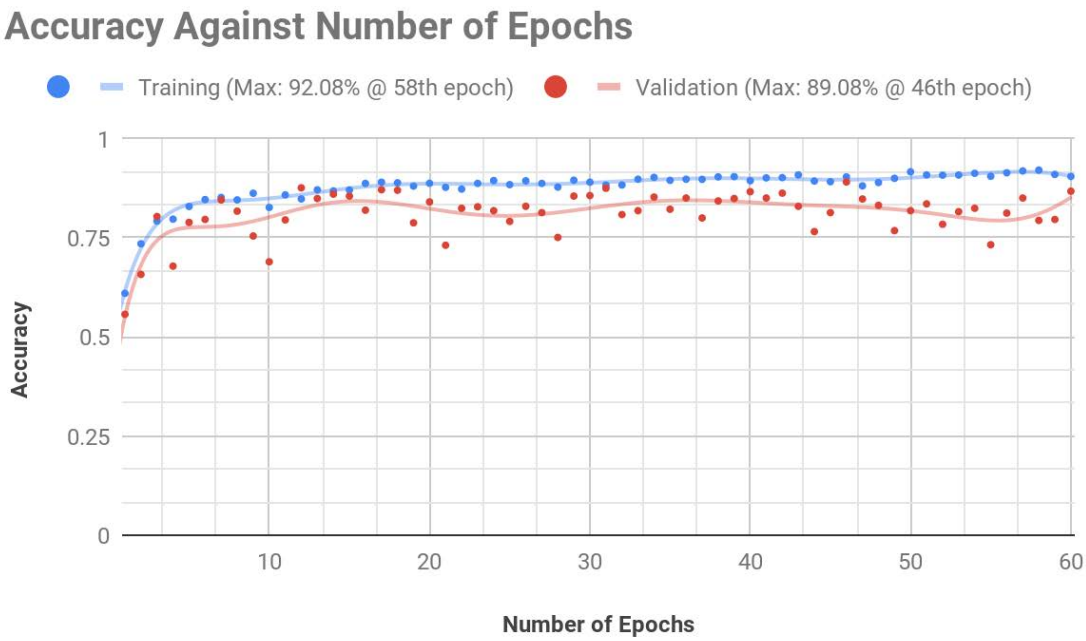


Fig 9: Accuracy Against Number of Epochs

From Fig 10, the training loss decreases with an increase in the number of epochs. Furthermore, the training loss is low compared to the validation loss. This is because the model learnt the characteristics of the training dataset and not the validation dataset.

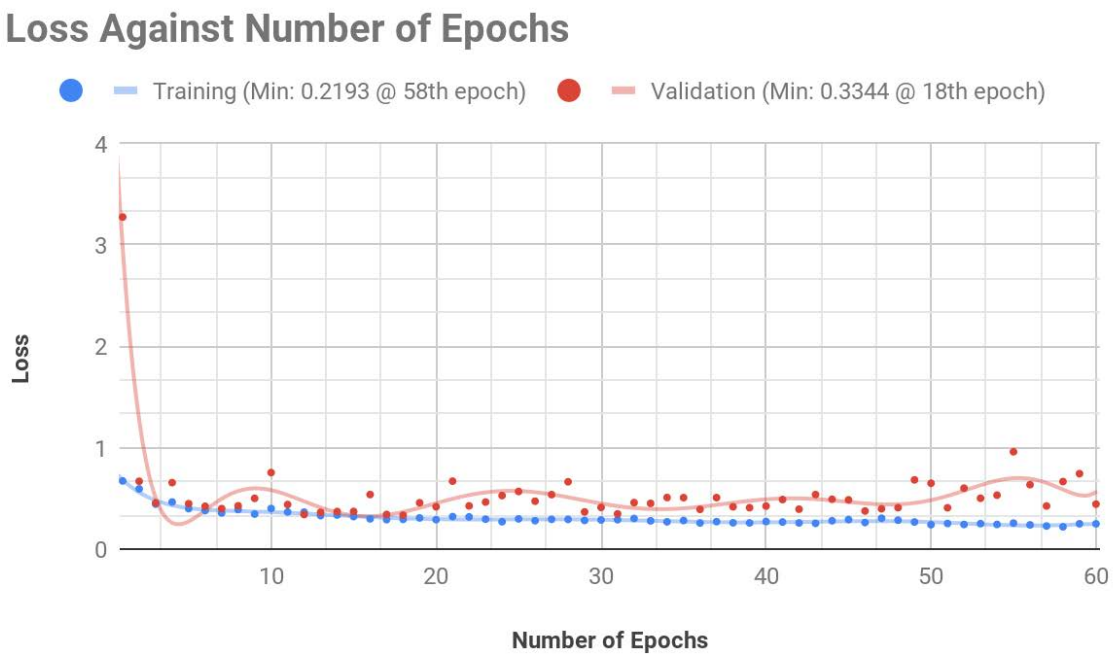


Fig 10: Loss Against Number of Epochs

Finally, it can be seen from Table 3 that the best time to have stopped training was during the 12th epoch. This is because:

1. it had at a low validation loss of 0.3408 compared to the lowest of 0.3344 during the 18th epoch.
2. It had a high validation accuracy of 87.61% compared to the highest of 89.08% during the 46th epoch.

Therefore, stopping should have been done early.

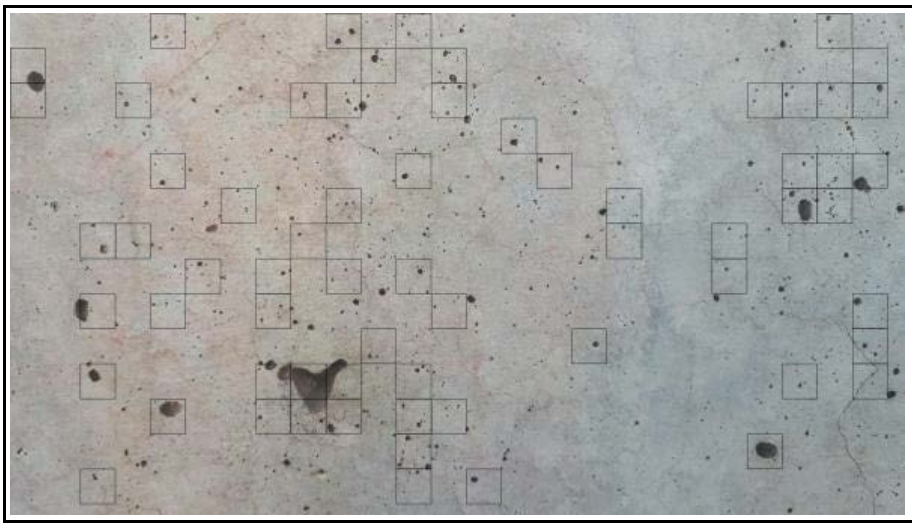
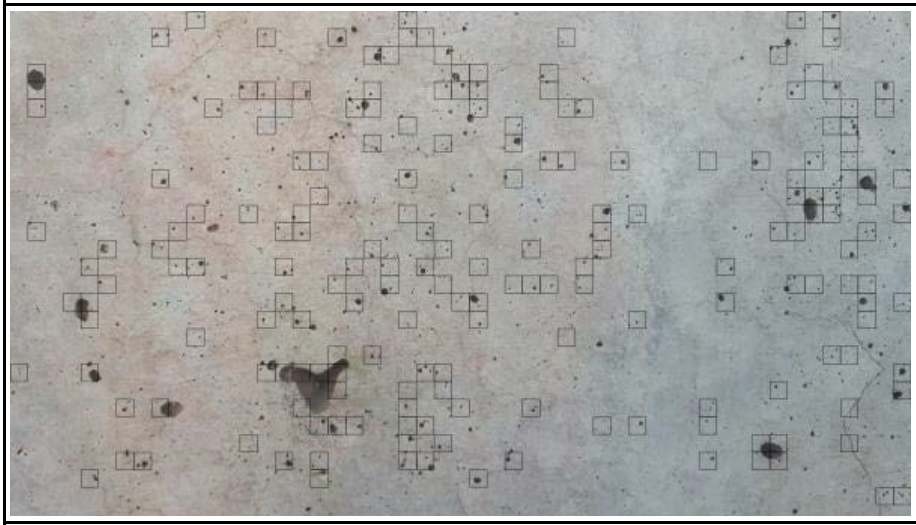
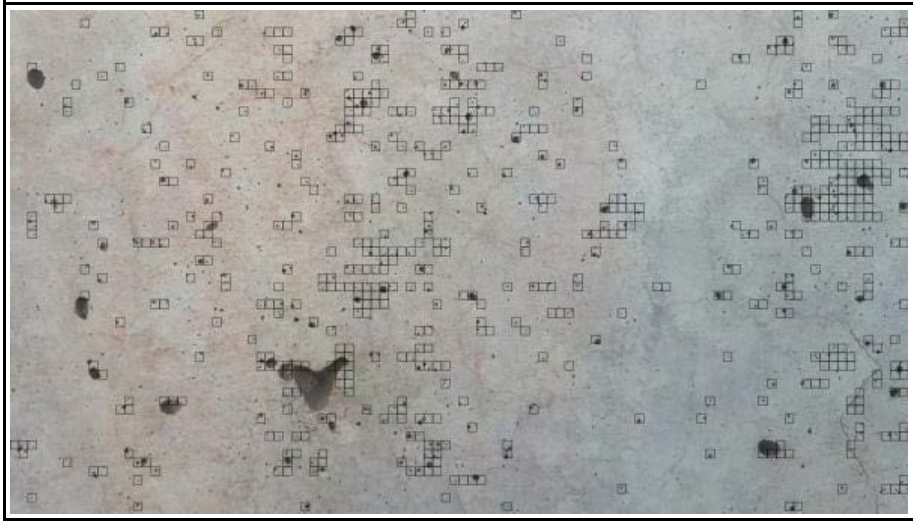
Table 3: Best Epochs to Stop Training

Epoch	**Val Accuracy (%)**	**Val Loss**
12	87.61	0.3408
13	84.91	0.3627
14	86.01	0.3706
15	85.52	0.3711
17	87.12	0.3413
18	86.99	0.3344
29	85.52	0.3666
31	87.48	0.3469
46	89.08	0.3758

Effect of Varying the Size of the Sliding Window

Table 4: Results of Varying Window Sizes

Photo	**Window Size**

	128x128
	64x64
	32x32

It was found that the largest window size (128x128) was best for detecting large voids. However, it could not adequately detect small voids. The smallest window size (32x32) performed the best at detecting small voids, but could not adequately detect large voids. Only the edges of the larger voids could be detected by the 32x32 window size.

As it can be see from Fig 11, the 32x32 window size (a) performs the worst. The 64x64 (b) does a bit better. However, the best detection was done by the 128x128 window size (c).

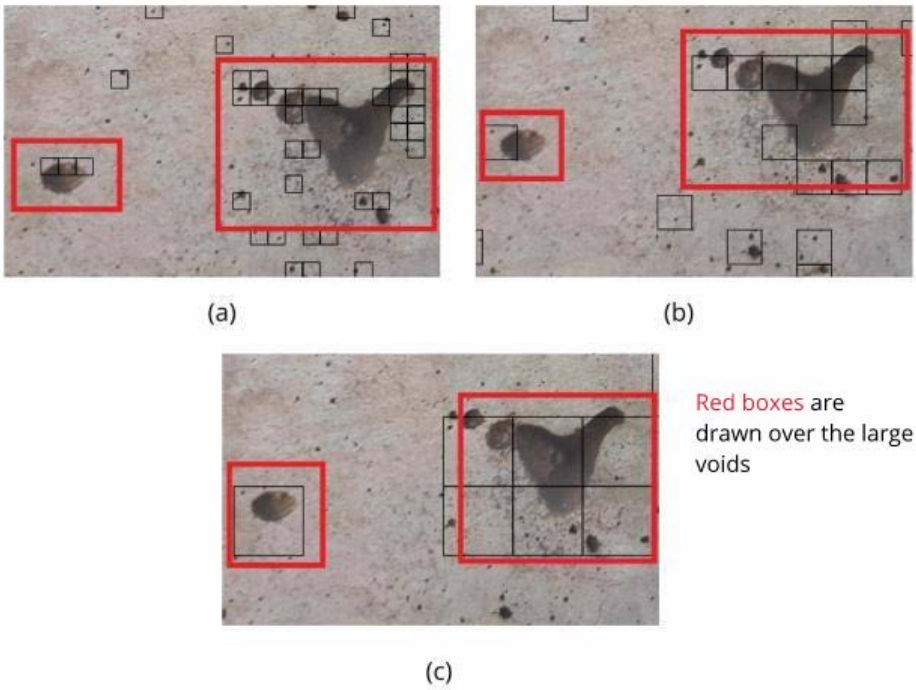


Fig 11: Detection of large voids: (a) 32x32 window, (b) 64x64 window and (c) 128x128 window

It can be seen from Fig 11 that the detection of large voids increases with increase in window size.

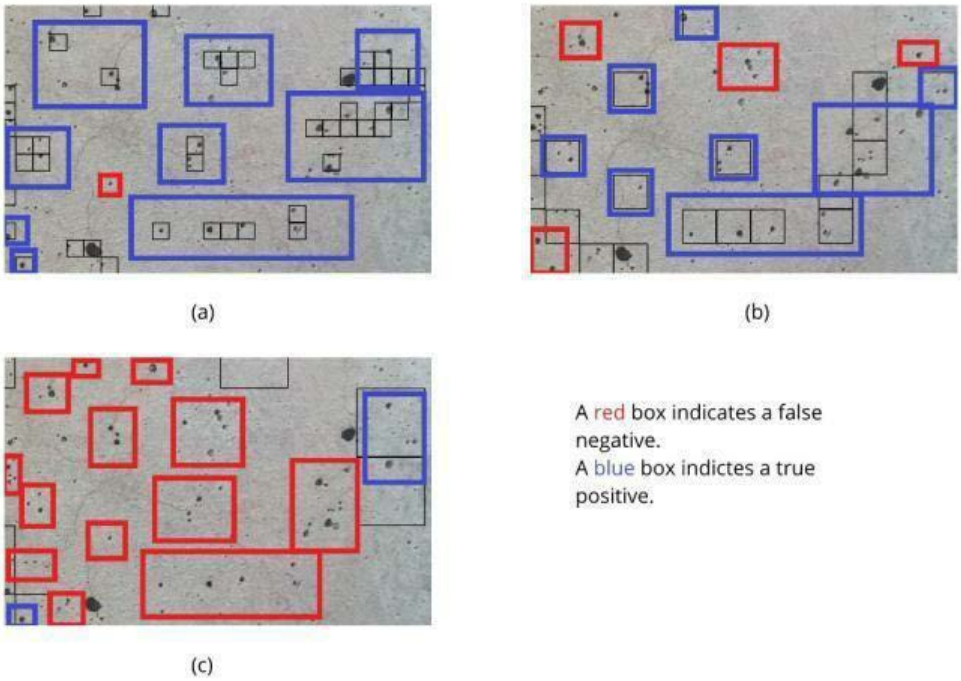


Fig 12: Detection of small voids: (a) 32x32 window, (b) 64x64 window and (c) 128x128 window.

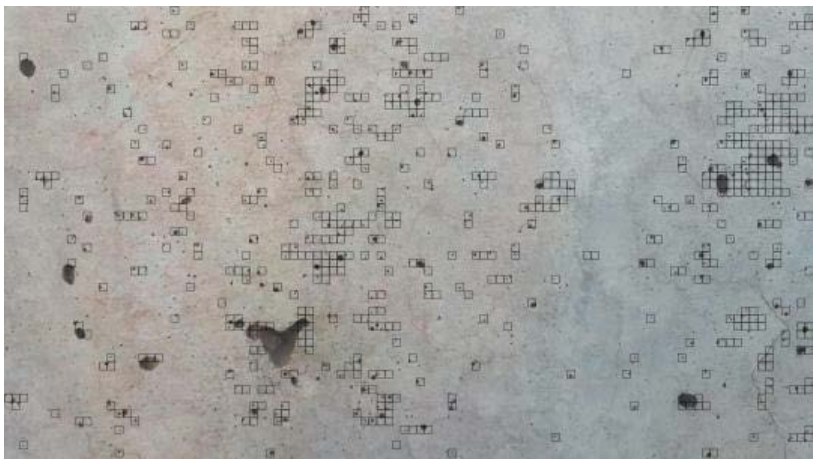
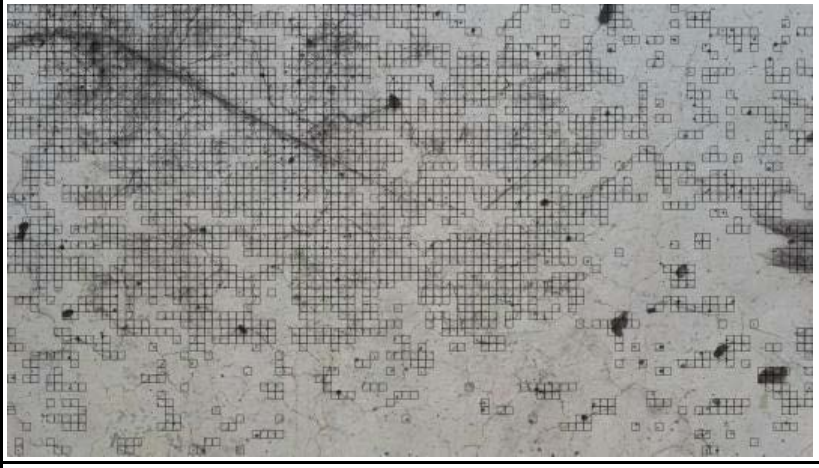
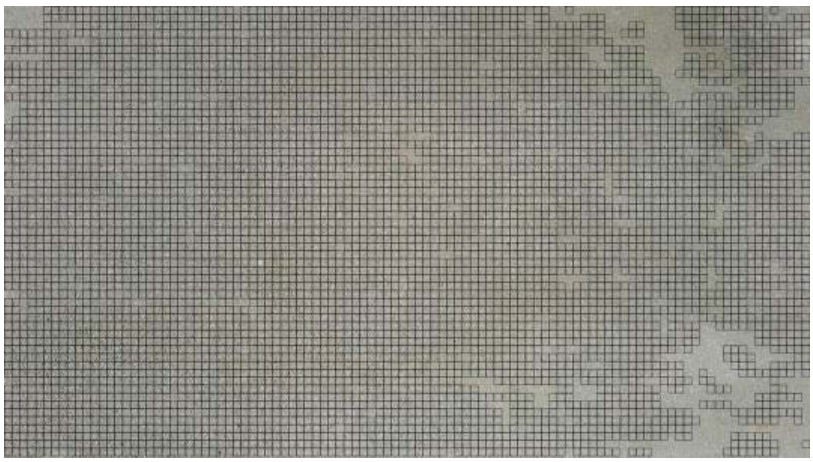
It can be seen from Fig 12 that the detection of small voids degrades with an increase in the window size. Furthermore, it can be seen that a 32x32 rectangle more closely wraps around the void compared to the larger rectangles. Therefore, a 32x32 window is better suited to calculate an estimate of the area occupied by voids.

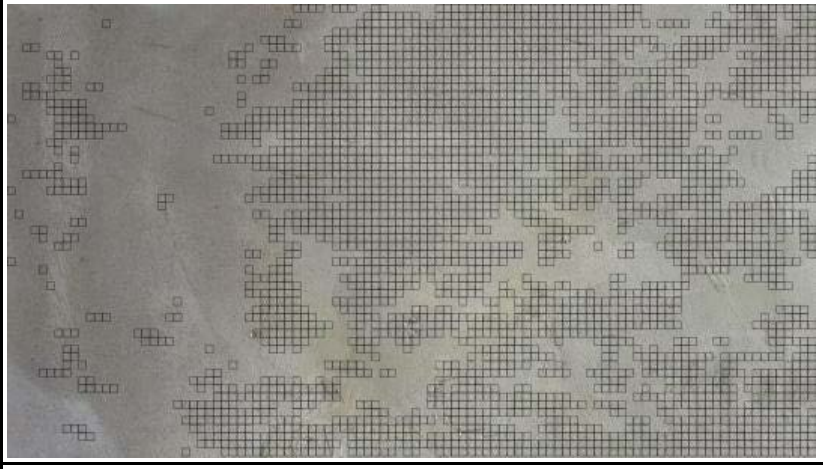
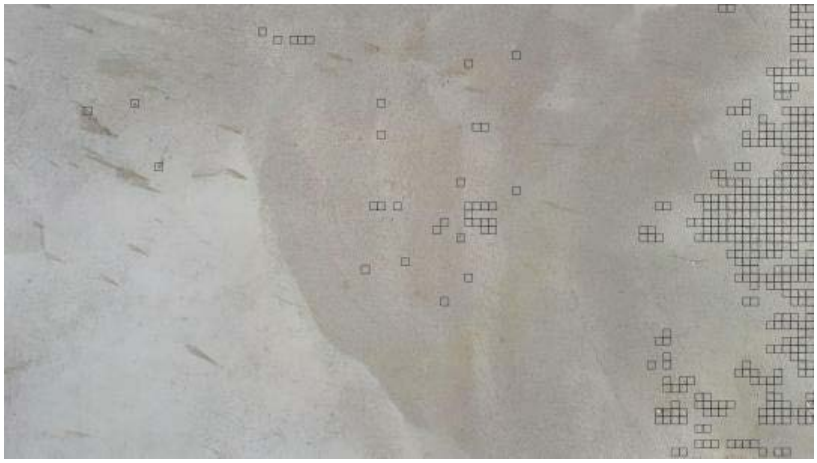
Estimation of the Percentage Area Occupied by Voids

A window of size 32x32 was chosen to compute an estimate of the ratio of the area of voids to total area. This is because the window would provide a relatively much tighter fit to the voids compared the larger window sizes. However, this would come at the expense of detecting the larger voids. The ratio of the area occupied by voids to the total area gives us a rough estimate of the area covered by voids. The ratio was computed as a percentage.

$$ratio(\%) = \frac{Area\ occupied\ by\ voids}{Total\ Area\ of\ Photo} \times 100$$

Table 5: Results of Estimating Percentage Area Covered by Voids

#	Photo	Area covered by voids (%)
1		10.68%
2		49.62%
3		89.23%

4		50.17%
5		6.64%

As expected the 32x32 window size could not adequately detect large voids present in photo 1 in Table 5. This could be because the small size doesn't give the model adequate information to make an accurate prediction when the sliding window is traversing a large void. However, photo 1 gave the best estimate of the area occupied by the voids compared to the other 4 photos. This could be because it had no stains (as seen in photo 2), no coarse surface (as seen in photos 3, 4 and 5) and had good lighting.

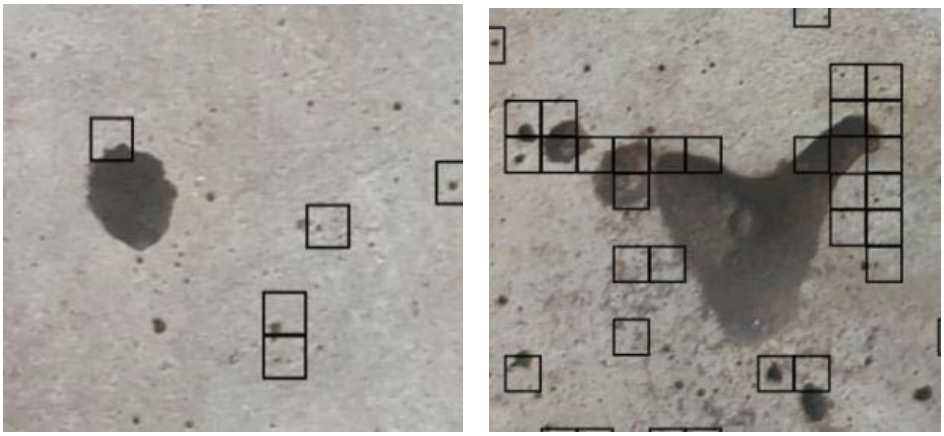


Fig 13: Model could not Detect Large Void When Using a 32x32 Sliding Window

However, there was one accurate prediction of a large void in photo 2 by the model. By observing the way the boxes have fit almost perfectly in the void, it is plausible that the detector was able to gather enough information from the edges of the void to know that it was a void. This ability to detect the edges of the void appears to be crucial for the model. This corroborated by Fig 13 as the edges to the voids are much better detected than the rest of the voids.

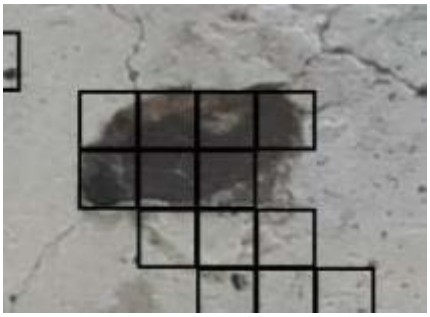


Fig 14: Accurate Prediction by the Model from Photo 2 of Table 5

Secondly, the presence of stains in photo 2, cause the model to make a lot of false positive predictions hence giving inaccurate results. This is because the model was not trained on stained surfaces. Although the model was not trained on stained surfaces, the photo was chosen regardless in order to assess the performance of the model.

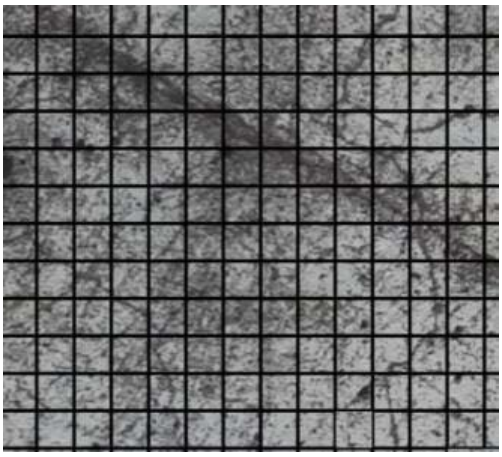


Fig 15: Stains on Concrete Surface Detected as Voids

Lastly, photo 3, 4 and 5 had a coarse finish to the surface. This coarseness was detected as void by the model even though the surfaces did not have any visible voids on them. This observation is elaborated below.

Effect of a Coarse Surface on Detection

When the detector comes across a coarse surface with no visible voids, the model detected that voids were present. This resulted in a lot of false-positives. This could be because the images that the model was trained on were of concrete surfaces that had a relatively smooth finish. The coarser surfaces on some of the test images, from the wall near the American Wing building, were not encountered during training.

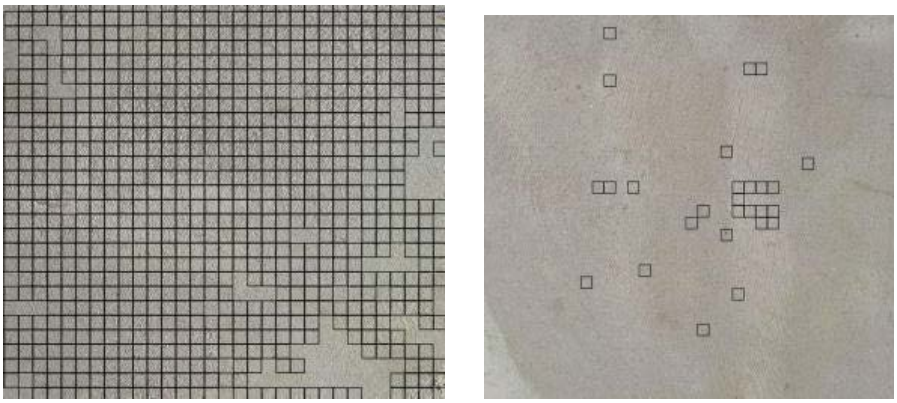


Fig 16: Coarse Surfaces Detected as Having Voids

Fig 17: Example of Coarse Surface

This behaviour of the model does introduce additional inaccuracies in results for Table 5.

Detection of Voids on Surface of Porous Concrete

Table 6: Results of the detector on the surface of porous concrete

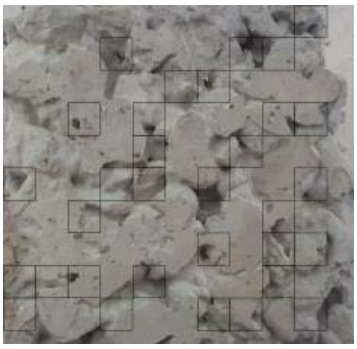
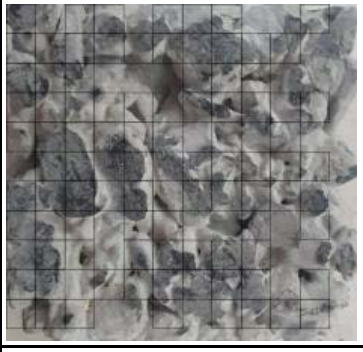
#	32x32	64x64	128x128
1			
2			
3			

Table 7: Ratios obtained using different window sizes

Sample	1			2			3		
Window Size	32	64	128	32	64	128	32	64	128
Ratio (%)	6.13	11.04	28.27	26.91	35.39	65.27	4.45	14.09	31.88

Table 8: Actual Porosity Determined in the Laboratory

Sample	Actual Porosity
1	23.6
2	24.5
3	22.8

Table 9: Actual porosity and ratios obtained using different window sizes

Sample	Actual Porosity	Ratio (% area occupied by voids)		
		32	64	128
1	23.6	6.13	11.04	28.27
2	24.5	26.91	35.39	65.27
3	22.8	4.45	14.09	31.88

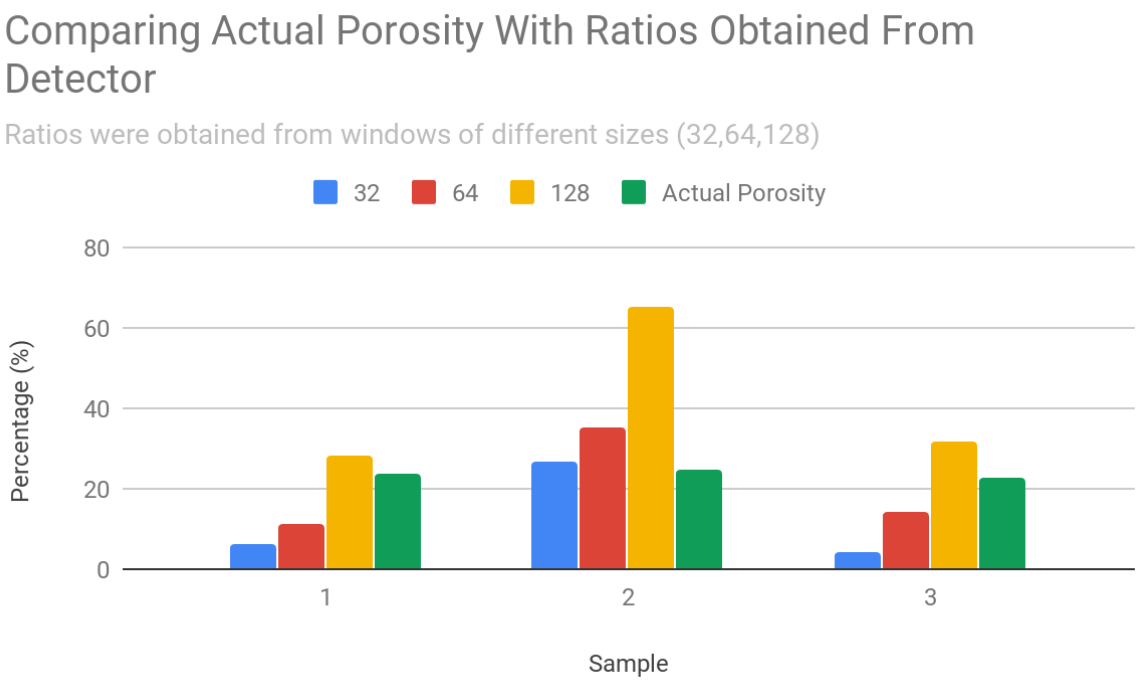


Fig 18: Comparing Actual Porosity and Estimated Area occupied by Voids

From Table 6, it can be seen that the model was thrown off by the darkened areas of the concrete in photo 2. These dark areas were caused by the lubricant used to lubricate the mould in the laboratory. These darkened areas, therefore, caused numerous false detections resulting in higher than expected values for percentage ratio of the area occupied by voids to total area. A possible solution to this would have been collecting images of surfaces discoloured by lubricants although it is difficult to encounter such stains in actual structures. Therefore, it is more prudent to discard the results of such surfaces.

Secondly, it can be observed that the size of the majority of the voids on the surfaces of the samples is large, hence it is not surprising that the 32x32 window size isn't adequate at detecting them. 64x64 and 128x128 performed much better with this regard. However, when 64x64 and 128x128 are compared, the 64x64 window size performed comparatively much better in certain situations. This is illustrated in Fig 19.

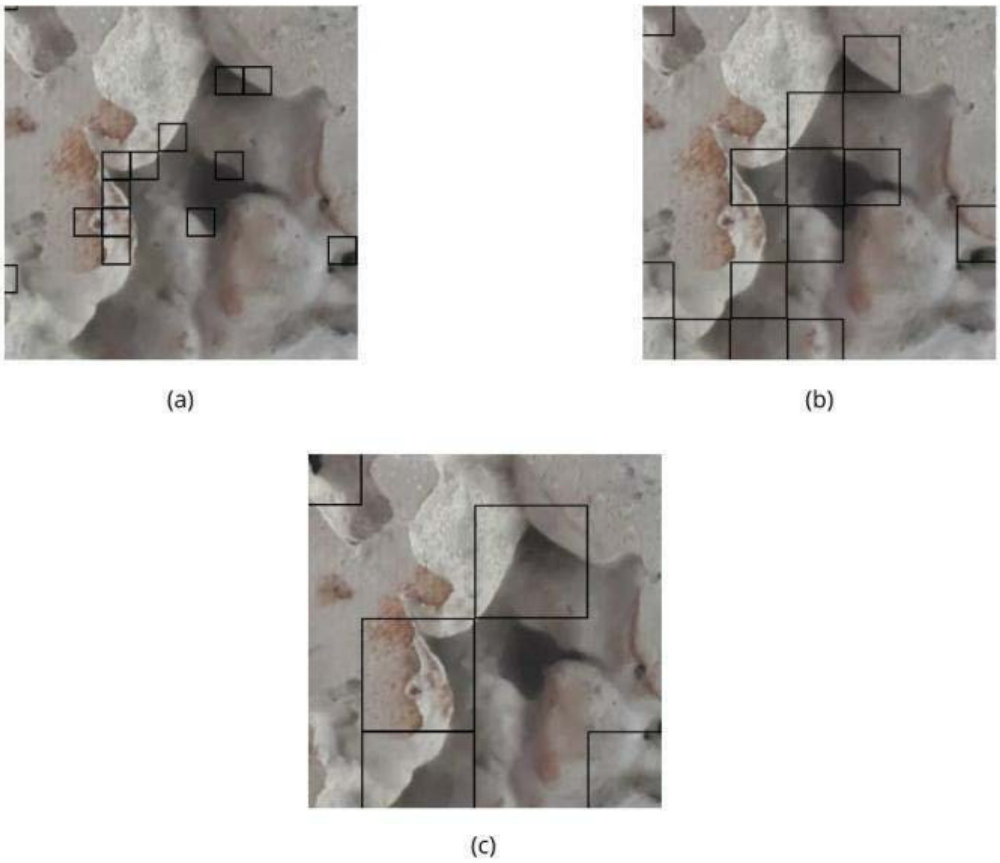


Fig 19: Performance of detector on photo 3 of Table 6: (a) 32x32 window, (b) 64x64 window, and (c) 128x128 window

Overall, as shown in Fig 18, the relationship between the percentage area covered by voids and actual porosity was unclear.

Problems With The Detector

1. The rectangles that the detector drew over the voids did not perfectly cover the voids.

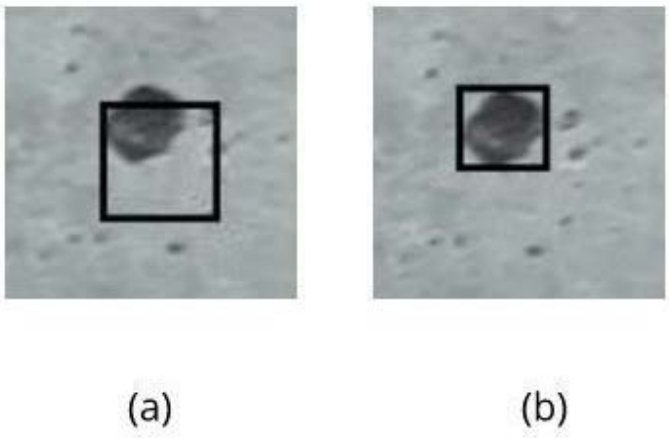


Fig 20: (a) Rectangles don't perfectly cover voids and (b) Example of how rectangles should cover voids.

In some instances, the detector drew rectangles that only covered part of the

void while leaving the rest uncovered. This can be seen in Fig 20 (a) where the top part isn't covered. This resulted in an erroneous estimate of the area of the void.

2. The detector cannot dynamically adapt the size of the rectangles to cater for voids of different sizes.

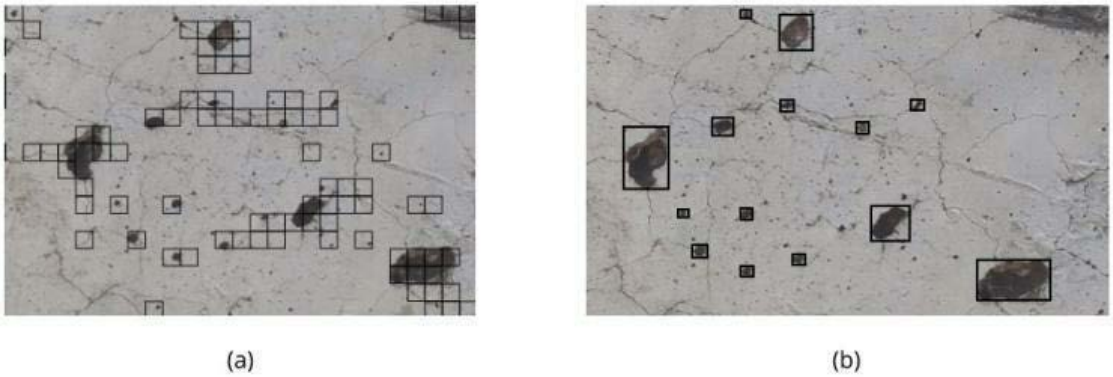


Fig 21: (a) The rectangles are of the same size and (b) Example of how the model should vary the rectangle size

In many instances, the fixed rectangle size was sometimes inadequate at covering the voids. At times the voids were smaller than the rectangle leading to the rectangle capturing large portions of the concrete surface that did not have voids. Consequently, this gave a larger estimate of the area of the void. At other times, the voids were larger than rectangles hence the detector could not detect the voids all at once. It, therefore, relied on creating building blocks of smaller rectangles in order to cover the voids entirely. This can be seen in Fig 14. However, if the voids were too large, the detector would fail to detect the parts of the voids that did not have edges in them. Therefore, the detector wouldn't draw rectangles around those portions, consequently giving a lower estimate of the area of the void. This can be seen in Fig 13.

Conclusion and Recommendation

Conclusion

From this study, the following conclusions were made:

1. CNNs are an effective way of detecting voids. Accuracies of 92.08% and 89.08% were obtained during training and validation respectively.
2. The larger the sliding window size, the more effective it is at detecting large voids. However, the larger the sliding window size, the less effective it is at detecting small voids and vice versa.
3. The relationship between the percentage area covered by voids and actual porosity was unclear.

Recommendations

It is recommended that an established object detection algorithm such as region proposal techniques, YOLO and SSD be used. This is because they produce closely fitting bounding boxes compared with the simple sliding window algorithm used in this study. They can also produce bounding boxes of different sizes depending on the size of the object.
It is also recommended that more data be collected so that the CNN can be able to learn how to detect voids under different concrete surface conditions.

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The Effectiveness of Principal in Managing Human Resource in Private Secondary Schools in Phnom Penh, Cambodia.

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Abstract- Human resource management plays a significant role in maintaining and promoting quality education in private secondary schools. The active participation of principals in managing human resource is to ensure ensuring effective teaching and learning. The functions of human resource management in the school includes recruitment and selection, training and development, compensation and benefits, and performance management. Without effective personnel management and well-motivated workforce operating within a sound human resource management, productivity, and the performance have not happened. Since the roles of principals in managing human resource is a key component in the performance of staff and their ability to function effectively towards the realization of success in school management. That`s why this paper has been reviewed over the period of six months from July to December 2018 on Effectiveness of Principal in Managing Human Resource in Private Secondary Schools in Phnom Penh, Cambodia to address the effectiveness of principals` roles in managing human resource, determine the challenges faced by the principal in the management of human resource, and propose some strategies that could be used by principal for effectiveness of human resource management. The paper also recommended to future comprehensive study should conduct human resource management strategies on improving employee performance. This review would be an important academic source for principals, and HR professionals to improve upon human resource framework for the effectiveness of managing human resource at school levels. It also benefits for secondary schools both public and private, and educational institutions over Cambodia and global perspective.

Index Terms-Principal, Effectiveness, Managing Human Resource, Private Secondary Schools,

INTRODUCTION

Human resource management is vital in improving employee productivity and school performance that can be attributed to effective educational management. Furthermore, the roles of the principal in managing human resource is a key component in promoting an employee`s ability to perform the job more effectively towards employee performance for the success of school management. When the principals have implemented the human resource management functions as the strategic approaches more professionally to staff management, the human resources can be a competitive advantage and a great source of competitive strength for the schools. Armstrong (2012) addressed that human resource management as strategic and coherent approaches to the management of an organization's most valued assets. Currently, the private secondary schools in Phnom Penh, Cambodia, recognized that human resource is the most important and unique asset that the school has. Thus, the importance of managing this valuable asset is being challenging tasks for successful principals. It is, therefore, the effectiveness of human resource management policy can contribute to quality education and employee productivity, employee performance, and effectiveness of school management (MoEYS, 2012). Despite the role of the principal in managing human resource is needed to ensure well-personnel management, but there are still lack of adequate recruitment and selection process, shortage of compensation and benefits framework, staff training and development, and low of staff performance management systems. To respond to human resource management practices situations above, this paper will review the effectiveness of the principal in managing human resource in private secondary schools in Phnom Penh, Cambodia.

THEORETICAL FRAMEWORK

Human Resource Management Practices

According to Matthis and Jackson (2010) human resource management as the strategic and operational management of activities in an organization. From the statement above; the human resource management is seen in terms of two principal functions, namely; the operational and strategic forms which the former focus refers to the personnel activities which include controlling attendance, ensuring employee health and safety, administering rules and regulations to comply with the labor laws. The strategic focus involves human resource planning, forecasting, recruiting more people, employing people with new skills and competencies. This researcher stipulated that human resource management has moved from the traditional role of personnel management into strategic management where all employees, especially, the principals should be involved in problem-solving, corporate culture promoting and leadership styles management. Moreover, the human resource policies aimed at supporting the mission and objective of the schools and making it a competitive environment in the context of education sectors. The appropriate use of human resource management practices positively impacts the level of employer and employee commitment and performance (Purcell, 2004). Practically, human resource management functions are well managed by principals such as hiring new people, employee training and development, competitive compensation, and performance appraisal can encourage the employees to work better in increasing productivity and performance. More essentially, human resource management in education is the methods of maintaining and retaining both teaching and non-teaching staff so that the school can achieve consequently achieve the goals of schools optimally.

RESULT AND DISCUSSIONS

The Roles of the School Principal in Human Resource Management

Human resources management is found as a strategic approach to improve the commitment of individuals and team who in turn contribute to school growth. According to Armstrong (2010). the purpose of human resource management is to ensure that the organization is able to achieve success through people. It is, therefore, the principle of human resource management requires the principal to manage the teaching staff and non-teaching staff in the school, to ensure the right person in the right job, to oversee staff motivation, staff capacity development, staff performance evaluation based on proper of personnel policies. However, the principal plays important functions in human resource management as following:

Recruitment and Selection-It are the fundamental roles of the human resource department that the principal is in charge to ensures the school obtains the most skillful and competent person from a pool of applicant. The techniques and procedures of recruitment and selection are successful if it fits with organizational performance (Milikic, 2009). Although, the principal evaluates the ability and competency of the potential employees in relation to the needs of the school. The principal also takes responsibility in the recruitment process to identify and attract potential candidates from within and outside the school to select them for future employment. It is believed that the success of the educational program is mainly dependent upon the selection of qualified both teaching and non-teaching staff to perform the right jobs.

Training and Development-It is one of core human resource management functions which is to identify the key skills and competence of an employee that need for training and development to improve their skills for better performance. There is a change needed through training and development to improve and grow in competence. This can be done through on-the training, off-the-job training, conference, workshop, and seminars. According to Anderson (2000) training is a process to change the behavior of employees at work through the application of learning principles and necessary skills both hard and soft to build employee abilities for better performance. The principle requires to manage the systematic development of the attitude, knowledge and skill behavior pattern required by an individual in order to perform adequately a given task or job in the school to achieve effective performance, and to develop the abilities of the individual and to satisfy current and future manpower needs of the school.

Compensation and Benefits- It is one of the main human resource management functions. One of the researchers, Ahmed, Tabassum, and Hossain (2005) found the pay and advantage practice is profoundly connected with the organization's performance. The principal has to determine the compensation strategy of the management is a crucial human resource function which is must be ensured internal equity as well as labor market competitiveness.

The principal also needs to work out innovative incentive schemes so as to motivate employees that can create and sustain a competitive advantage and performance.

Staff Performance Management-It is one of the main pillars of human resource management functions. Kleiman (2000) addressed that the performance appraisal approach is an assessment of employees' job performance levels. A good and effective performance appraisal will help to direct employee behavior towards the goals of the school and it will also help to monitor how good employee performance is. It is significant for the principal to oversee the performance appraisal process of evaluating employee performance by setting performance goals, determine the key performance areas, identifying critical attributes for effective performance. The system is to provide guidance and approach for an employee to perform tasks and what they need to be achieved, and it will help to provide feedback, identify training need, area development, and planning, and to provide inputs for management of pay administration, rewards, and staff promotion. So performance management is the most important function for the principle that needs to be well managed and implemented for employee performance in order to gain quality education and school goals.

Concept of Secondary School in Cambodia

Cambodia has committed to pursuing the Education for All (EFA) goals to reduce poverty and promote the general secondary education to help young people develop the mental and physical with qualities that will enhance their employability. To reach these goals, the Cambodian Ministry of Education Youth and Sports (MoEYs) has developed its strategic plan including human resource strategy to improve school management and quality of education (MoEYS 2014). Currently, the private secondary schools in Cambodia is organized in two levels: lower secondary school and upper secondary school and it is affiliated with MoEYS to overview all aspects of education with the assistance of semi-autonomous to ensure education standard and academic quality. The first one is lower secondary school lasts three years and is the last mandatory cycle. Upon completion of this cycle, pupils sit a national exam to gain access to upper secondary; and the second is upper secondary, lasting three years, and the last level of general education. At the end of this cycle and have specialized in either social sciences or exact sciences, pupils sit the national baccalaureate exam, which entitles them to university admission. Thus, the quality of learning depends on the class of its teachers and principal. They are the spirit of the school that turns out learning results, and its high quality to the school. It is, therefore, this paper is reviewing the effectiveness of the principal in managing human resource in private secondary schools.

CONCLUSION

The paper concludes that private secondary schools remain a veritable means of human resource management in Phnom Penh, Cambodia. Principals as the head of the school are to execute the roles of human resource management. The principal` s role is to manage effectively human resource in planning, recruitment and selection, training and development, compensation and benefits and, performance appraisal to ensure employee performance, quality education and effective school management. The paper has shown that the effectiveness of the principal in managing human resource was not fully achieved. The principals were not completely followed the existing rules, regulations and necessary steps of human resource management processes. There were inappropriate recruitment and selection procedures found much attention and implementation, the compensation packages were not well effectively managed, the opportunities for short-term and long-term training were not implemented as planned, and the low rate of usage performance result for feedback the strengths and weaknesses, rewards, promotion to achieve the school goals. However, there were challenges of for principal in managing human resource, since it`s difficulty in attracting the potential and qualified candidate to fill in the vacancies, training and development are finances and times due to the tight budgets and schedules, the compensation package is not very competitive and meet staff expects to be paid finance rewards commensurate with the task performed, staff performance appraisal system is not clear and transparent. As a result, there were not timely manpower supply, low of staff abilities and competencies to perform a better job, poor performance in teaching learning process activities and high staff turnover.

RECOMMENDATION

Considering the importance of strategies proposed towards effective human resource management in private secondary schools, the following are recommended.

1. Recruitment and Selection-the school should develop clear and transparent criteria, guidelines that can handle the recruitment and selection process so as to employ qualified and competent teachers. Therefore, the resource pool for teaching staff should be well managed to fill in timely vacancies.

2. Training and Development-the school should conduct regular workshops and short courses to help principal keep abreast with trends in human resource management. Moreover, the training framework should be developed for effective implementation of both on the job and off the job training in order to equip the employee with the necessary skills and commitment in the area for enhancing performance.

3. Compensation and Benefits-the school should develop precisely compensation and benefit structures to support the principal in managing more effectively and promoting competitive compensation packages to teaching and non-teaching staff in order to motivate them for better productivity and performance.

4. Performance, Appraisal-the school should have better performance appraisal system with clear procedures for effectively implemented by the principal, and some mechanisms should be designed by which teachers are informed about their performance results for further benefit and for purposes of promoting a working environment to attract and retain staff.

5. A future comprehensive study should conduct human resource management strategies on improving employee performance.

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Demonstration of the Random Changes in the Nigerian Financial Market and a Prediction to the Future.

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ABSTRACT
Random changes in financial markets have motivated the extensive use of stochastic processes in finance. With the advent of digital technology and the accompanying gains in processing speed and data storage, techniques in signal processing have become increasingly sought after in the finance industry. These techniques, although traditionally used exclusively in engineering to analyze electrical signals, have proved general enough that their use now transcends engineering and form the basis of any field where time varying signals are subjects of interest. Finance is one such field since financial data is very often compiled with reference to time as the independent variable. More specifically, most forms of time varying financial data may be interpreted as discrete time signals. In this research, we demonstrate the fluctuation in financial markets by investigating the past recent changes in the Naira and four other foreign currencies i.e. United States dollar (bureau de change (BDC) rate and Inter-bank Foreign Exchange IFEM) rat) Euro, and Britches Pounds (GB) and their relationship is shown in the form of signal graph using Microsoft Excel. The observations were discussed and a projection is made for the year 2025.

KEYWORDS: Financial market, Digital technology, financial data, Signal processing, Exchange rate.

1. INTRODUCTION

Prediction of Naira price has always been an enticing and intriguing area of study in Nigeria as the price of the Naira continues to rise and fall in the world currency market in recent years. Predicting the exchange rate behavior through techniques and various methods is a useful tool to assist investors in the country to act with greater certainty, and taking the risks, and volatility of an investment into consideration and know when to buy goods at the cheapest price and when to sell. A few of the published articles, such as Feng, (2015) and Nocera (2009) shed some light on the fact that signal processing techniques play an important role in today's finances. Indeed, today's financial analysis and risk managers depend on mathematical tools that, at their core, are based on signal processing techniques. Increase and decrease of the Naira depends on various factors, but in this work, we consider the Naira price variation as time series and without notation to the any factor, and just by finding the sequence rules of price train within the past five years, and make the price prediction into the future. The first step is to acquire large amounts of historical data for analysis, put the data in Excel format and using the set of input training data, a curve is plotted using Excel to predict the future (2025) of the Nigerian currency.

1.1 Relevance of Signal Processing to Finance

Yes, looking at this instance; assume that a producer is asked by a customer to sell some stock products to him at any moment in time that the customer chooses within the next few months, but at the same prices as today rather than that moment's prices. Obviously, the customer is prepared to pay today a premium to the producer for exercising this option. How much should the producer place its price so that the deal proves profitable for him/her? And how will the customer choose the optimal point in time to exercise the option he/she paid for? Both the customer and the producer will have to monitor the price of the product and extrapolate its future evolution according to past available information. Viewing the price as a signal, this is a classical problem in signal processing.

In financial investment strategy, there are two prominent schools of thought: fundamental analysis and technical analysis. The former aims to assess the true value of a business regardless of its transient market value. This approach has limited use for signal processing because it specifically avoids the troves of data such as daily share prices and uses more modest quantities of data for a somewhat subjective assessment. In contrast, at the heart of technical analysis lies the aim of using historical financial data to predict the future market value of a business. This is precisely the type of task for which signal processing is suited because the quantity of historical data is often immense and the sheer objectivity demanded in calculations is scarcely different from that seen in electrical engineering applications.

Signal processing techniques are generally used for technical analysis by major investment banks and especially by hedge funds. It takes advantage of very momentary random fluctuations in the market to generate reasonable profits on low margins but enormous volumes and fortune telling.
The rest of this paper is arranged thus; section 2: Review of related literatures, section 3: Methodology, section 4: result and discussion and section 5: conclusion.

2. REVIEW OF RELATED LITERATURES

Oyelami, & Edooghogho 2013 in their paper carried out simulation to study the exchange rate of the Nigerian Naira against the exchange rates of the US dollar, British pound and the Euro currency using Euler-Maruyama forward difference approximation.
Hina & Qayyum, 2015 disclosed that Exchange rate modeling and forecasting is important for policy making. Also, Ramzan *et al*, 2012 stated that forecasting exchange rate is crucial as it has significant impact on the macroeconomic fundamentals such as oil price, interest rate, wage, unemployment and the level of economic growth.
Adeoye & Atanda (2011) access the volatility of the Naira/Dollar exchange rate using the Purchasing Power Parity model and found non consistency in the nominal and real exchange rates for Naira/Dollar currency thereby suggesting the relevance of long term shocks in understanding the movement in the rates.

3. METHODOLOGY

To obtain data from the Internet, data scraping was used. The Excel opens the URL which includes the start and end date between which data points are retrieved. The monthly average rates of United State, United Kingdom, European countries and Nigeria were downloaded from the Central Bank of Nigeria (CBN) statistics and data website. This data is pulled and sorted into an excel sheet. The excel sheet is refreshed to pull new data. Data containing the monthly currency price, from January 2014 to November, 2018, a period of five years - was used. The choice of the period was deliberate as it is large enough to strongly depict and verify the predictive quality of the algorithms employed and to predict the future (up to 2025). The data set was divided into two parts for all algorithms. Two-thirds of it was used for training, while one-thirds was reserved for testing.

4. RESULTS AND DSICUSSION

Arising from the above description, the tables containing the price of Naira monthly exchange rate with respect to other currencies are given for the different years as follows;

Table 1: Year 2014 (Source: CBN)

Months\Currency	IFEM (USD)	BCD (USD)	GB POUNDS	EURO
January	160.23	171.71	256.59	212.10
February	163.62	169.45	257.81	212.72
March	197	320.93	280.4	218.89
April	162.19	170.25	260.67	215.14
May	161.86	166.85	262.41	213.98
June	162.82	167.17	263.29	211.68
July	162.25	167.71	265.93	211.24
August	161.99	170.36	260.12	207.41
September	201.00	254.06	168.64	162.93
October	164.64	169.43	250.27	197.63
November	171.10	175.85	249.96	197.60
December	180.33	188.45	262.86	207.16

s
The annual changes in the Naira against different currencies for 2014 are given in form of signal as shown in the graph below.

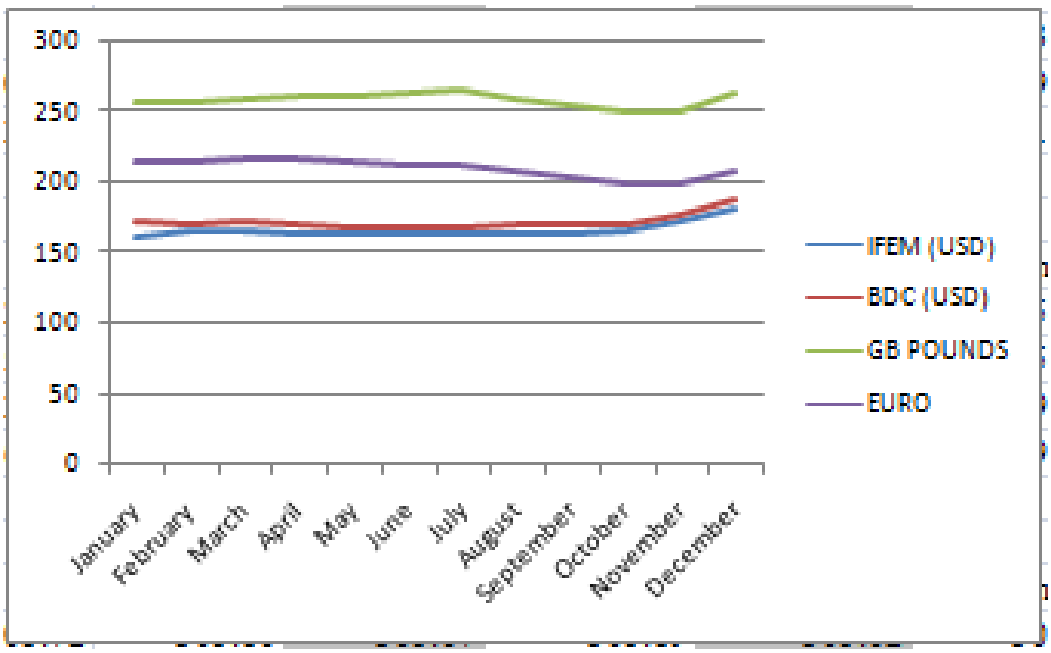

Figure 1: Signal processing graph for 2014.

From the above graph, the prices of pounds remain stable from January but slightly increased from February through to September, It then falls in October but rose-up again in November and December respectively. The price of Euro remains stable between January and June, decreased slightly through to September and was stable between September to November after which it rose up in December. The price of (IFEM and BDC) dollar was high in early part January but fell down towards the end through to October but increases from October to December.

Table 2: 2015 (Source: CBN)

Months\Currency	IFEM(USD)	BCD (USD)	GB POUNDS	EURO
January	181.78	196.13	254.39	194.85
February	194.48	213.03	274.79	204.78
March	197.07	222.93	295.60	213.74
April	197.00	210.70	294.24	212.11
May	197.00	219.55	304.79	219.85
June	196.92	218.98	306.06	220.84
July	196.97	237.15	306.41	216.87
August	197.00	216.64	307.21	219.33
September	197.00	222.68	302.55	221.22
October	196.99	224.83	302.26	221.45
November	196.99	232.40	299.38	211.53
December	196.99	258.30	295.39	214.00

The annual changes in the different prices for 2015 are given in form of signal as shown in the graph below.

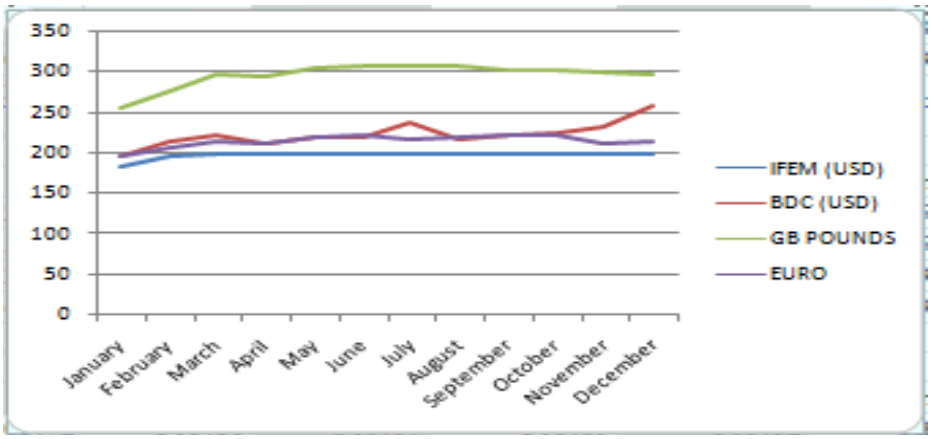

Figure 2: signal processing graph for 2015.

The price of Pounds increased sharply from January through to March but remained stable from then till December 2015. He price of Euro increased steadily throughout the year. The price of IFEM US dollar was a little bit increased in January but remain stable throughout the year.

Table 3: Year 2016 (Source: CBN)

Months\Currency	IFEM(USD)	BCD (USD)	GB POUNDS	EURO
January	197.00	289.78	283.62	214.09
February	197.00	329.83	281.79	218.55
March	197.00	320.93	280.40	218.89
April	197.00	320.71	282.07	223.46
May	197.00	336.93	286.33	222.85
June	231.76	351.82	328.53	260.03
July	294.57	364.47	388.37	325.90
August	309.73	396.15	406.13	347.33
September	305.23	431.10	401.08	342.17
October	305.21	462.03	375.71	336.21
November	305.18	415.36	379.49	329.84
December	305.22	455.26	381.39	322.13

The annual changes in the different prices for 2016 are given in form of signal as shown in the graph below;

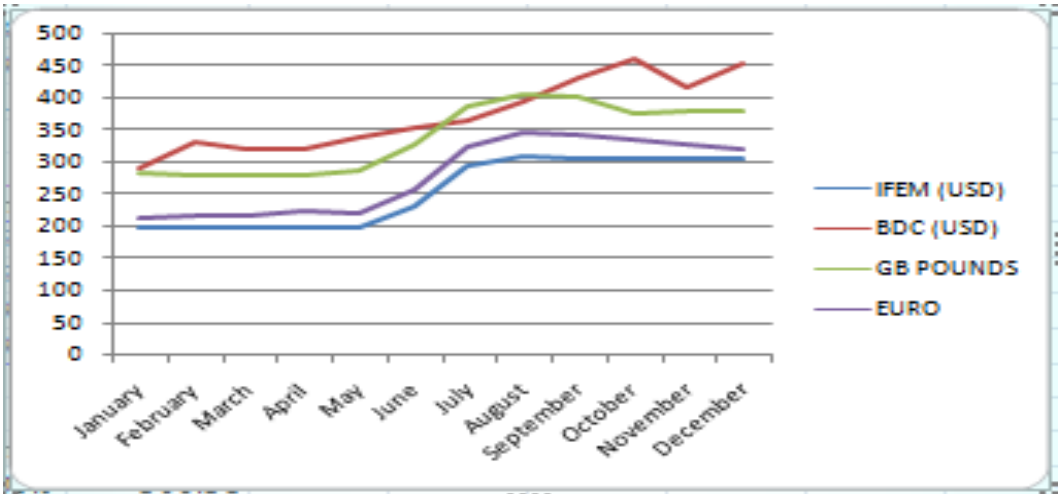

Figure 3: signal processing graph for 2016

The price of BCD US dollar increases gradually from January to October and decreased slightly mid October and finally increased from October through to December. Pounds remains stable from January to April but increased gradually and was stable at a some point in time, it remained stable till September and the price was stable from October through to December.

The various currencies at 2016 from the graph above continue to fluctuate with its pick at December.

Table 4: Year 2017 (Source: CBN)

Months\Currency	IFEM(USD)	BCD (USD)	GB POUNDS	EURO
January	305.20	493.29	376.32	324.37
February	305.31	494.70	381.17	324.95
March	306.40	429.48	378.13	327.35
April	306.05	392.89	386.92	328.15
May	305.54	384.48	395.04	337.72
June	305.72	366.25	391.57	343.24
July	305.86	365.38	397.36	358.50
August	305.67	365.57	396.08	360.93
September	305.89	365.55	408.57	364.53
October	305.62	362.21	403.25	359.34
November	305.90	362.41	404.45	359.07
December	306.31	362.83	410.48	362.36

The annual changes in the different prices for 2017 are given in form of signal as shown in the graph below;

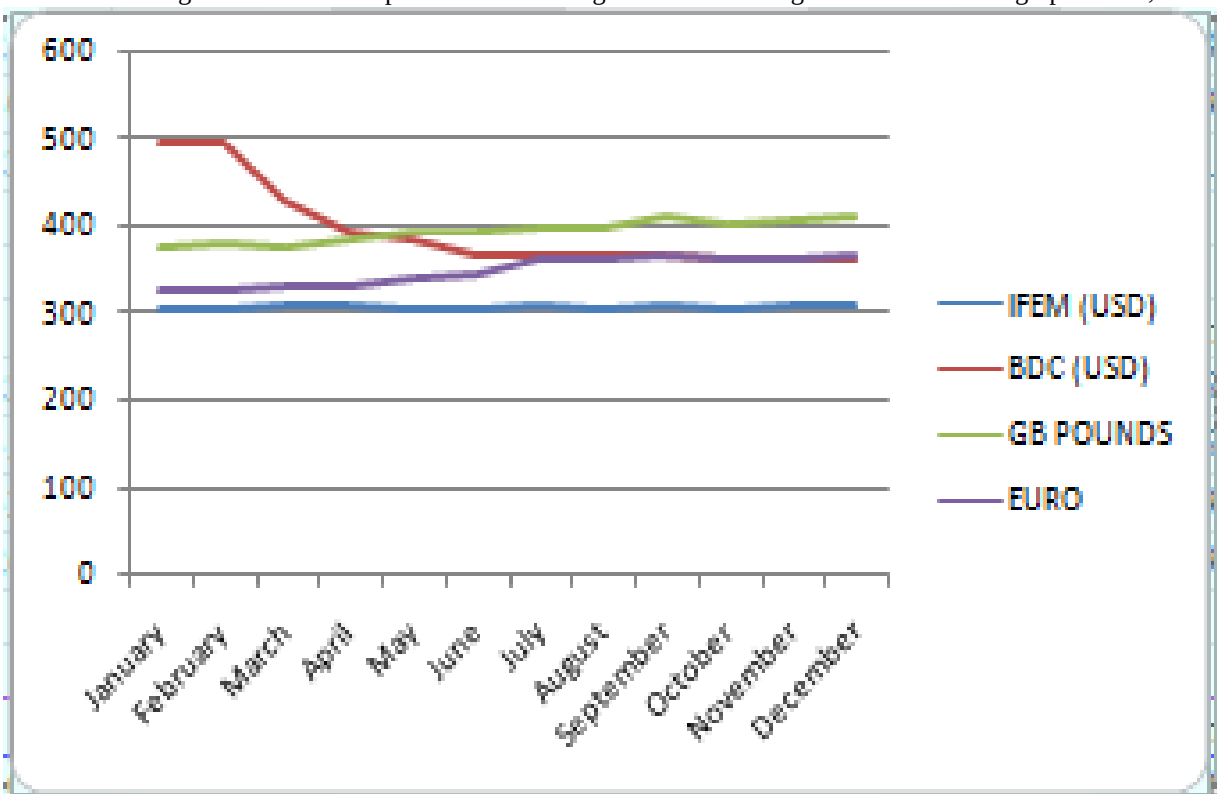

Figure 4: signal processing graph for 2017

The price of BDC (US dollar) was stable from January down to February after which it gradually falls from ₦500 to ₦360 in June and was stable till December. The price of Euro slightly increased from ₦330 to ₦360 and then remained stable till the end of that year. The price of GB Pounds increased slightly increased from January at ₦370 to ₦400 in June and remained at that through to the end of August, at September, it increased to ₦420 where it remained till the close of the stock market year. The price of Euro dropped down slight;u February and was stable at ₦362 till December.

Table 5: Year 2018 (Source: CBN)

Months\Currency	IFEM(USD)	BCD (USD)	GB POUNDS	EURO

January	305.78	363.20	422.35	373.00
February	305.90	362.48	427.40	377.84
March	305.74	362.07	427.26	377.19
April	305.61	362.25	428.38	374.22
May	305.83	362.86	412.23	361.67
June	305.87	360.66	406.64	357.48
July	305.81	359.36	402.76	357.40
August	306.06	359.00	394.24	353.54
September	305.83	362.86	399.86	357.14
October	306.5	360.74	398.86	351.87
November	306.71	362.82	395.87	348.61

The annual changes in the different prices for 2018 are given in form of signal as shown in the graph below;

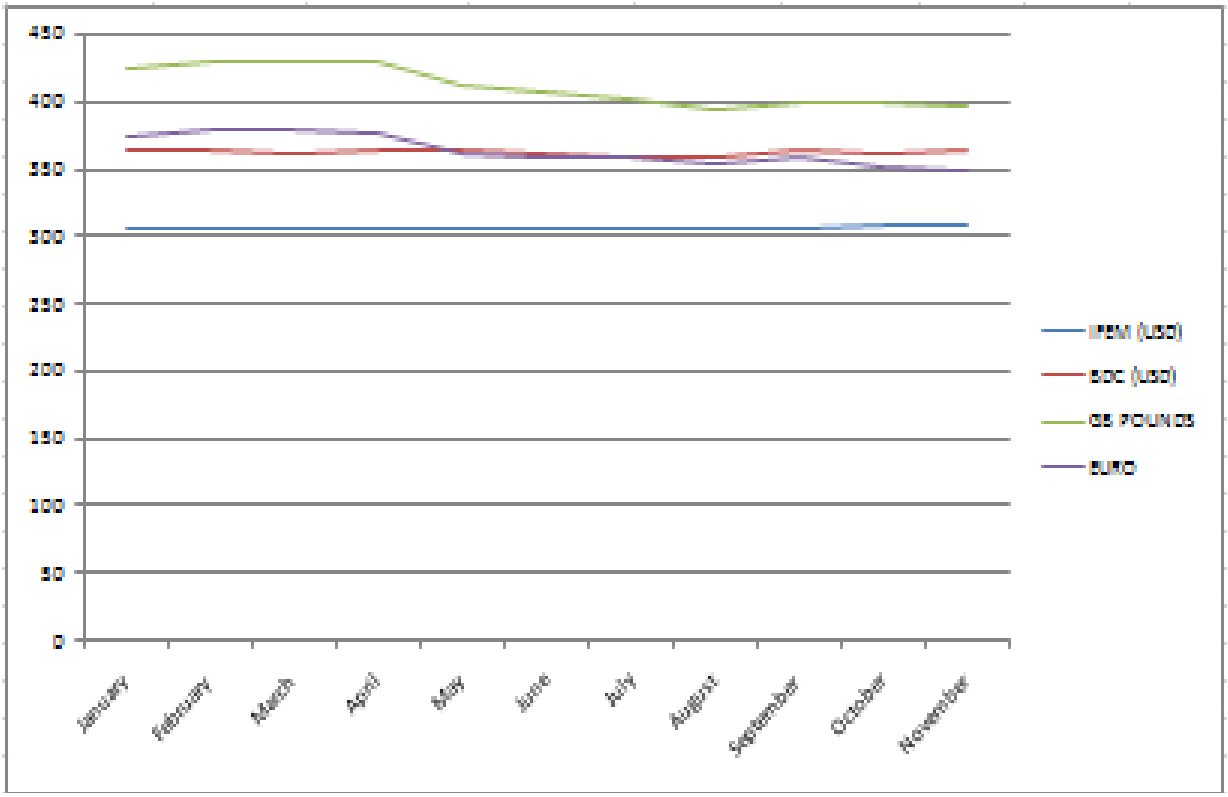

Figure 5: signal processing graph for 2018

In figure 5 above, the price of British Pounds was stable at ₦430 from January down to mid-March but decrease slightly to ₦410 from then through to July and became stable at ₦400 till December. IFEM us dollar was stable from January to April at ₦380 and then falls slightly to ₦350 in August were it remained stable till December. BDC (US Dollar) was stable through all months of the year at ₦370. Lastly for the year 2018, BDC (US dollar) was also stable all through the year.
The graph below gives a Single signal relationship graph of the 5 years comparing the three entities;

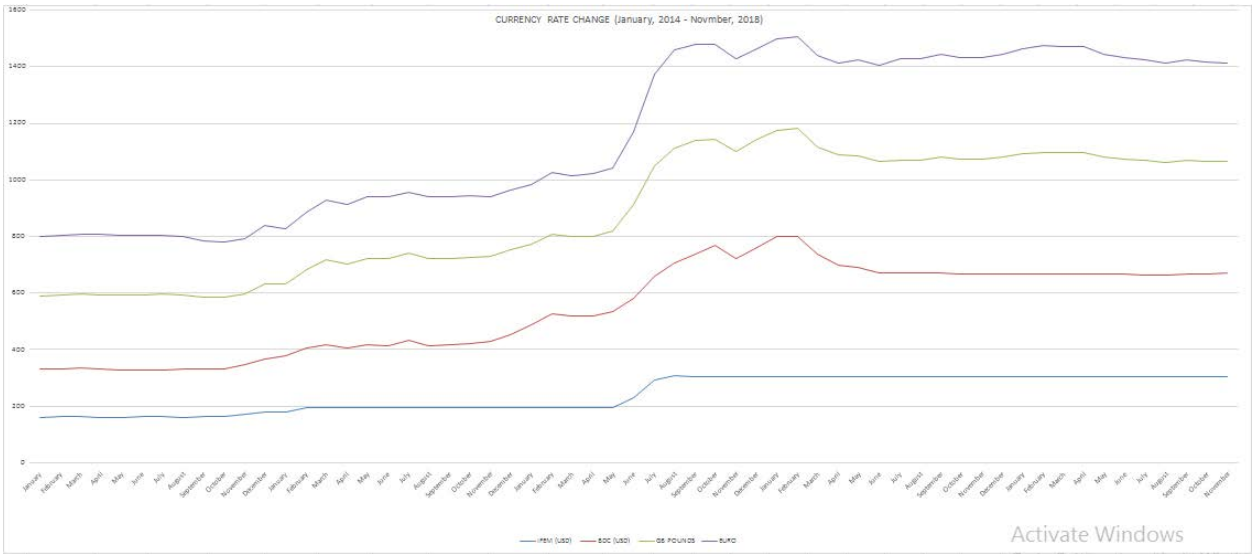

Figure 6: Signal processing graph showing all the years together.

The mean of the whole currency between the year 2014 and 2018 is shown in the table 6 below;

From the simulation, except with the IFEM US dollar, the difference in the cost of the currencies from the first year (2014) down to the concluding year is very glaring. The IFEM USDollar rose to its pick in August 2016 and has been constant even until the end (2018); this implies that the price of Naira with respect to IFEM USDollar would be stable for the next couple of years. Furthermore, the BCD US Dollar rose to its pick between January and February 2017 after which it gradually dropped in June that same year slightly and became stable till the end of 2018; this can predict that the price of the Naira with respect to BDC Dollar may likely be stable in the nearest future. Lastly it was observed that the GB Pounds and Euro has been highly unstable all along except during the very first year (2014), it goes up and comes down at any point in time. This may be as a result of constant changes in the interest rate; this brought us to our prediction that the Naira compared to GB Pounds and Euro respectively is likely to be even more unstable in 2025.

Table 6: Average (Mean) of the annual yearly currency exchange rate.

Year/Currency	IFEM(USD)	BDC (USD)	GB POUNDS	EURO
2014	170.75	191.19	253.25	205.71
2015	195.52	222.78	295.26	214.30
2016	253.49	399.61	339.58	280.12
2017	305.79	395.42	394.11	345.88
2018	306.14	361.66	374.22	362.72

5. CONCLUSION

The exchange rate model considered in the paper did not approach the simulation from the econometric
Perspective, but rather represent their relationship in the form of wave signal. The data use for the simulation was gotten for the central bank of Nigeria's website which most exchanges rates are found to be most accurate. It was predicted that the prices of Naira when compared to IFEM and BDC USDollar are likely to be stable in the nearest future while when compared to Euro and GB Pounds might exhibit some unstable characteristics in the as the years unfolds ahead.

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Transient Analysis of a Transmission line

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Abstract- In high-current, high-voltage power systems a very clear differentiation between steady-state and transient behavior of circuits is made. This is based on the concept that steady state behavior is normal and transients arise from the faults. The operation of most electronic circuits (such as oscillators, switch capacitors, rectifiers, resonant circuits etc.) is based on their transient behavior, and therefore the transients here can be referred to as ‘‘desirable’’. The transients in power systems are characterized as completely ‘‘undesirable’’ and should be avoided; and subsequently in some very critical situations, they may result in the electrical failure of large power systems and outages of big areas. It is with the belief that transient analysis of power systems is one of the most important topics in power engineering analysis.

It is found that there are many way to analyze the transient of transmission network. This paper proposes for simulation using MATLAB is done by considering the transient of transmission line. Simulation results will be provided by using Simulink in MATLAB software.

Index Terms- Transient Analysis, circuit equipment, linear circuit, transmission line, instantaneous, load current, steady-state.

I. Introduction

Transient analysis (or just transients) of electrical circuits is as important as steady-state analysis. When transients occur, the currents and voltages in some parts of the circuit may many times exceed those that exist in normal behavior and may destroy the circuit equipment in its proper operation. It’s distinguished the transient behavior of an electrical circuit from its steady-state, in that during the transients all the quantities, such as currents, voltages, power and energy, are changed in time, while in steady-state they remain invariant, i.e. constant (in d.c. operation) or periodical (in a.c. operation) having constant amplitudes and phase angles. The cause of transients is any kind of changing in circuit parameters and in circuit configuration, which usually occur as a result of switching (commutation), short, and open circuiting, change in the operation of sources etc. The changes of currents, voltages etc. during the transients are not instantaneous and take some time, even though they are extremely fast with duration of milliseconds or even microseconds.

These very fast changes cannot be instantaneous since the transient processes are attained by the interchange of energy, which is usually stored in the magnetic field of inductances or the electrical field of capacitances. Any change in energy cannot be abrupt otherwise it will result in infinite power (as the power is a derivative of energy, p=dw/dt), which is in contrast to physical reality. All transient changes, which are also called transient responses, vanish and, after their disappearance, a new steady-state operation is established. The transient describes the circuit behavior between two steady states, an old one, which was prior to changes, and a new one, which arises after the changes.

II. TRANSIENT ANALYSIS

The behavior of the circuit as a function of time is studied under transient analysis.The inductors in the circuit are replaced by their equivalent current sources and resistances. The capacitors in the circuit are replaced by their equivalent voltages sources and resistances. The circuit voltages and currents are calculated at the time of switching (usually at t = 0). This is the initial condition solution. The voltages across the capacitors and the currents across the inductors are used to calculate the circuit voltages and currents at each time step.This is done repeatedly for a designated amount of time and the results are then plotted.

A network needs to be analyzed in order to derive information about it so that its predicted behavior can be verified. The need for this analysis arises from the need of the circuit designer to verify the conceived design and to predict the effect of changes in a circuit. The task of analysis starts off with a mathematical model chosen by the designer to represent the behavior of an actual circuit. If the behavior of the model does not reflect the behavior of the actual circuit, the circuit parameters of the model are adjusted in order that the response conforms to the specification. Once the response of the model is within acceptable limits, detailed analysis of the circuit responses and detailed calculations of the effects of component variations must be made. If there is a discrepancy, the circuit is re-modelled and analyzed. The mathematics involved is the solution of a set of simultaneous differential equations. These equations can be line arise for linear circuits.

A circuit with an excitation voltage or current of x and an output voltage or current y is linear if y is proportional to x i.e. if y = f(x) or ky = f(kx). Any circuit which is not linear is called non-linear. Almost all physical components in the circuit are non-linear owing to effects such as aging, internal heating, voltage breakdown and magnetic core saturation, which alter the component value and depend on the applied voltage and its frequency. However, the linearity assumption greatly simplifies circuit analysis. It is important to make this assumption even if the circuits are only approximately linear. Analytical techniques, some of which apply exclusively to linear circuits, are used to gain insight into the circuit behavior. The linearity assumption has several important consequences. If we consider a change of Δx in the excitation x, a corresponding change Δy is produced in y. In a linear circuit the changes are proportional. Therefore

$\Delta y / y = \Delta x / x = k$ and
$\Delta y = f(\Delta x)$.

The changes in the circuit voltages and currents produced by variation of the fixed sources are therefore independent of the nominal values which exist in the circuit. Also since

$$1 + (\Delta y / y) = 1 + (\Delta x / x) = 1+k,$$
$$(y + \Delta y) = f(x + \Delta x),$$

The effects of source variation are additive to the nominal values. If the variations Δy and Δx are small compared with the nominal values x and y, the analysis for variation only is called small signal analysis. As noted earlier, all practical circuits are non-linear. Fortunately, many circuits operate in regions of near linearity and distortion due to non-linearity is usually small enough to ignore. Circuits in which this cannot be assumed cause major errors when linear analysis is employed and special analysis techniques are required. Models of non-linear elements such as diodes can be line arise by replacing the non-linear element with a combination of sources and linear elements. The resulting linear circuit is valid, provided that small signals are assumed that do not deviate significantly from the nominal or bias values.

III. ANALYSIS OF LINEAR CIRCUITS

The "node" method of analysis is used for systematic analysis of *lumped component circuits*. In any circuit, current varies with time, and the electromagnetic energy is radiated and lost. When the wavelength of the generated electromagnetic wave is usually large in comparison with the physical dimensions of the circuit, the energy loss is negligible.

The basic relations for circuit analysis are the first two laws of Kirchoff.

a) The sum of all currents entering a node must equal the sum of all currents leaving it. (current law or KCL)
b) The sum of all voltages in a given loop must be equal to zero. (voltage law or KVL)

In analyzing a network, one or the other of the above laws is applied to every independent node or independent loop of the network. The number of independent nodes is generally less than the number of independent loops in a network and hence there are fewer node equations than loop equations. Circuit analysis programs generally use node voltage equations for analysing the network.

IV. BASIC RELATIONSHIPS

Let the branches in the network be labelled uniquely and sequentially starting from one (1). Let the nodes be labelled uniquely and sequentially starting from 0. The node given the number zero (0) is the reference node or the ground node. The circuit connections can be represented by

$$A_a I_b = 0 \qquad (1.1)$$

where $\mathbf{I}_b$ is the branch current matrix (the current i_j is the current flowing in branch j). The elements of the matrix $\mathbf{A}_a$ are given by :

$$a_{mn} = \begin{cases} 1 & \text{if the current } i_n \text{ leaves node } m \\ -1 & \text{if the current } i_n \text{ enters node } m \\ 0 & \text{if the current } i_n \text{ neither enters nor leaves node } m. \end{cases} \qquad (1.2)$$

These valuations hold for all the nodes in the circuit. Each equation is the application of Kirchoff's current law (KCL) for the mth node. For N independent nodes, Eq. (1.1) is represented by:

$$A I_b = 0 \qquad (1.3)$$

where matrix **A** has the elements given by Eq.(1.2) and contains *N* columns (number of branches) and *M* rows (number of independent nodes).

Voltage-current relationships for passive elements in a linear circuit are characterized by a single (complex) number (the number is complex for alternating current (AC) circuit analysis):

$$i = y.v \qquad (1.4)$$

with $y = 1/R$ for a resistor, $1/(j\omega)L$ for an inductor, or $(j\omega)C$ for a capacitor where R is the resistance, L is the inductance, C is the capacitance, y is the admittance and ω is the frequency; in the AC analysis, i and v are complex valued phasor representations for the current and voltage.

As a result of the branch currents flowing through the various branches, a voltage is developed across the respective branches. These voltages can be represented by:

$$V_b = B\, V_n \qquad (1.5)$$

where $\mathbf{V}_n$ represents the node voltage matrix (voltage v_j is the voltage measured at node j) and is a column vector containing n rows. Node voltages are measured with respect to the ground which is at zero potential. The elements of vector **B** are given by

$$b_{mn} = \begin{cases} 1 & \text{if the branch m leaves node } n \\ -1 & \text{if the branch m enters node } n \\ 0 & \text{if the branch m neither enters nor leaves node } n. \end{cases} \qquad (1.6)$$

From Eqs. (1.2) and (1.6) we find that

$$\mathbf{B} = \mathbf{A}^T \qquad (1.7)$$

where $\mathbf{A}^T$ is the transpose of matrix **A**.

This implies that the direction of the current in each branch is the direction of positive voltage to negative voltage in each branch and the number of elements in I_b and $\mathbf{V}_b$ are the same. (i.e. i_2 refers to the current in branch 2 and v_2 refers to the voltage in branch 2); hence the same branch numbering and the same node numbering apply to both Eqs. (1.3) & (1.5).

A branch can represent either an active element (i.e. a voltage or current source) or a passive element (i.e. an inductor or a capacitor or a resistor). If a branch has an independent current source (represented by the vector $\mathbf{I}_g$), then the current leaving that branch is the difference of the currents caused by the independent source and all other currents (represented by $\mathbf{I}_b$). The branch current will then be

$$\mathbf{I}_b = \mathbf{I}\, \mathbf{b}^* - \mathbf{I}_g = \mathbf{Y}_b \mathbf{V}_b - \mathbf{I}_g \qquad (1.8)$$

where $\mathbf{Y}_b$ is the *branch admittance matrix*.

Combining Eqs. (1.8), (1.5) and (1.3) we get the relationship

$$\mathbf{A}\mathbf{Y}_b\mathbf{A}^T\mathbf{V}_n = \mathbf{A}\mathbf{I}_g \qquad (1.9)$$

$\mathbf{A}\mathbf{Y}_b\mathbf{A}^T$ is called the *node-admittance matrix* $\mathbf{Y}_n$.

V. ANALYSIS OF A NETWORK

In the analysis of linear networks, various element types must be considered. The elements that are used in this analysis is a minimum subset of elements that are present in a network . The elements used in our program are:

Passive Elements

a) Resistance (R)
b) Inductance (L)
c) Capacitance (C)

Active Elements (Sources)

a) Independent voltage source (V)
b) Independent current source (I)

The definitions of the various elements are:

1) An element is a resistance if it is characterized by a single real number R, such that the voltage across the element is R times the current through that element. The reciprocal of R is called conductance and is denoted by G. R is measured in ohms and G in mhos.
2) An element is an inductance if it is characterized by a single real number L, such that the voltage across the element is L times the current through the element. L is measured in henries. For the purpose of transient analysis, the inductor has an initial current through it which is measured in amperes and is denoted by I_0.
3) An element is a capacitance if it is characterized by a single real number C, such that the current through the element is C times the voltage across the element. C is measured in farads. The capacitance can have an initial voltage across it measured in volts and is denoted by V_0.
4) An element is an independent voltage source, if the voltage across it is independent of the current through it. The voltage is measured in volts.
5) An element is an independent current source, if the current through the element is independent of the voltage across it. The current is measured in amperes.

There are two types of sources: accompanied and unaccompanied sources. If a source is accompanied, it implies that there is a small resistance in series with a voltage source and a small resistance in parallel with a current source. Unaccompanied sources are pure current and voltage sources and do not have any accompanying resistances. In our analysis we will consider only accompanied voltage sources as unaccompanied sources present difficulties when forming the branch admittance matrices. Since the accompanying resistance (R) is zero, the admittance (1/R), becomes infinite and the current through the branch becomes indeterminate. The element definitions are consistent with the universally used definitions of the basic network elements and are valid for direct current (DC) transient analysis.

A general network of the type shown in Fig. 1 and made up of M branches and N nodes will be considered for analysis. The voltages and currents in each branch of the network are related as follows:

$$i_b = i_e - i_g \tag{1.10}$$

$$v_b = v_e - v_g \tag{1.11}$$

he element voltage and current also satisfy the relationship

$$i_e = y_e . v_e \tag{1.12}$$

where y_e is the conductance of the passive element in the branch. The above three equations hold for all branches in the network. The branch currents $i_{b1}, i_{b2} \ldots i_{bM}$, are represented by a matrix as:

$$\mathbf{I}_b = \begin{bmatrix} i_{b1} \\ i_{b2} \\ . \\ . \\ i_{bM} \end{bmatrix} \tag{1.13}$$

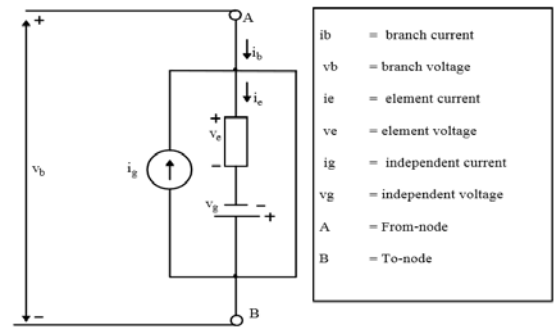

Figure 1: A Network Branch

Similarly the M-vectors for $\mathbf{I}_e$, $\mathbf{I}_g$, $\mathbf{V}_e$, $\mathbf{V}_b$, $\mathbf{V}_g$ are defined. The currents and voltages for all the network branches satisfy the following vector equations:

$$\mathbf{I}_b = \mathbf{I}_e - \mathbf{I}_g \tag{1.14a}$$

$$\mathbf{V}_b = \mathbf{V}_e - \mathbf{V}_g \tag{1.14b}$$

The voltage-current relationships for the passive elements lead to the matrix equation

$$\mathbf{I}_e = \mathbf{Y}_e . \mathbf{V}_e \tag{1.14c}$$

$\mathbf{Y}_e$ is a diagonal matrix of M rows and M columns if the network consists solely of resistors, inductors and capacitors.

Form Eqs (1.14 a, b & c) we get

$$\mathbf{I}_b = \mathbf{Y}_e (\mathbf{V}_b + \mathbf{V}_g) - \mathbf{I}_g \tag{1.15}$$

By Kirchoff's current law

$$\mathbf{A}\mathbf{I}_b = \mathbf{0} \tag{1.16}$$

where **A** is the MxN *incidence* matrix of the network. Hence

$$\mathbf{A} [\mathbf{Y}_b (\mathbf{V}_b + \mathbf{V}_g) - \mathbf{I}_g] = \mathbf{0} \tag{1.17}$$

The node voltages are related to the branch voltages by:

$$\mathbf{A}^T \mathbf{V}_n = \mathbf{V}_b \tag{1.18}$$

Thus, the node voltage expression becomes

$$\mathbf{A}\mathbf{Y}_b\mathbf{A}^T\mathbf{V}_n + \mathbf{A}\mathbf{Y}_b\mathbf{V}_g - \mathbf{A}\mathbf{I}_g = \mathbf{0} \tag{1.19}$$

If the interconnection of the circuit (i.e. the incidence matrix) and the independent voltages and currents are known, then the node voltages can be solved using the above equation.

If the node voltages are known then, the branch voltages and currents can be solved from eqs. (1.18) and (1.15). Finally, the element voltages and currents can be solved for using eqs. (1.14b) and (1.14c).

The relationships hold for DC as well as AC analysis with the major differences being that the voltages, currents and admittances are all complex quantities in AC analysis, and that the branch matrix will no longer be a diagonal matrix because of mutual inductances. The analysis is also similar for networks with dependent current sources and voltage sources. The branch currents would then be the difference between the element currents, the dependent currents and independent currents. Also, the branch voltages plus the independent voltage sources would be equal to the element voltages and the dependent sources.

VI. INTRODUCTION OF MATLAB

The availability of modern digital computers has stimulated the use of computer simulation techniques in many engineering fields. In electrical engineering the computer simulation of dynamic processes is very attractive since it enables observation of electric quantities which cannot be measured in live power system for strictly technical reasons. Thus the simulation results help to analyses the effects which occur in transient (abnormal) state of power system operation and also provide the valuable data for testing of new design concepts. In case of computer simulation the continuous models have to be transformed into the discrete ones. The transformation is not unique since differentiation and integration may have many different numerical representations.

MATLAB, developed by Math Works Inc., is a software package for high performance numerical computations and visualation. The combination of analysis capabilities, flexibility, reliability, and powerful graphics makes MATLAB the premier software package for electrical and electronics engineers. SIMULINK is a graphical mouse-driven program for the simulation of dynamics system. SIMULINK enables students to simulate linear, as well as nonlinear, systems easily and efficiently.

VII. CIRCUIT DESCRIPTION

This circuit is a simplified model of a 132 kV three-phase power system. Only one phase of the transmission system is represented. The equivalent source is modeled by a voltage source (132 kV rms/sqrt(3) or 76.21 kV peak, 50 Hz) in series with its internal impedance (Rs Ls) corresponding to a 3-phase 2000 MVA short circuit level and X/R = 10. (X = 132e3^2/2000e6 = 8.71 ohms or L = 0.0702 H, R = X/10 = 0.87 ohms). The source feeds a RL load through a 150 km transmission line. The line distributed parameters (R = 0.035ohm/km, L = 0.92 mH/km, C = 12.9 nF/km) are modeled by a single pi section (RL1 branch 5.2 ohm; 138 mH and two shunt capacitances C1 and C2 of 0.967 uF). The load (35 MW - 10 Mvar per phase) is modeled by a parallel RLC load block.

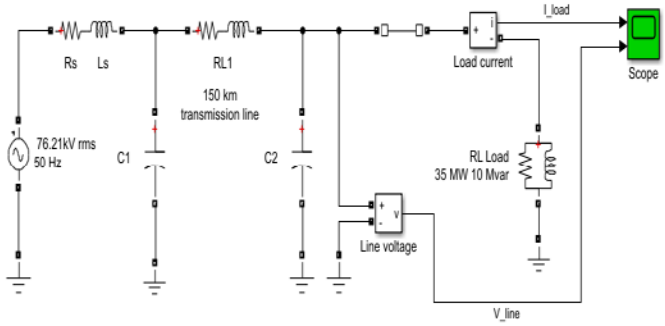

Figure 2: Simulink Model of Transient Analysis

A circuit breaker is used to switch the load at the receiving end of the transmission line. The breaker which is initially closed is opened at t = 2 cycles, then it is reclosed at t = 7 cycles. Current and Voltage Measurement blocks provide signals for visualization purpose.

Start the simulation and observe line voltage and load current transients during load switching and note that the simulation starts in steady-state. Use the zoom buttons of the oscilloscope to observe the transient voltage at breaker reclosing.

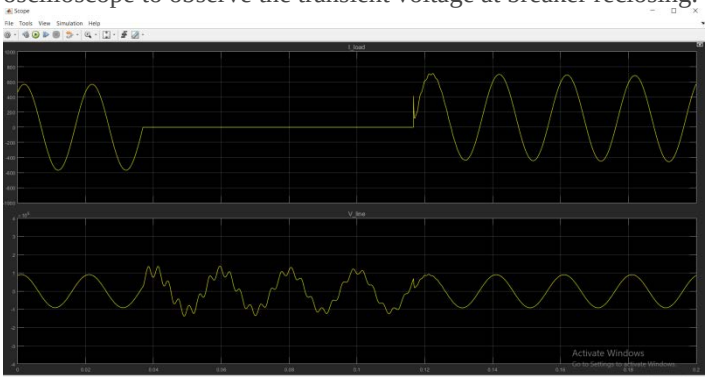

Figure 3: Transient of Voltage and Current

VIII. CONCLUSION

Transient analysis has important application to computer circuitry the switch is on a circuit with a delay line do not immediately arrive at the desired steady state value when a transmission line or a delay line. The settling time depends on the length of the line involved.

Power system transients appear in different waveform shapes and are caused by different underlying reasons. In order to better understand their origins, it is important to analyze transients according to their underlying causes (or events).

The method presented in this paper only analyzes of transients that can be modeled as damped sinusoids in noise. The technique is demonstrated by comparing the achieved results with those already available in the literature for the same case studies. In future, all other transient specifications like rise time, peak time, settling time, delay time can be calculated.

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Future work should include additional elements such as transformers and dependent sources, there by extending the range of circuits that can be analyzed. Another important extension would be the inclusion of constraints as part of the circuit description itself.

Finally, an advantage of our approach is that we are able to generate instances of circuits from general schemas and descriptions of their required behavior.

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A Quasi Experimental Study to Assess the Effectiveness of Progressive Muscle Relaxation Technique on Level of Stress among School Teachers in Selected Schools of District Jalandhar, Punjab, 2019.

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Abstract- Modern life is full of stress. Everyone face stress in their daily life. Stress is simply a fact of nature forces from the inside or outside world affecting the individual. The individual responds to stress in ways that affect the individual as well as their environment.[1] Stress is a big issue know a days in teaching profession because of overburden at their work environment. Therefore, the present study was conducted on school teachers to assess the level of stress and educate them about management of stress by using progressive muscle relaxation technique.

Aim: The aim of the study is to reduce the level of stress by using progressive muscle relaxation technique among school teachers. **Method and Material:** Non probability purposive sampling technique was used to select the 100 samples for the study. A Self Structured Job Stress Scale was used to collect data. **Statistical Analysis:** Collected data was analyzed by using descriptive and inferential statistics.

Result: A quasi experimental study was conducted on 100 School teachers of Babe Ke Senior Secondary School, Wara Jodh Singh, GHS School Nakodhar, Government senior secondary school, Nawan Pind Khalewal, Government high school , Gidder Pindi, Jalandhar district in the month of January 2019 to assess the effectiveness of Progressive Muscle Relaxation Technique to assess the level of stress.

Conclusion: In pre test 50% school teachers had moderate stress and 36% had mild stress in experimental group. In post test after intervention (progressive muscle relaxation technique) 2% school teachers had severe level of stress and 74% had mild level of stress in experimental group. So, it was concluded that Progressive muscle relaxation technique was effective to reduce stress level among school teachers.

Index Terms- Assess, Effectiveness, Progressive Muscle Relaxation Technique, School Teachers.

I. Introduction

"An anxious mind cannot exist in a relaxed body"

Edmund Jacobson, MD

Stress is a part and parcel of living. The fact that one is living implies that he is experiencing some amount of stress. This means that stress affects their performance.[2] Stress is defined as an unpleasant psychological and physiological state caused by some internal and external demands that go beyond our capacity. Also defined as "the state manifested by a specific syndrome which consists of all the nonspecifically-induced changes within a biologic system" (Selye, 1976).This syndrome of symptoms has come to be known as the "fight or flight" syndrome.[3]

Stress symptoms can affect the body, thoughts and feelings and behavior of the individual. The common stress signals which can affect the human body are headache, muscle tension or pain, chest pain, fatigue, change in sex drive, stomach upset and sleep problems. Mood symptoms of the individual are anxiety, restlessness, lack of motivation or focus, irritability or anger, sadness or depression and the unhealthy behavioral symptoms are overeating or under eating, anger outbursts, drug or alcohol abuse, tobacco use, smoking and social withdrawal.[4]

Occupational stress can be defined as the physical and emotional response that occurs where worker perceives an imbalance between their work demands and their capability and/or resources to meet these demands or in simple words it is the harmful physical and emotional response that can happen when there is conflict between job demands on the employee and the amount of control and employee has over meeting these demands.[5]

With the changing socio-economic scenario and increasing unemployment, the values of teacher and their professional concerns associated with the job have undergone a change, increasing stresses and

hassles of teachers.[6]According to Kyriacau (2001) "Teachers stress as the experience by a Teacher of unpleasant emotion such as tension frustration, anger and depression resulting from aspects of his work as a teacher."[7] **Education staff Health Survey (2014)** report stated that 80 % of people working in education field have suffered from stress, 72 % anxiety and 4 % had depression. The leading cause of stress were work load, rapid pace of change, unreasonable demands from supervisors and changes in students behavior.[5]

American federation of teachers and Badass teachers association (2017) conducted a survey on educator quality of work life survey in two districts of New York having 30 questions and random sample of 830 American Federation of Teacher members as well as educators and in response to concerns regarding work stress that educators had reported "always" their work is stressful 61% of the time higher than workers in the general population.[8]

Stress management refers to the wide spectrum of technique and psychotherapies aimed at controlling a person's level of stress, especially acute stress, usually for the purpose of improving everyday functioning. The process of management is named as one of the keys to a happy and successful life in modern era. Many practical stress management techniques are available, which may help to reduce the stress and provide positive feeling of being in control of one's life and enhance general well-being.[9] Jacobson's progressive muscle relaxation is especially helpful for people whose stress is strongly associated with muscle tension.[5] They may experience chronic tightness on shoulders and neck, which can be effectively relieved by practicing progressive muscle relaxation. Progressive relaxation involves alternation by tensing and relaxing the muscles. The basic therapeutic claim of muscle relaxation therapy is that tensed, stressed and anxious people can find relief from distress and its physiological accompaniments by learning to reduce tensions.[10]

Nayak HK, Tiwari Hemant et.al (2011) had carried out –a community based cross sectional study to assess the prevalence and pattern of stress relaxation practices in Ahmedabad city, Gujarat, India. The prevalence of different types of stress relaxation practices in relation with their socio-demographic profile studied. Results revealed that out of 904 persons above 20 years of age were surveyed among them 310 doing stress relaxation practices were able to maintain balance between work and other activities than non-stress relaxation practice group.[11]

II. MATERIAL AND METHOD

Study design and sample

A quasi research design was used for the study. Non probability purposive sampling technique was used to select the teachers from Babe Ke Senior Secondary School , Wara Jodh Singh, GHS School Nakodhar, Government senior secondary school, Nawan Pind Khalewal, Government high school , Gidder Pindi, Schools of district Jalandhar for research study.

Data collection and study tool

Prior to the data collection the researcher introduced her and explained the purpose of the study to the participants. They were assured for the confidentiality of their identity and response. Research tool was consisted of selected socio demographic variables and Self Structured Job Stress Scale to assess the level of stress among school teachers. First part of the tool consisted of 10 items and second part of research tool was consisted of 30 items. Criterion measure for Self Structured Job Stress Scale was Mild stress (30-70 scores), Moderate stress (70-110 scores) and severe stress (110-150 scores).

III. RESULT SECTION-1

Socio-demographic characteristics of sample

There was association between post test level of stress among school teachers and teaching experience (in years) in experimental group and travelling time from home to school in control group.

Variables	**Experimental group n=50**		**control group n=50**	
	f	**%**	**f**	**%**
1. Age (in years)				
a) 21-25	12	24%	16	32%
b) 25-40	29	58%	25	50%
c) 40-55	9	18%	8	16%
d) 55 and above	0	0%	1	2%
2.Gender				
a) Male	24	48%	23	46%
b) Female	26	52%	27	54%
3.Qualification				
a) B.A., B.ED, TET	12	24%	13	26%
b) M.A., B.ED	13	26%	16	32%
c) Double M.A,B.ED	15	30%	8	16%

d) PGDCA, TET	5	10%	5	10%
e) M.Sc.	4	8%	5	10%
f) Any other	1	2%	3	6%
4. Marital status				
a) Married	37	74%	33	66%
b)Unmarried	13	26%	16	3%
c)Divorced /separated	0	0%	1	2%
d)Widow /Widower	0	0%	0	0%
5. Type of family				
a) Nuclear family	27	54%	32	64%
b) Joint family	23	46%	18	36%
c) Extended family	0	0%	0	0%
6. Type of School				
a) Government	25	50%	25	50%
b) Private	25	50%	25	50%
7. Travelling time from home to school				
a) ≤ 30 mins	18	36%	21	42%
b) Up to 1 hour	24	48%	23	46%
c) 1-2 hours	8	16%	5	10%
d) More than 2 hours	0	0%	1	2%
8. Type of employment				
a) Contract base	33	66%	30	60%
b) Regular	17	34%	20	40%
9.Teaching experience (in years)				
a) ≤ 5	18	36%	30	60%
b) 5-10	30	60%	17	34%
c) 10-15	2	4%	3	6%
d) 15& above	0	0%	0	0%
10. Income Per month (in rupees)				
a) ≤ 10,000	2	4%	5	10%
b) 10,001 to 20,000	23	46%	18	36%
c) 20,001 to 30,000	7	14%	7	14%
d) 30,001 and above	14	28%	16	32%

Distribution of pre test level of stress among school teachers in control and experimental group.

Level of stress	Score	Experimental Group		Control Group	
		f	%	f	%
Severe	**110-150**	**18**	**36%**	**17**	**34%**
Moderate	**70-110**	**25**	**50%**	**22**	**44%**
Mild	**30-70**	**7**	**14%**	**11**	**22%**

Percentage Distribution of post test level of stress among school teachers in control and experimental group.

Level of stress	Score	Experimental Group		Control Group	
		f	%	f	%
Severe	**110-150**	**1**	**2%**	**15**	**30%**
Moderate	**70-110**	**12**	**24%**	**25**	**50%**
Mild	**30-70**	**37**	**74%**	**10**	**20%**

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Internet Banking in Sri Lanka – Customer Concern

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Abstract- The banking sector recognized as the dominant and leading sector of adopting the trend of using Internet to serve their customers. Banks are now moving forward towards Internet banking from their traditional banking procedures and adopt e-commerce to carry out most of their banking transactions. The prime objective of undertaking this study is to analyse the contributors of the customer adoption of Internet banking in Savings Bank in Sri Lanka. The self-administered questionnaires relying on a 4 point likert scale was distributed to sample of 300 customers who are using internet banking and analysed and the corresponding findings are discussed in the work.

Index Terms- Customer Adoption, Internet Banking, Relative Advantage, Risk and Compatibility

I. Introduction

The banking activities are the fundamental backbone for the development of an economy and the endurance of any country. The tremendous growth in of Information technology occupied the space in the field of banking too. The Internet has encouraged an IT-based transformation in the financial services sector that has drastically transformed the mode that banking services are provided. This advancement in banking sector, referred as Internet banking (IB), which allowed busy people to complete their financial activities in a cost-effective and efficient manner at any time of the day at any place (Makris et al., 2009). Huge collection of financial amenities such as bill payments, checking account information, balance inquiry, fund transfer, and utilizing investment and check services through bank websites are possible whenever and wherever via internet banking to customers (Tan and Teo, 2000).

Internet banking (IB) is defined as "the use of the internet as a remote delivery channel for banking services, and an internet banking is defined as a bank that offers (web-based) transactional services" (Gopalakrishnan, Wischnevsky and Damanpour 2003). Both the bank and the customers are benefited via the internet banking services. Internet banking permits banks to cut-down their operation expenditure with the reduction of physical facility and human resources also reduce the queuing time in branches which help to concentrate on other prospective business operations which help to increase the sale performances and wider reach (Hernando and Nieto, 2007). In customers' perspective, internet banking allows them to do a wide range of bank transaction electronically through the bank web-site anytime from anywhere (Granbner-Krauter and Faullant, 2008). Despite of many benefits of internet banking the numbers of customers are not increasing as the number of internet users. Adoption of internet banking among customers is not in pace as banks are expecting. Especially the internet banking in developing countries is still in its nascent stage. Deyoung added that slow and low adoption of new technology and related product and services indicates threat for success of that technology (Deyoung R and Duffy D, 2002)

Therefore, there is a clear need to investigate the factors that influence customers' adoption to the internet banking services, so that banks can better formulate their marketing strategies to increase this service usage in the future. This study aims to identify the factors impact the ability on the customers' acceptance of internet banking services in Sri Lanka. The study began with a literature review followed by research model then data analysis and results and discussion followed by conclusion and references.

II. Literature Review

Wijayaratne (2015) has undertaken a study to analyse the expansion of the Internet banking and overcoming the barriers to adopt Internet banking among Sri Lankan customer for the 27th Anniversary Convention of the DFCC Bank. Factors such as image barriers, traditions, risk, value, usage and lack of awareness were measured against the Internet banking adoption. Results revealed that these six dimensions have significant negative relationship with the adoption of the Internet banking. Based on the findings, Wijayaratne (2015) concluded that usage barrier has the most significant impact on adoption of Internet banking followed by the value barrier and the image barrier.

Six dimensions were used including trust, security, easy to use, banking needs, relative advantage and customer attitudes in a study carried out by Wickramaarachchi (2015) in analysing the factors affecting customer adoption of Internet Banking among the People's Bank customer in Colombo and Gampaha district. The results divulged that age group between 26-40 and who have education attainment above the G.C.E. A/L are more likely to use Internet banking. Males use Internet banking than the females. Results also evidenced that easy to use and the customer attitudes as the major determinants of Internet banking adoption.

Shiraj (2015) also studied the factors affecting the adoption of Internet Banking referring the commercial banks in South Eastern region of Sri Lanka. Factors such as attitude towards change, perceived benefits, perceived risk, age, gender, occupation, user IT knowledge and information on online banking were used as independent variables. It was found that the adoption or not adoption significantly influenced by the factors of perceived risk, perceived benefits, attitudes towards change and IT knowledge of the users. Information available on Internet banking does not to have any impact on the customer adoption. This study also confirmed that men likely to adopt Internet banking than women and the individuals between the age of 25-40 adopt Internet banking than other age groups levels.

Similarly, Hettiarachchi (2013) examined the factors affecting customer adoption of Internet banking considering decomposed theory of planned behaviour. This included subjective norms, perceived behavioural control and attitudes (risk, trialiability, complexity, compatibility and relative advantage). According to the results, it was noted that compared to subjective norms, perceived behavioural control and attitudinal factors significantly determine the customer intention to adopt the Internet banking. Factors such as technology support, self-efficacy, risk, trialability, internet skills, compatible with values and relative advantage influence the Internet banking adoption of the consumers. These evidences were compatible with the findings of Tan and Teo (2000).

An empirical investigation undertaken by Weerasekara and Abeygunawardhana (2011) to study the reasons from limited and slow adoption of Internet banking by the customers in Sri Lanka revealed that compared to the continuously increasing usage of Internet, the Internet banking adoption in Sri Lanka is very slow. Four distinct variables were considered in measuring the reason for this situation including, consumer resistant to change, perceived characteristics of the Internet banking, awareness and knowledge of the Internet banking and legal support and IS security. Among these factors resistant to change found to be the most influencing factor that limits the customer adoption of Internet banking. Awareness and knowledge and legal support and IS security also have significant impact on the customer adoption of Internet banking. However, perceived characteristics of Internet banking has no impact on limited adoption of Internet banking (Weerasekara and Abeygunawardhana, 2011).

III. Research Model

Based on the literature review the study model has been derived to understand the influence of "relative advantage, compatibility, complexity, trialability and perceived risk" on internet banking adoption by customers of a savings bank in Sri Lanka.

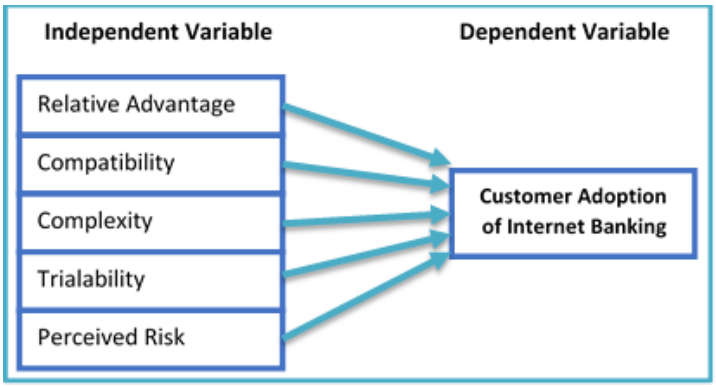


Figure 1: Age distribution

IV. Methodology

A. Sample and Data Collection

The targeted population for the study covers all customers using Internet banking facility in a savings bank in Sri Lanka. A total of 300 questionnaires were distributed to the customers residing in the Colombo city of Sri Lanka. Of the total, 274 usable questionnaires with a percent of 90% were received for the analysis.

B. Measurement and Analysis

The first part of the questionnaire demonstrates the background data of participants including age, gender, educational level, and occupation. These variables were divided into distinctive categories, and nominal scales was used. The second part includes the items of the model variables that anchored by a 4-point Likert scale (strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4). In that, the measurements of prior research were employed to measure the relative impact of separate independent variables on customers' adoption of Internet banking in a savings bank in Sri Lanka.

C. Testing Reliability

Cronbach's Alpha was used for measuring the total consistency between all items of the instrument and internal consistency among items for each dimension. The minimum alpha of 0.6 sufficed for the early stage of research (Nunnally, 1978). The minimum proposed composite reliability value is 0.70 (Hair et al., 2010).

The results of reliability analysis show that the value of Cronbach's alpha is in the very good range for all variables and also of overall questionnaire. The value of Cronbach's alpha of the overall questionnaire is 0.902 which indicates that the data and the instrument are almost 90 percent reliable, and the study could get consistent results by using this instrument. Results of the reliability analysis confirm that the data and the instrument are reliable for any further estimation (Table 1).

TABLE I
RELIABILITY TEST

Dimension	No of Items	Cronbach's Alpha
Relative Advantage	2	0.895
Compatibility	2	0.878
Complexity	2	0.835
Trialability	2	0.962
Risk	2	0.918
Customer Adoption	5	0.808

V. Results and Discussion

A. Age composition

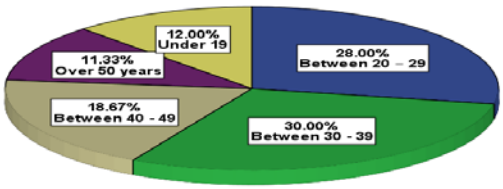


Figure 2: Age distribution

In relation to the age of respondents, 30% were for the age of 30 to 39 years old, followed by the age group of 20 – 29 with 28%, 18.67% were fir age if 40 – 49, and nearly 12% were for age below 19 and above50 years old. It can be said that the higher percentages were associates with the ages of economic young workforce. This category groups prefer to use the Internet banking than the other age groups. Most of them are doing a job

so they want to do their bank transactions immediately with higher security. The age above 50 do not show much interest towards the modern technology, furthermore the age below 19 years old do not use the internet banking because they do not have the banking accounts so they do not use the internet banking facility. The similar kind of link between the age of customer and Internet banking adoption was found in previous researchers (Ameme, 2015; Njuguna et al., 2012; Pikkarainen et al., 2004). Wngwanitchackron, (2002) pointed out that elderly people are less likely to be adopters of internet banking online systems than young people.

B. *Gender distribution*

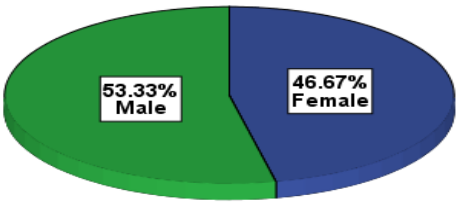


Figure 3: Gender distribution

For the Gender analysis, the results revealed that from the total sample 53.33% of the Internet bank users are males and females are amounting to 46.67%. Under the gender distribution male people more interest to use the internet banking than female as the reason for that female have not enough knowledge about this facility and also they have not enough time to use it. So that's the reason more percentage in male. Wickramaarachchi (2015) revealed that female are less likely to be adopters of internet banking online systems than male. The same type of association between the gender and Internet banking adoption was found by Shiraj (2015), confirmed that men are more prospective to adopt Internet banking than women.

C. *Occupation*

According to the findings, sample is comprised with customers with different occupations. Among them, majority is the businessmen which is 34% followed by 25.33% of salaried employees and 21.33% of students. There are also some 8% of professions and 7.33% of house wives. Most of the businessmen do not have enough time to visit the bank; on the other hand they don't like to do the transactions physically. Thus most of them prefer to do their banking transactions with internet. Likewise most of salaried employees also prefer to do their bill payments, fund transfer and account balance checking through the internet due to the time constraint.

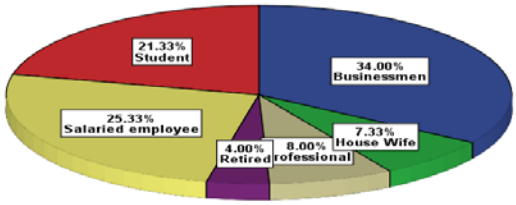
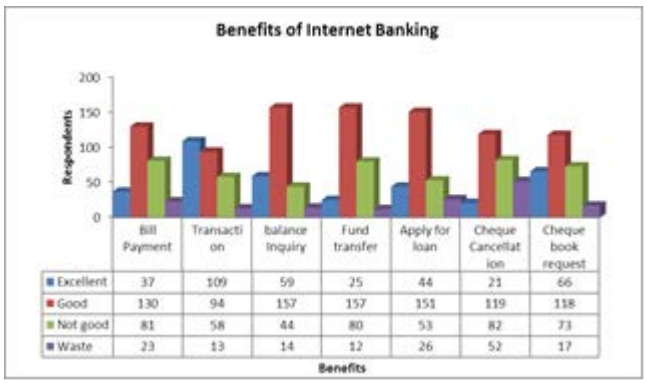


Figure 4: Occupation

D. *Benefits of Internet banking*



	Bill Payment	Transaction	balance inquiry	Fund transfer	Apply for loan	Cheque Cancellation	Cheque book request
Excellent	37	109	59	25	44	21	66
Good	130	94	157	157	151	119	118
Not good	81	58	44	80	53	82	73
Waste	23	13	14	12	26	52	17

Figure 5: Benefits of Internet Banking

Bill payment

Majority of the respondents (46.7%) get benefited in bill payment facility and they rate it as good while 14% rate as excellent. On the other hand 28.7% of the respondents thought internet banking is not trustable option for bill payment where 10.7% supposed it is waste of all.

Transaction summary

It is found that 36.7% of the sample believed that this facility in the Internet banking is excellent and 34.7% believed that it is good. There are 22% who believed that transaction summary facility is not good while for 6.7% this facility is waste of all. Most of people like to know their transactions summary so 55 of people say this is excellent, because some of people do not have enough time to go to the bank to update their passbooks. But any person can know their transaction summary without going the bank.

Account information

Majority, which is 57.3% of the sample said that this facility is good and 18.7% said it is excellent while 17.3% said this is not good. Getting account information through online is waste of all for 6.7% of the customers .Majority of 80 people say good because without any cost any person can know their transaction summary.

Fund transfer

57.3% of the respondents believed that internet banking facility is good for fund transfer followed by 29.3% who stated that it is not good. 7.3% of the sample said that this facility is excellent while 6% said it is waste of all. If a customer wishes to deposit money to another account then s/he has to withdraw the money and deposit it again. But through this facility any person can transfer funds immediately without any float, thus most of the people like to use the internet banking facility.

Apply for loans

Majority (51.3%) of the respondents believes that Internet banking is good while 20% consider this facility as not good and 14% indicated that this facility is excellent. Furthermore 8.2% claimed, apply for loans through online is waste of all. Through the internet banking facility any person can apply loans such as. personal loans, housing loans, buddhi loans, etc., .All the required documents could be collected via the internet banking

service, so it make the work very easy for all. Hence most of people perceived the service as good.

Cheque cancellation

Another facility offered using Internet banking is the cancellation of cheques 47.7% of the respondents stated that cheque clearance via internet banking is good followed by 29.3% of customers who think that this service is not good. 17.3% indicated that this service is waste of all while for 6% of the respondents believed that this service is excellent. Internet banking facility enables people to cancel the cheques and stop the cheque payments.

Chequebook request

It is understood that for 44.7%, which is the majority of the sample, chequebook request facility is good and for 24.7% this service is not good. There are some 23.3% who said that this facility is excellent and 7.3% said this is waste of all.If we want to request cheque books that we can request it through the internet banking with minimum cost.because we do not fill any applications or any documents.so most of people like to use this facility

E. Descriptive Statistics

Mean values were calculated for all the independent and dependent variables in order to understand to what extent the sample respondents are experiencing these factors. Findings are as below;

TABLE II

DESCRIPTIVE STATISTICS

Variables	Mean	Std. Deviation
Relative Advantage	6.16	1.29
Compatibility	5.60	1.19
Complexity	2.76	0.91
Trialability	5.86	1.24
Risk	5.78	.1.30
Adoption of Internet Banking	14.40	2.38

As the table above reflects, the highest mean value is achieved for the independent variable relative advantage which is 6.16. Since the value can be ranging from 2 (lower) to 8 (higher), the achieved mean score is high. A total of 35% of respondents indicated that Internet banking made easy to handle their banking transactions, 45.6% of respondents were in moderate level of satisfaction, whereas 19.4% disagreed with the statements. However, more than 50% of respondents indicated that Internet banking gives them greater control in managing their finances more efficiently. Thus, it can be said that sample respondents highly recognize and experience the relative advantage of Internet banking. This means majority of the sample agreed that Internet banking brings them advantages than they actually perceived.

Trialability achieved a mean score of 5.86 while risk achieved a mean score of 5.78, both values are in the rage of satisfaction. Therefore, it can be said that according to majority's view saving bank give a space for experimental and it ensures the data security (minimum risk). At least 16.8% of respondents indicated that they are encouraged by the bank to try the internet banking before the actual usage and bank give enough time to experiment it with enough time on a trial basis, while 83.2% of respondents were disagree with these statements. With regard to security nearly 30% of the respondents disagreed that transactions via Internet banking is as safe as go to the bank branches physically, while about 50% of the respondents were uncertain, where about 30% agreed that operating via Internet banking is as safe as visiting the bank branches physically.

Compatibility achieved a mean score of 5.60 which also a high value indicating that Internet banking is compatible. The majority of respondents (67.4%) indicated that using Internet banking to do their banking business fits into their life style; only 32.6% disagreed with the statements. The respondents indicated that Internet banking is more convenient than queuing in the bank, branches and it enable them to save time and travelling.

The lowest mean value is recorded for complexity which is 1.4 indicating that according to majority's view, Internet banking is not complex to use. The majority of respondents (60%) indicated that they disagree that Internet banking programme makes it easy to manage their finances, while 40% of respondents were uncertain, with regard to the complexity exist in Internet bank service.

The dependent variable of adoption of Internet banking achieved a mean value of 14.40. The value can be ranging from 5 (lower) to 20 (higher), the achieved mean score is high which is a moderate value explaining that sample respondents somewhat adoptive towards Internet banking. The majority of respondents (46.9%) indicated that they do not have a favorable attitude towards the use Internet banking service, 30.9% of respondents were uncertain, while 22.2% indicated that they highly satisfied with the use of Internet banking service at present and in the near future.

VI. CONCLUSION

The basic purpose of this research is to identify and determine the most important factors of customer adoption of Internet banking service in a saving bank in Sri Lanka. The study was carried out to understand the factors influence on customer adoption of internet banking of a savings bank in Sri Lanka. A survey research questionnaire has been adopted and contextualized to collect the data from the users of Internet banking of different banks located in Colombo city of Sri Lanka. The sample size consists of 300 respondents. Customers using internet banking experiencing various ease as well as difficulty and build their perception according to that. However the result of this study concluded relative advantage of the internet banking is an important influencing factor to adopt, since the technology made ease of life and activities. Over all the study proves that customers of the savings bank in Colombo region are adopting the internet banking and feel quite comfortable which processing their day to day business through the online banking facility.

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Effects of Public- Private Participation in infrastructure on GDP & inflation rate in Sub-Saharan Africa for the period 1990-2017

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Abstract: competitiveness imposed by globalization and international trade requires improvement and measurement of policies on public administration as well as private participation projects in infrastructure with measuring effects on the economic gross domestic product (GDP) & inflation rate, paper aims to Define the geographic & sectorial disruption of private participation in infrastructure projects in Sub Saharan Africa region and popular types was used for period 1990-2017. Also measuring the impact of private participation in infrastructure projects on economic gross domestic product (GDP) & inflation rate, the hypothesis supposed there is increase in investment in infrastructure with the participation of the private sector, concentrated in sectors characterized by fast easy and clear ways to recover their revenues. Also Private participation in infrastructure positively affects the gross domestic product (GDP) & inversely affects in the inflation in Sub Saharan Africa countries for period 1990-2017, Two models was used to measure the effect Private participation in infrastructure in domestic product (GDP),The second model measures on in the inflation rate for same period. Resulting to achieving completed and active projects 98% from the total projects indicates to success of experience of private participation in infrastructure in development proceed in sub Saharan Africa. Also achieving of Energy sector (electricity and gas) is 55% from total because the Energy is the mainstay of development, which is growing rapidly, followed by the transport sector (roads, railways, ports) by 31.2% Water Sewage by 1% due to the difficulty and complexity of investment risks. Strong positive and significant statistically relationship between GDP with private participation infrastructure projects and Reversible weak significant statistically relationship with inflation rate. Recommending The necessity for the participation and integration of sub-Saharan African countries together in their private sector in the work of joint infrastructure projects beyond one country, to strengthen the process of common development, also Emphasis on the provision of facilities and guarantees for the private sector to access in telecommunications and energy sector because of its high potential for investment with an attempt to overcome obstacles by providing customs and tax reliefs. Finely Create appropriate environment by strengthening the investment base to participation projects by providing a legal structure, rules, procedures, and unifying them with economic stability represented by stable rates of inflation, exchange rate, interest rate, and political security stability.

Key word: private participation in infrastructure, gross domestic product, Sub-Saharan Africa.

FIRST: Introduction: The public–private partnership (PPP) is a cooperative arrangement between two or more public and private sectors, typically of a long-term nature However, the late 20th century and early 21st century when have seen a clear trend towards governments across the globe making greater use of various PPP arrangements(Hodge, G. A and Grave, C. 2007), in fact The most important elements of the development process are spending on the build, operation, Rehabilitation of infrastructure in public service sectors, water, electricity, telecommunications, transport, road and information sectors, an important criterion for measuring the progress of countries. Public and private sector partnership is dominant phenomenon over the past ten years due to insufficient investment and increasing pressure on government budgets, as well concern about the inefficiency of services provided by Governmental institutions.

Remained mainly in the areas of economic infrastructure (such as telecommunications, energy, water, and roads). Also recently, however, social infrastructure (health, education, and other services) has been seen. It is known this kind of services were mainly provided by the public sector, because require large fund, in economic terms, it takes a long time before they start to give a return. The desire for better more efficient services, as well need for additional sources of funding, are increasingly driving governments to adopt public and private sector partnerships to deliver these services In particular the decade of globalization, which created the open

international trade, which forces countries to provide services and infrastructure at a high level of administrative and technical efficiency, leading to broad changes in policies, public administration and governance in line with them. Africa was estimated at USD 93 billion (15% of GDP), a third of which would be for operations and maintenance in various sectors (Foster and Briceno-Garmendia, 2010; AfDB, 2011 ˜). It was also estimated that annual expenditure on infrastructure going forward would range from 9% to 13% of GDP (Sachs et al., 2004; ECA, 2005).

Objective: paper seeking to explore and investigate the following:
Define the geographic & sectorial disruption of private participation in infrastructure projects in Sub Saharan Africa region and popular types was used. Also measuring the impact of private participation in infrastructure projects on economic gross domestic product (GDP) & inflation rate for same region for period 1990-2017.

The Problem: The competitiveness imposed by globalization and international trade requires constant improvement and measurement of policies on governance and public administration as well as private participation projects in infrastructure. Sub Saharan Africa countries is most of the new countries experience in this field, the research question represent what the impact of private participation in infrastructure on economic gross domestic product (GDP) & inflation rate?

The hypotheses: First hypothesis is there is an increase in investment in infrastructure with the participation of the private sector, concentrated in sectors characterized by fast easy and clear ways to recover their revenues. Also second hypothesis is Private participation in infrastructure positively affects the gross domestic product (GDP) in Sub Saharan Africa countries for period 1990-2017 , finally third hypothesis is Private participation in infrastructure inversely affects in the inflation rate for same period.

Empirical analysis & Research Methodology: Analysis Two models are used to measure the effect Private participation in infrastructure in domestic product (GDP) in Sub Saharan Africa countries for period 1990-2017 ,The second model measures the effect Private participation in infrastructure on in the inflation rate for same period. Finally, distribute.

Data and Justification of Selection of Cases Studies Research uses the descriptive, comparative and quantitative methods of analysis and use a combination of the most suitable primary (qualitative) and secondary (quantitative) Data. The Secondary data was used for the quantitative analysis and obtained from local Institutions (e.g. governmental institutions reports…, Etc.).

Literature: It should be noted that there is a lack of studies and literature that directly study the subject of PPP infrastructure in the in Sub Saharan Africa countries.

1- **Study of Richaud, C. Sekkat, K. & Varoudakis, A. (1999)** paper presented proofs on growth spillovers across African economies and examines the specific role of infrastructure in their transmission. The results proposed that enhance infrastructure in a given country raises the profitability of domestic and foreign investment, therefore raising investment ratios and boosting growth in per capita income. Expansion in one country raises the profitability of investment in neighboring countries, as it creates a wider market and improves opportunities for export. This, in turn, feeds back and further enhances growth in the initially expanding economy. Owing to such externalities, investment in infrastructure carried out at the national level is likely to be sub-optimal. These results suggest that external aid, aimed at financing infrastructure in Africa, might be better provided at a regional than at a national level. This would help better internalize the benefits accruing to individual countries and would lead to a better allocation of investment outlays.
2- **Study of Saghir, J. (2017).** Discussed issues affecting sustainable infrastructure development in Sub-Saharan Africa (SSA) countries including challenges, opportunities, and investment options facing SSA countries. Results Governments in SSA are not investing enough in sustainable infrastructure where there are tremendous needs. Investment is currently at 2%-3% of GDP. Under-investment in infrastructure will have a negative impact on potential economic growth, living standards, and private sector development. At the same time, the private sector has not been able to fill the investment gap. The private sector continues to be a very important contributor to SSA infrastructure development. In addition, new modalities of private investment—especially from local and, international neighboring country investors, local currency financial intermediaries, and investment and pension funds—are emerging. In general, private sector discipline and financing have had a positive impact on infrastructure service delivery in SSA, and much more is needed to sustain economic growth.
3- **Robert Osei – Kyei & Albert P.C. Chan (2016)** the paper therefore aimed to examine the project experiences (success and failure factors) of three highly profiled transport PPP projects, namely the Lekki toll road concession project (Nigeria), N4 toll road (South Africa/Mozambique) and Port of Maputo (Mozambique) in order to develop policy measures for effective future implementation. The experiences of the three projects show that transport PPP policy is indeed feasible in SSA. However, to realize its full applicability, proper policy actions and measures must be carefully observed and these include effective and efficient stakeholder management, transparent and competitive tendering process, high participation of local investors, stable macro-economic conditions and strong government commitment and regulatory framework. The projects

experiences and policy actions developed are impactful in accelerating transport infrastructure development through PPP approach in SSA. Hence, it is hoped that policy-makers and practitioners would be informed on the key strategies to employ in implementing future projects.

4- **a study of Estache and Saussier (2014)** argue that the available empirical evidence confirms that PPI can lead to improvements in efficiency, but do not necessarily do so. The econometric evaluation of various types of PPI experiences indeed shows that the careful choice of control variables, the proper framing of the institutional and sectorial context and the careful avoidance of selection biases in sample choices matter to the conclusions reached by empirical tests. Based on an empirical analysis using time series data (1995-2006) in 32 countries of LACconclude that there is a positive and significant impact of private sector participation in the coverage, quality of service and labor productivity of the analyzed utilities, especially when regulation is strong. The report does not distinguish among management and lease contracts concessions, Greenfield projects, and divestitures. The terms "private participation in infrastructure" and "privatization" are used interchangeably to cover all four types of private sector participation (PSP). In this report, the author used information on 181 firms in electricity distribution, telecommunication and water distribution that went through privatization in the 1990s as well as the LAC electricity-benchmarking database (World Bank, 2008) which contains annual information of 250 private and state-owned utilities.

5- **Kodongo, Odongo & Ojah, Kalu. (2017).**they used System GMM to estimate a model of economic growth augmented by an infrastructure variable, for a panel of 45 Sub-Saharan African countries, over the period 2000–2011. they found that it is the spending on infrastructure and increments in the access to infrastructure that influences economic growth and development in Sub-Saharan Africa. Interestingly, these significant associations, especially those of infrastructure spending, are more important for lesser developed economies of the region than for the relatively more developed economies, which uncommonly have better than near-zero access to infrastructure. In addition to these robust direct links between the target variables, they find important that infrastructure access, and quality, also relate to economic growth indirectly via export diversification (trade competitiveness), and cross-border capital flows and trade competitiveness, respectively. Among other important policy derivatives of our findings, we emphasize that efforts aimed at reversing Africa's pervasive infrastructure deficit, in ways that enable economic growth and development, must be carefully nuanced.

6- **Estache, Antonio & Speciale, Biagio & Veredas, David. (2005).** paper provided the first systematic quantitative assessment of the importance for SubSaharan Africa's growth of investment in the various infrastructure sub-sectors by relies on an augmented Solow growth model and on a recently updated World Bank indicators database to demonstrate the importance of infrastructure stocks for Africa. It provides additional insights on the argued differences in the relative importance for the effectiveness of infrastructure activities of geography (coastal vs. landlocked countries) as well as of the legal tradition of the country (Anglophone vs. nonAnglophone countries). It concludes with a test of the growth effects of the adoption of infrastructure "privatization" policies. Throughout the empirical Section of the paper, the information generated by the models testing the importance of the various infrastructure subsectors is compared to the information generated by a Solow model accounting for human capital exclusively.

First, infrastructure matters to growth however infrastructure are looked at. Second, sanitation is an exception to this first conclusion. It appears to have very little to do with growth in Africa, at least at the current stage of development, irrespective of the geographical or legal characteristics considered. Third, the legal origin of the country is generally a more important determinant of the variance of the elasticity than the geographical characteristics. Accounting for legal heritage indeed leads to different elasticities in 3 of the 5 sectors (telecoms, roads and water). In the three cases, investment in these sectors has a higher growth payoff in countries under common law over the last 35 years or so than in the rest of SSA. results hide some additional interesting facts. First, telecoms, roads and water affect GDP differently if the country has British legal heritage. For telecoms and roads, increases in the explained variance are close to 20% while for water it is of about 8%. Second, the fact that the country is landlocked or coastal is innocuous to the effect of infrastructure on GDP except for roads where the effect is higher if the country is coastal the result is surprising in light of ongoing a priori policy debates in Africa

SECOND: Theoretical framework:

Public-Private Partnership (PPP) can be broadly defined as a contractual agreement between the Government and a private firm targeted towards financing, designing, implementing and operating infrastructure facilities and services that were traditionally provided by the public sector. It embodies optimal risk allocation between the parties – minimizing cost while realizing project developmental objectives. Thus, the project is to be structured in such a way that the private sector gets a reasonable rate of return on its investment. (PPPC, 2019), also public–private partnership (PPP, 3P or P3) is a cooperative arrangement between two or more public and private sectors, typically of a long-term nature. Governments have used such a mix of public and private endeavors throughout history. However, the late 20th century and early 21st century[when?] have seen a clear trend towards governments across the globe making greater use of various PPP arrangements.(Hodge, G. A and Greve, C. 2007)

PPPs are best seen as a special kind of contract involved in infrastructure provision, such as the building and equipping of schools, hospitals, transport systems, water and sewerage systems .(Bovaird, Tony.2015)

Although concession contracts have been used for many centuries, notably in Europe, the first reference to the term "Public-Private Partnership" dates from the 1950s in the United States and was originally applied to joint ventures between the public sector and not-for-profit organizations in educational and urban renewal programs ,The term PPP found wider application in 1997 under the new Labor government in the UK ,also Other terms are being used internationally to represent the partnership between the public and private sectors embodied in the PPP approach. Related terms include: (PPIAF,2009)

- Private Participation in Infrastructure (PPI), used by the World Bank (data base) and within the development-financing sector; also adopted for the South Korean PPI program.
- Private-Sector Participation (PSP), also used within the development-financing sector.
- P3, used in North America.
- Privately-Financed Projects (PFP), used in Australia.
- P-P Partnership (to avoid confusion with the term "purchasing power parity", a method of comparing currency exchange rates, and also referred to as(PPP).
- Private Finance Initiative (PFI), originating in UK but now also used in Japan and Malaysia.

Types of public-private partnership:

There are several different types of public-private partnership contracts (often known as PPPs and P3s), or in the UK, Private Finance Initiative, or PFIs) depending on the type of project (for example, a road or a prison), level of risk transfer, investment level and the desired outcome:.(SWG,2019)

- **Build – Operate – Transfer (BOT)** :A BOT model is generally used to develop a discrete asset rather than a whole network, for example a toll road. This simple structure provides the most freedom for the private sector partner during construction and the public sector bears the equity risk.
- **Build – Own – Operate (BOO)**: This is a similar structure to BOOT (below), but the facility is not transferred to the public sector partner. A BOO transaction may qualify for tax exempt status and is often used for water treatment or power plants.
- **Build – Own – Operate – Transfer (BOOT)** : The private sector builds and owns the facility for the duration of the contract, with the primary goal of recouping construction costs (and more) during the operational phase. At the end of the contract the facility is handed back to the government. This structure is suitable when the government has a large infrastructure financing gap as the equity and commercial risk stays with the private sector for the length of the contract. This model is often used for school and hospital contracts.
- **Design – Build**: The contract is awarded to a private partner to both design and build a facility or a piece of infrastructure that delivers the performance specification in the PPP contract. This type of partnership can reduce time, save money, provide stronger guarantees (as the work is with a single entity rather than a consortium) and allocate additional project risk to the private sector
- **Design – Build – Finance**: The private sector constructs an asset and finances the capital cost during the construction period only.
- **Design – Build – Finance – Operate (DBFO)**
- **Design – Build – Finance – Maintain (DBFM)**
- **Design – Build – Finance – Maintain – Operate (DBMFO)** : Similar to BOOT, DBFO (and its variations) is more used in the UK for PFI (Private Finance Initiative) projects. The private sector designs, builds, finances, operates an asset, then leases it back to the government, typically over a 25 – 30 year period. Public sector long-term risk is reduced and the regular payments make it an attractive option to the private sector.
- **Design – Construct – Maintain – Finance (DCMF)**: Design, Construct, Maintain and Finance is very similar to DBFM. The private entity creates the facility based on specifications from the government body and leases it back to them. This is generally the convention for PPP prison projects.
- **O & M (Operation & Maintenance)** : In an O&M contract, a private operator operates and maintains the asset for the public partner, usually to an agreed level with specified obligations. The work is often sub-contracted to specialist maintenance companies. The payment for this contract is either via a fixed fee, where a lump sum is given to the private partner, or more commonly a performance-based fee. In this situation, performance is incentivized using a pain share / gain share mechanism, which rewards the private partner for over-performance (according to the agreed SLAs) or induces a penalty payment for work which has fallen short.

The most important advantages of PPP projects for the state are (Valdimarsson,2007):

- Transfer of risks is the most important driver when the state looks at the advantages of PPP projects. In PPP projects, there is a possibility to transfer most or all of the risks to the private entity (for a price). Risk and opportunity go hand in hand. The private entities can and want to explore opportunities, even though they involve risks.

- Minimizing the government by outsourcing non-core activities is another important advantage. One of the state's objectives is to reduce the government and move as much as possible of its tasks over to the private sector.

- Possibility for multiple uses of the facilities. The state is not stimulated to explore this possibility, since it does not compete on the market. The possibility for the private sector to use the facilities in multiple ways represents another advantage of PPP.

- Constant cash flow. The state budget is formed of fixed budgets for each ministry. Major investments are temporary modifications of the budget of a ministry, and this problem can be difficult to deal with within the budgetary process. Avoiding major investments by having a constant cash flow is an important driver when the state looks at the advantages of PPP.

- Quicker execution of a project (once contract is signed). The advantages and risks of PPPs projects can be synthesized as follows:

Table 1: Advantages and risks of PPP

Advantages	Risks
Possibility for smaller investments	Limited influence of public authority over the investment
Possibility for conducting other public investments	Increase of the prices charged to the users of the infrastructure
Savings to the budget	Reduction of bargaining position of public authorities
Transfer of new technologies	High transaction costs
Sharing the risk	Poorer quality of the services
More competition on market	Limited accessibility to services
More competition on market	Decrease of employment in the public sector
Guarantee of the services for a longer term	Financial risk for public partner
Decrease of the political influence in economy	Opportunity risk for public partner
More transparency in the economy	Political risk for private partner
Possibility for smaller investments	Limited influence of public authority over the investment
Possibility for conducting other public investments	Increase of the prices charged to the users of the infrastructure
Savings to the budget	Reduction of bargaining position of public authorities

Source: Brzozowska, 2006, p. 24

Geographically & sectorial distribution of Private Participation in Infrastructure (PPI) in sub-Saharan Africa:

Geographically, the sub-Saharan Africa region, according to the United Nations, is composed of all the group countries that fall entirely or partially sub-Saharan Africa. The United Nations Development Program (UNDP) shows 46 out of 54 countries in Africa as sub-Saharan Africa, with the exception of Algeria, Djibouti, Egypt, Libya, Morocco, Somalia, Tunisia and Sudan after the break-up followed North African countries (Wikipedia. Sub Saharan Africa)

Table 1 Investment value of PPI projects during 1990-2017 - million USD

Year	amount	accumulated amount	Year	amount	accumulated amount
1990	39.60	**39.60**	***2004***	450.70	**12,418.09**
1991	0.00	**39.60**	***2005***	3,730.00	**16,148.09**
1992	0.00	**39.60**	***2006***	5,994.00	**22,142.09**
1993	0.00	**39.60**	***2007***	2,589.00	**24,731.09**
1994	446.60	**486.20**	***2008***	2,824.00	**27,555.09**
1995	368.50	**854.70**	***2009***	2,623.00	**30,178.09**
1996	921.20	**1,775.90**	***2010***	1,770.00	**31,948.09**
1997	2,426.00	**4,201.90**	***2011***	2,285.00	**34,233.09**
1998	1,126.00	**5,327.90**	***2012***	10,200.00	**44,433.09**
1999	1,843.00	**7,170.90**	***2013***	10,412.00	**54,845.09**

2000	499.29	**7,670.19**	***2014***	2,684.00	**57,529.09**
2001	1,826.00	**9,496.19**	***2015***	6,008.00	**63,537.09**
2002	586.20	**10,082.39**	***2016***	4.73	**63,541.82**
2003	1,885.00	**11,967.39**	***2017***	2,606.00	**66,147.82**

Source: Prepared from World Bank website, Perception, PPI.

The previous table shows the total amount invested in infrastructure by private sector participation, which in 1990 amounted to 39.6 million dollars, the first project in the state of Ivory Coast in the field of electricity worth 39.6 million dollars in terms of leasing, operation and conversion, and then escalated to $ 921.2 million in 1996, To $ 1.7 billion. Most of these investments were in the telecommunications field. These countries launched telecommunications services.

Investment in telecommunications expanded to $ 2.4 billion in 1997, and the total investments accumulated since 1990 to 1997 amounted to 4.2 million dollars Dollar R, and stepped up the value of investments in 2006, the value of $ 5.9 billion so new that even reached the total accumulated 22.14 billion, and the continued increase in new investments annually in the fixed area between 2 to $ 2.6 billion because of the global financial crisis, then it escalated in the year 2015 until the year 2017.

The growth in cumulative investments since 1990 to 2017 is from $ 39.6 million to $ 66.14 billion. It is also noted that the years 1990-2000 were slightly growing at an average of only $ 1 billion for the entire period and doubling the average growth to 2 billion between 2000-2010 and between 2010 and 2017. This stage witnessed a significant growth in the value of investments with an average of 5 billion and is due to the years 2012 and 2013, where new investments reached a barrier of 10

This confirms the global demand for investment in the region and the continued increase in investment in infrastructure with the participation of the private sector. This is due to the continuous growth of the region according to the requirements of development and the needs of their economies.

Analysis of PPI projects for Sub-Saharan Africa by project status:

Table 2 PPI projects for Sub-Saharan Africa by project status since 1990- $ 1990 billion

Status	Number	amount	Percent	Upper sector
Active	388	68,776.00	33.8%	Electricity
Ended	38	130,360	64.2%	Electricity
Distressed	38	2,275	1.1%	Telecommunications
Abandoned	13	1,775	0.9%	Railways
Total	**477**	**203,186**	**100.0%**	**Electricity**

Source: Prepared from the World Bank website, Visualization, PPI.

The total number of projects with the participation of the private sector in the region reached about 477 projects with an investment value of $ 203.1 billion. The electricity sector accounts for 243 projects worth $ 38.3 billion, for easy access to the private sector. The projects ended 38 projects worth $ 130.3 billion investment, 64.2%, and the active projects, which have not been canceled about 388 projects worth $ 68.7 billion and occupy 33.8% of the total projects, namely

That the percentage of outgoing and active together exceed 98% of all, which indicates the success and strength of the general trend of countries and the private sector in sub-Saharan Africa for this type of partnerships in infrastructure, especially in the field of electricity, and the projects reached 38 projects with investment value of 2.2 billion dollars, 1.1% of Total projects, which were canceled 13 projects worth investment $ 1.7 billion, a weak rate of 0.9% of the total projects.

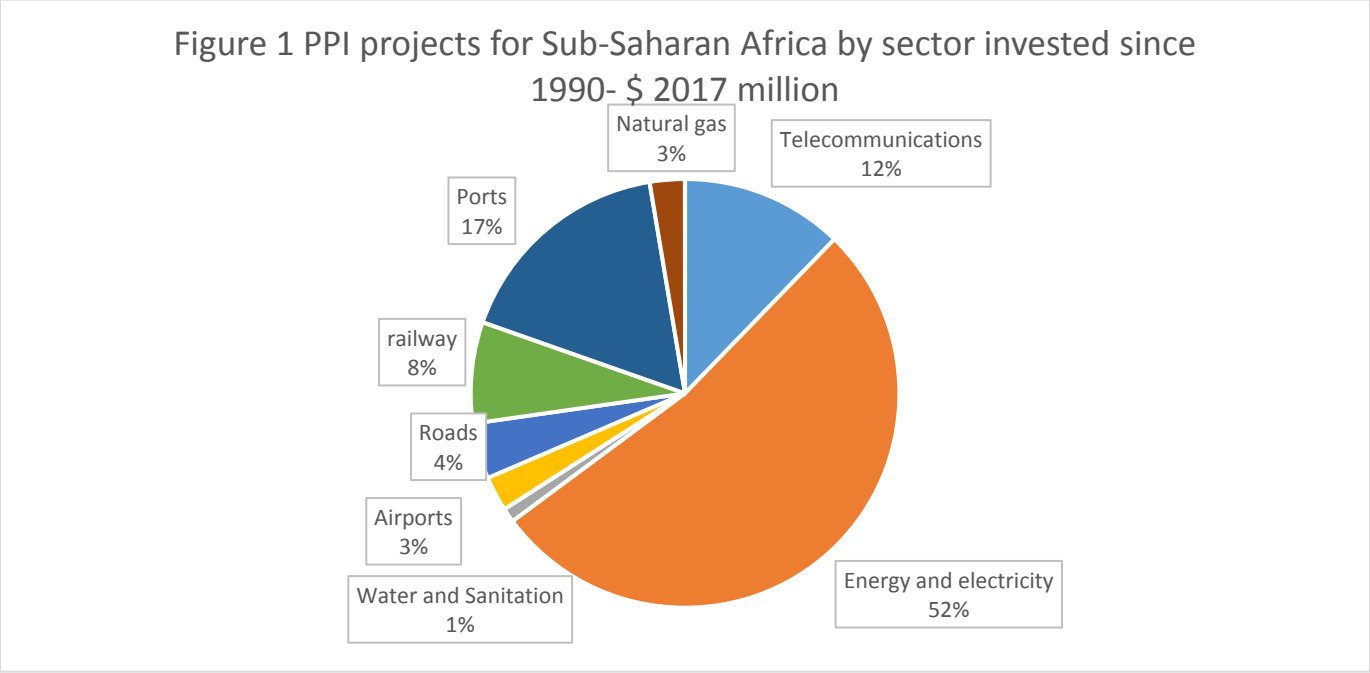
Of the above, it is clear that the total number of active and finished projects reached 199.1 billion dollars and 98.01% of total projects, while the faltering and canceled projects amounted to only 4 billion dollars and the percentage does not exceed 2% of total projects, which indicates the success, profitability and strength of the general trend of countries and the private sector towards partnerships Investment in infrastructure in sub-Saharan Africa.

Analysis of PPI Projects for Sub-Saharan Africa by Investment Sector:

Table 3 PPI projects for Sub-Saharan Africa by sector invested since 1990- $ 2017 million

Sector	Number	amount	Percent
Telecommunications	88	8,942.0	%12.26
Energy and electricity	**243**	**38,372.0**	**%52.60**
Water and Sanitation	32	779.3	%1.07
Airports	16	1,919.0	%2.63
Roads	14	3,057.0	%4.19
railway	21	5,573.0	%7.64
Ports	57	12,383.0	%16.97
Natural gas	6	1,932.0	%2.65
Total	**477**	**72,957.3**	

Source: Prepared from the World Bank website, Visualization, PPI.



Source: Prepared from the World Bank website, Visualization, PPI.

- **Energy and Electricity Sector:** The total number of infrastructure projects reached 243 projects with investment value of 38.3 billion dollars, representing 52.6% of the total investments. It is the largest sector that has been invested for speed and clarity to recover its costs and profitability. Energy is the basis of development for the countries of the region and the public sector. Great in them.

- **Telecommunications sector:** The second highest sector was invested with the participation of the private sector with 88 projects with an investment value of 8.9 billion dollars, representing 12.2% of the total investments. The countries of the region have not entered the establishment of new telecommunication systems and mobile phones.

Its costs and profitability are high and therefore the private sector is entering it strongly from the sectors traditionally privatized.

- **Ports Sector:** The third highest sector was invested with 57 projects with investment value of 12.3 billion dollars, representing 16.9% of the total investments. This is due to important sectors in development. The country always plays a strong role.

- **Railway Sector:** Total projects amounted to 21 projects with an investment value of 5.5 billion dollars, represent of 7.6% of total investments per.

- **Roads sector:** Investment reached 14 projects worth 3 billion dollars, represent of 4% of total investments.

- **Natural gas sector:** Projects reached 6 projects worth $ 1.93 billion, represent of 2.63% of total investments.

- **Airport sector:** Infrastructure projects reached 16 projects by $ 1.9 billion, represent of 2.6% of total investments.

- **Water and Sanitation Sector:** Projects reached 32 projects with investment value of $ 779 million, representing 1% of the total investments for all investments. It is one of the least invested sectors for the length of its construction and high costs. The public sector plays a major role in these projects. In addition, the private sector is afraid to invest fully in the risks associated with it.

It is important to conclude that the arrangement of the sectors is subject to the decisions of the priorities of the development process. The energy sector and the transport sector are generally considered the most important pillars. Investment in the telecommunications sector alone is second only to privatization, thus providing the possibility of high flexibility in controlling risks and returns. Clarity and guarantee of its revenues, and if we include electricity rates with natural gas to be the energy sector of a unit equivalent to 55% of investments for sub-Saharan Africa and also the integration of roads, ports, airports and railways under the name of the transport sector Of which the total investment is 31%, which makes it the second percentage after electricity in general and the second in terms of partnership with the private sector while noting that the weak sectors are the water and sanitation sector.

Description of the Standard Models: It includes the following steps (Tariq Al-Rasheed and Samia,p5-2010): Determining variables of the model / Determining the mathematical form of the model / Determining values and signals(+ or -)

Determining Variables of the model: - The researcher used to determine the variables of the standard model on several sources: The study is based on the measurement of Public- Private Participation in infrastructure on GDP & inflation-rate in Sub-Saharan Africa for the period 1990-2020. Therefore, the dependent variable in this study represents GDP & inflation rate, the independent variable: Private Participation in Infrastructure project in Sub-Saharan Africa all data collected from world bank and IMF The researcher relied on the method of experimentation and dissemination to reach the mathematical functions to of Public- Private Participation in infrastructure on GDP & inflation-rate in Sub-Saharan Africa for the period 1990-2020. As follows:

GDP = f (PPI)

INF= f (PPISSA)

GDP= (B1)C +(B2)PPISSA +U

INF= (B1)C - (B2)PPISSA +U

- **GDP=** Gross domestic product (GDP) is a monetary measure of the market value of all the final goods and services produced in a period of time, often annually.(Finance & Development,2019)
- **INF=** Inflation is a sustained increase in the general price level of goods and services in an economy over a period of time.(Blanchard, Olivier,2000).When the general price level rises, each unit of currency buys fewer goods and services; consequently, inflation reflects a reduction in the purchasing power per unit of money – a loss of real value in the medium of exchange and unit of account within the economy.(Paul H. Walgenbach, Norman E. Dittrich and Ernest I. Hanson, .1973) The measure of inflation is the inflation rate, the annualized percentage change in a general price index, usually the consumer price index, over time. (Mankiw, N. Gregory,2002) The opposite of inflation is deflation.
- **PPISSA=** Private Participation in Infrastructure project in Sub-Saharan Africa
- **C = constant variable**
- **U = Errors variable**

Prepositions of the parameters: In this step, theoretical predictions of the signal and size of the parameters of the model are specified Based on what is provided by economic theory or previous sources of information. According to the standard models proposed in the This study predicts the prior sign by the nature of the relationship between the dependent variables (GDP and Inflation rate) & independent variables (Private Participation in Infrastructure project in Sub-Saharan Africa)as follows: - GDP coefficient reference In

relation to Private Participation in Infrastructure project in Sub-Saharan Africa is expected to be a positive sign due to the existence of a relationship between the GDP and Private Participation in Infrastructure project in Sub-Saharan Africa , also The reference coefficient of inflation rate in relation to Private Participation in Infrastructure project in Sub-Saharan Africa is expected to be a negative signal because of a relationship The opposite between of them,

THIRDLY:EMPIRICAL STUDY:

A- Private Participation in Infrastructure project on GDP in Sub-Saharan Africa 1990-2017
Table 4

Dependent Variable: GDP
Method: Least Squares
Date: 05/23/19 Time: 14:37
Sample: 1990 2017
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.15E+10	3.30E+09	3.484292	0.0018
PPISSA	45.35055	3.398312	13.34502	0.0000

R-squared	0.872605	Mean dependent var	4.96E+10
Adjusted R-squared	0.867705	S.D. dependent var	2.39E+10
S.E. of regression	8.70E+09	Akaike info criterion	48.68007
Sum squared resid	1.97E+21	Schwarz criterion	48.77522
Log likelihood	-679.5209	Hannan-Quinn criter.	48.70916
F-statistic	178.0897	Durbin-Watson stat	0.969485
Prob(F-statistic)	0.000000		

Source: result from E-Views Program.

First: Economic Estimates: The criterion of economic theory: (c) consent is (1.15) is appositive sign representing the value of the dependent variable (GDP) when the values of all independent variables in the model are zero, it is value of the GDP, without any linked to the changes in the PPISSA. The (PPISSA) coefficient (45.350) is positive and this result indicates that there is an absolute correlation between the changes in the PPISSA and the change in GDP, according with economic theory.

Second: Statistical Estimates: T-test used to test the significance of the estimated parameters to determine the effect of the independent variables on the dependent variable. If The probability value is measured (test for the estimated parameter with 5% if the probability is bigger than 0.05) The Zero Hypothesis is accepted and therefore the parameter is statistically insignificant , but if the probability value is less than 0.05, well rejected the Zero Hypothesis and accepted the alternative hypothesis, the result is a statistically significant relationship between the independent variable and the dependent variable results estimate as follows: **(A)** Clarity significance of the constant C at the level of significance of 5%, where it is observed from the table that the probability value (P.Value of the estimated parameter 0.0018) .**(B).** The significance of the coefficient of PPISSA is evident from the table, which shows that the probability value of the PPISSA coefficient (P.Value) is 0.0000 less than the significance level of 5%. This result indicates a relationship with statistical significance between the GDP and Privet Participate infrastructure project in sub-Saharan Africa (PPISSA). **(C)** Significance of a complete model determined by the value of F, where the probability value (Prob = 0.0001) is less than the significance level (5%).

Third: Model Match Quality Test: The interpretation of the model or the model's ability to interpret is defined as R2, and the interpretation is stronger when it is closer to number (1) in the model. From the estimation results table, R2 shows that about (87%) of the changes in GDP were explained by changes in PPISSA, also (13%) of the changes are due to the variables not included in the model. This indicates the quality of the model.

The impact of the Privet Participate infrastructure project in sub-Saharan Africa (PPISSA) on GDP, therefore can express the relationship to mathematical function as fellow:

GDP= (1.15) + (45.35) PPISSA+ U

B- Private Participation in Infrastructure project on inflation rate in Sub-Saharan Africa 1990-2017
Table 5

Dependent Variable: INF
Method: Least Squares
Date: 05/26/19 Time: 13:10
Sample (adjusted): 1996 2017
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15.59182	2.169903	7.185491	0.0000
PPISSA	-1.45E-10	6.24E-11	-2.331383	0.0303

R-squared	0.213693	Mean dependent var	11.57836
Adjusted R-squared	0.174377	S.D. dependent var	6.818860
S.E. of regression	6.195874	Akaike info criterion	6.572152
Sum squared resid	767.7771	Schwarz criterion	6.671338
Log likelihood	-70.29368	Hannan-Quinn criter.	6.595517
F-statistic	5.435346	Durbin-Watson stat	0.862629
Prob(F-statistic)	0.030305		

Source: result from E-Views Program.

First: Economic Estimates: The criterion of economic theory: (c) consent is (15.5) is appositive sign representing the value of the dependent variable (INF) when the values of all independent variables in the model are zero, it is value of the INF, without any linked to the changes in the PPISSA. The (PPISSA) coefficient (-1.45) is Negative sign and this result indicates that there is an absolute Reverse correlation between the changes in the PPISSA and the change in INF, according with economic theory.

Second: Statistical Estimates: T-test used to test the significance of the estimated parameters to determine the effect of the independent variables on the dependent variable. If The probability value is measured (test for the estimated parameter with 5% if the probability is bigger than 0.05) The Zero Hypothesis is accepted and therefore the parameter is statistically insignificant , but if the probability value is less than 0.05, well rejected the Zero Hypothesis and accepted the alternative hypothesis, the result is a statistically significant relationship between the independent variable and the dependent variable results estimate as follows: **(A)** Clarity significance of the constant C at the level of significance of 5%, where it is observed from the table that the probability value (P.Value of the estimated parameter 0.000) .**(B).** The significance of the coefficient of PPISSA is evident from the table, which shows that the probability value of the PPISSA coefficient (P.Value) is 0.0303 less than the significance level of 5%. This result indicates a relationship with statistical significance between the on inflation rate (INF) and Privet Participate infrastructure project in sub-Saharan Africa (PPISSA). **(C)** Significance of a complete model determined by the value of F, where the probability value (Prob = 0.0303) is less than the significance level (5%).

Third: Model Match Quality Test: The interpretation of the model or the model's ability to interpret is defined as R2, and the interpretation is stronger when it is closer to number (1) in the model. From the estimation results table, R2 shows that about (21%) of the changes in INF explained by changes in PPISSA, also (79%) of the changes are due to the variables not included in the model. This indicates the quality of the model.

The impact of the Privet Participate infrastructure project in sub-Saharan Africa (PPISSA) on inflation rate (INF), therefore can express the relationship to mathematical function as fellow:

GDP= (15.5) - (1.45) PPISSA+ U

Consolation: Conclude that the arrangement of the sectors is subject to the decisions of the priorities of the development process. The energy sector and the transport sector are generally considered the most important pillars. Investment in the telecommunications sector alone is second only to it because it is fully privatized and thus offers the possibility of high flexibility in controlling risk reduction and profitability. And if we include electricity rates with natural gas to be the energy sector of the unit equivalent to 55% of investments for sub-Saharan Africa and also the integration of roads, ports, airports and railways under the name of the transport sector, Of the total investment in 31%, which makes the second percentage after electricity in general and the second in terms of partnership with the private sector while noting that the weak sectors are the water and sanitation sector. There is a strong positive and statistically significant relationship between GDP with private participation infrastructure projects in Sub-Saharan Africa, so any increase or decrease in the value of private participation infrastructure projects by one unit leads to the same trend in the value of

(45.3) from GDP, also a Reversible weak and statistically significant relationship between inflation rate with private participation infrastructure projects in Sub-Saharan Africa, so any increase or decrease in the value of private participation infrastructure projects by one unit leads to the Reverse trend in the value of (1.4) from inflation rate.

Results:

1- Infrastructure projects with the participation of the private sector are in direct harmony with the development process and are increasing their strength due to globalization, privatization policies and the requirements of development at a time when government resources are unable to meet all development needs.
2- Achieving completed and active projects 98% from the total projects indicates to success of experience of private participation in infrastructure in development proceed with its efficiency in sub Saharan Africa.
3- achieving of Energy sector (electricity and gas) is 55% from total because the Energy is the mainstay of development in the of sub-Saharan Africa economies, which is growing rapidly, followed by the transport sector (roads, railways, ports) by 31.2% Water Sewage by 1% due to the difficulty and complexity of investment risks.
4- Strong positive and significant statistically relationship between GDP with private participation infrastructure projects in Sub-Saharan Africa.
5- Reversible weak and significant statistically relationship between inflation rate with private participation infrastructure projects in Sub-Saharan Africa.

Recommendations:

1- The necessity for the participation and integration of sub-Saharan African countries together in their private sector in the work of joint infrastructure projects beyond one country, to strengthen the process of common development.
2- Emphasis on provision of facilities and guarantees for the private sector to access in telecommunications and energy sector because of its high potential for investment also with an attempt to overcome obstacles by providing customs and tax reliefs.
3- Create appropriate environment by strengthening the investment base to participation projects by providing a legal structure, rules, procedures, and unifying them with economic stability represented by stable rates of inflation, exchange rate, interest rate, and political security stability.

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`Slum Formation: A Corollary of Urban Development A case study of Akure, Ondo, Nigeria.

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Abstract

Taking into consideration the trend of urban development in recent times, the ineluctable evidence of slum formation can be seen as a resulting effect of urbanization in developing countries such as Nigeria. Urban centres are undoubtedly central to the changes in any society that lead to socio-economic advancement and urban development. Yet, in spite of the availability of collective services such as education, health, industrial, commercial and technological services, in most of these cities, regardless of their size, slums continue to have a dominant appearance across them. These slums reflect the challenges experienced by the urban poor, challenges which include population pressure, socio-cultural and socio-political exclusion, descent in the physical environment and standard of living. This paper therefore assesses the reality behind slum proliferation, the causes, effects and characteristics. The study employed the use of relevant literature, case study and Empirical survey. The study examines the central area of the city of Akure, as the case study. Findings were summarized and interpreted from the empirical survey. Investigations affirmed that the study area is indeed a typical slum environment. The paper therefore concludes that concerted efforts by government and relevant environmental organization must identify and set up the necessary machinery to prevent slum formation in new and old areas alike.

Keywords: Corollary, Development, Formation, Slum, Urbanization

Introduction

Slums are complex phenomenon that continue to plague cities world over, with sufficient evidence through series of physical manifestations serving as proof of its importance as a critical component of urbanization, (Morakinyo, Kolawole, Ogunrayewa and Olabode, 2012). Slums are fair examples of elements of environmental decay. One of the most acceptable definition for slums was given by United Nations Settlements Programme (UN-HABITAT), as a series households living within a geographical defined area considered to be lacking access to any or all of the following conditions: readily available clean municipal water, adequate sanitation, tenure security, quality affordable housing (UN, 2003). Formation of slums are a common corollary of urbanization with particular reference to developing countries such as Nigeria. Confirming the above, is the unavoidable evidence of “SLUMS” in the following locations; Cazenga in Angola, Nima in Accra Ghana, Ajegunle in Lagos Nigeria, Mukuru Kwa Njenga in Kenya and so on. Due to the nature to which slums are formed they are often categorised as informal settlements and as Arimah (2011) observed, in spite of the cosmopolitan approaches adopted when planning the development of cities or urban centres there seems to be no decline in sight to the formation of these informal settlements. Nigeria, a developing country has been observed as being one amongst the lot of rapidly

developing nations in Sub Saharan Africa SSA, (Olotuah and Adesiji, 2005), hence the avid prevalence of slums across the cities in Nigeria, where inhabitants are forced to live under impoverished living conditions with no means of escaping their plight.

Several literature over the years have reported that due to the challenges that slum formation pose, appropriate authorities within affected countries or regions often times take proactive measures to alleviate any potential urban decay a city might experience and chief amongst the factors responsible for this decay being slum presence.

Understanding that the determinants leading to slum formation are multifarious, a problem bedevilling households, communities and authorities of affected countries, this paper, prequel to suggesting apposite remedies to slum formation, examines the underlying factors leading to slum formation.

Review of Related Literature

Man constantly interacts with his environment and this interaction can either lead to environmental improvements or degradation. Rapid urbanization which also results in environmental degradation quickens the formation and growth of slums. (Goswami and Manna, 2013). For this reason, it should be understood that examination of slum factors and characteristics must include the basic concept of urbanization

Basic Concept of Urbanization & Slum

Understanding the concept of urbanisation can appear complex due to several definitions of the term URBAN and also a lack of reliable data. In many developing countries, there are cities that have an appearance of urban centres but mostly in terms of population sizes and territorial extent. Urbanization, a process simply involving an increase in population in urban areas, habitually as a result of migration from rural to urban areas. It is a major social transformation occurring world over. It is a process of definite alterations or modifications to form and distribution of urban population both in character and size of a settlement. (Bobadoye & Fakere, 2013).

Slums however are unplanned settlement within urban centres lacking suitable housing amenities, with apparent poor living conditions. Guillermo Alves (2015), while studying the concept of slums identified four key dimensions that form part of an ideal slum definition they include: Lack of services, Agglomeration, Housing quality & Legal Aspects. These dimensions can be observed in the attributes of slums, whereby slum settlers endure life threatening situations such as insecure tenure , poor supply of municipal water, poor or absent waste management policies, high presence of squalid and dilapidated shelters, non- existent sanitary facilities, an array of complex health problems and lastly a persistent change in residential population, all of the forgoing which are categorised under the following Social, Economic, Political and physical attributes. Guillermo Alves (2015), posited that if the aforementioned dimensions were traits observed in any form of settlement in urban areas, such areas are considered slum areas. Undoubtedly, Africa in recent times has experienced rapid urbanization and the quality of structures that accompany this development varies from simple sheds to proper structures and the series of poorly built structures transforms the environment in to one which is beset with poor sanitary conditions, high occupancy ratio, dilapidated structures and the eventually austere health challenges.

However, it should be borne in mind that slums are basically the type of settlement affordable and readily available to the urban poor, where quest for land and profits is highly competitive, hence the formation of slums and the prevalence thereof becomes inevitable. (UN-HABITAT).

Incidence of Slums in the Nigerian context

The incidence of slums in urban areas nationwide cannot be understated. These slums have continued to prevail in urban centres experiencing increasing levels of urbanization, urbanization which is fraught with incommensurate socio-economic, technological and infrastructural development. (Olotuah and Adesiji, 2005). In the course of studying slum formation, Adegun, (2011), presents an evidence of slum proliferation between the years 1990 to 2007 which can be seen in a Table 1 below. The table reveals the percentage of urban slum settlers to the entirety urban population is still on the high.

Table 1: Urban population and proportion of urban slum settelers in Nigeria.

Year	Population (Thousands)	Percentage (%) of Urban Population in slums	Urban slum population (Thousands)
1990	33,325	77.3	25,763
1995	45,372	73.5	31,127
2000	53,048	69.60	36,930
2005	65,270	65.8	42,928
2007	70,539	64.2	45,309

Source: Global Urban Indicators Database, 2010.

The Society for the Study of Reproduction (SSR) recognises Nigeria as a developing country and as earlier reviewed, developing countries have more occurrence of slums compared to their advanced counterparts. Nigeria has a copious amount of urban centres with slum infection and this is reflected in Table 2, as presented by (Bobadoye and Fakere 2013) in their findings.

Table 2: Select Urban Centres with slum infection in Nigeria.

S/N	Nigeria Cites	Slum Regions
1	Lagos	Ajegunle, Makoko, Agege, Bariga, Badia, Ilaje,Iwaya, Amukoko
2	Kaduna	Angwar kurmin Gwari, Television, Angwar Shanu
3	Enugu	Akwuke, Ugwuaji, Abakpa, Emene, Akegbuegwu
4	Ibadan	Beere, Oje, Inalende, Mapo, Oke-Padi, Yemetu, Oniyanrin
5	Port Harcourt	Njemanze, Igbo-et che, Bundu Waterside, Mlie 1,Eleme
6	Abuja	Dutsen Alhaji, Karimu, Gwagwa, Kabusa, Apo wumba
7	Jos	Bayan Rogo, Gangare, Katako, Angwan Rukuba
8	Makurdi	Wadata, Agwan Jukun, Idye, Logo
9	Minna	Tudun Fulani, Kpakungu, Angwan Biri, Dutsen Kura
10	Ado-Ekiti	Oke-Isa, Irona, Oke-Ila

Source: Bobadoye and Fakere (2013).

Causes of slum formation

A glut of factors can be ascribed to as reasons for slum formation. Majority of these factors are connected to low level of socio-cultural and economic lifestyle of slum settlers. These factors are categorised under Population Growth and Governance. (Omole, 2010).

<u>Population Growth:</u>

Rapid urban population growth translates to changes in economic policies. These changes inadvertently lead to slum formation. The ensuing problem or effect of this population growth is in fact the emergence of the urban poor. Today a significant amount of the world's population reside within urban centres.

- *Overcrowding*
- *Poverty and Illiteracy*
- *Urban Migration*

Governance:

Poor governance on the part of constituted authorities often times fails to identify and integrate the poor while developing a plan for urbanization. This invariably contributes to the growth of these informal settlements. Hence due to the lacklustre efforts from the government, most affected areas are unable to respond positively to rapid urbanization.

- *Infrastructural Neglect*
- *Ineffectual Sanitation Laws*
- *Deficient Building Materials*
- *Insecurity of Tenure*

Research Setting, Materials and Methods

This study adopted the Quantitative method of data collection that employs the use of textual and visual analysis, Structured and unstructured interviews (individual or group) and observation in order to gauge views. The Study focuses on a number of slum areas within Akure, Ondo State, Nigeria, the area occupies an expanse of land of about 3.6sq.km. With the combined use of related literature, secondary data and photographic representations, trends in urban and socio-economic activities, the general profile of the existing slum settlements within the study area are illustrated within.

The land use is majorly residential while commercial activities exist within the Central Business District (CBD). The study areas include; Isolo Quarters, Odo-Ikoyi and Obele Estate, which happens to be situated within the city core except for Obele Estate which is slightly on the fringe.

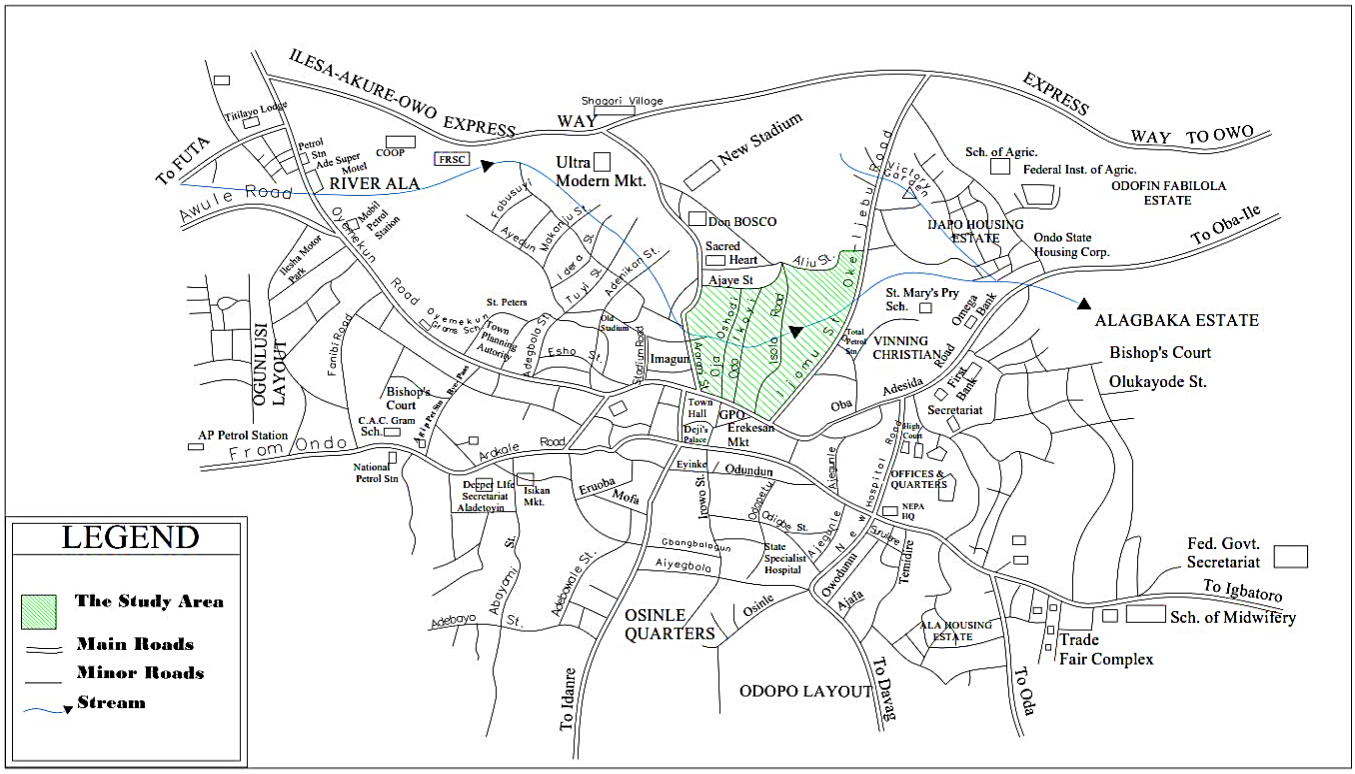


Fig. 1: Layout Map of the City of Akure, Ondo State, showing the study area

Source: *Ondo State Ministry of Lands and Housing, Akure (2010) updated.*

Results and Discussion

The findings presented were based on considerations for the following variables, socio-economic characteristics of respondents, condition of buildings, condition of the existing infrastructure, sanitary facilities and general environmental conditions of the area. Questionnaire administration, direct observation and also unstructured interviews were employed in collecting data on the field. 210 questionnaires were administered based on random selection during the survey across the focus areas. However only 185 of the administered questionnaires were effectively retrieved thereby representing 88.1% of the expected responses while 11.9% failed to return the questionnaires.

Socio-economic Characteristics of Respondents

Generally the level of education of the respondents was very low. As presented in Table 3, 42.2% of the respondents were without formal education while just 10.8% obtained education beyond the secondary level. This impacts negatively on their level of income which is evident as about 80.2% of the majority are either street traders, craftsmen or unemployed. Also, 55.1% have no fixed income or income at all while just 13.5% earn above ₦35000 monthly. The obvious indication is that poverty level is high, as very good amount of the populace maybe deprived the benefits of quality housing and social services.

Table 3: Socio-Economic characteristics of the Respondents

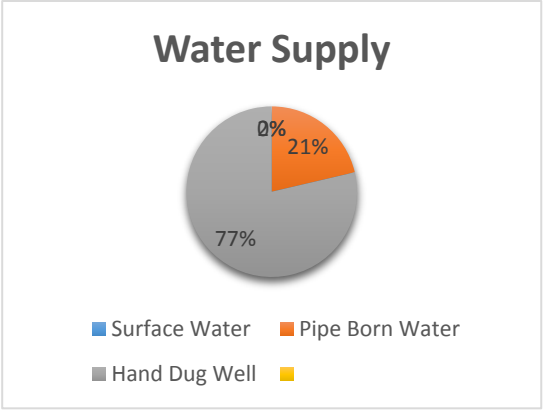
Variables		Frequency	Percentage (%)
Educational Level			
No-Formal Education		78	42.2
Primary		52	28.1
Secondary		35	18.9
Tertiary		20	10.8
Total		***(185)***	***100***
Occupation	Trading	54	29.2
	Public/Civil Servant	36	19.5
	Self employed	48	26
	Unemployed	47	25.4
	Others	0	0
Total		***(185)***	***100***
Household Size	1>3	42	22.7
	4>6	82	44.3
	7>9	50	27
	Above 9	11	6
Total		***(185)***	***100***
Income Monthly Rate- Naira(₦)			
₦7000-₦25000		30	16.2
₦26000-₦35000		28	15.1
Above ₦35000		25	13.5
No Fixed Income		62	33.5
No Income		40	21.6
Total		***(185)***	***100***

Source: *Researcher's Field Survey*

The average household size across the study area falls within 7-9, with an average density of 11 persons per building. The overall implication of this is continued poor living conditions if proactive and positive measures are not taken to improve the current situation.

General Environmental Conditions

The variables investigated in this category include, state of sanitary services, water supply and quality based on the source, drainage conditions, sewage and waste disposal methods, also considered were housing conditions and adequacy of infrastructure. Fig. 2 shows that 79% of the respondents publicly and privately source their water from hand-dug wells with a fair amount of these wells located in dirty environment while 21% get water supply from pipe borne water. 62% of the respondents reacted by saying the quality of water was poor as they had to spend extra money on treating the water after collecting from its source. This puts these dwellers in danger of being infected by water borne diseases.



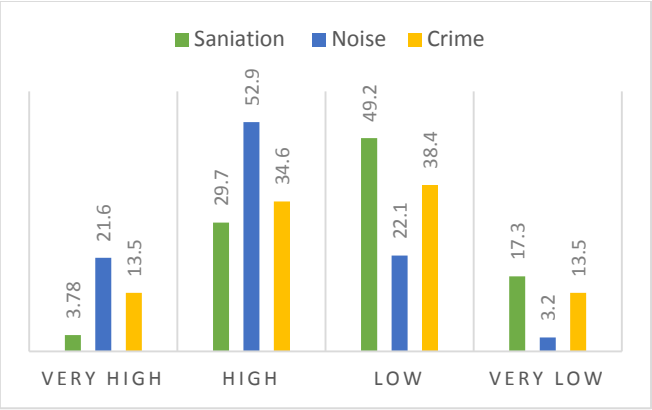
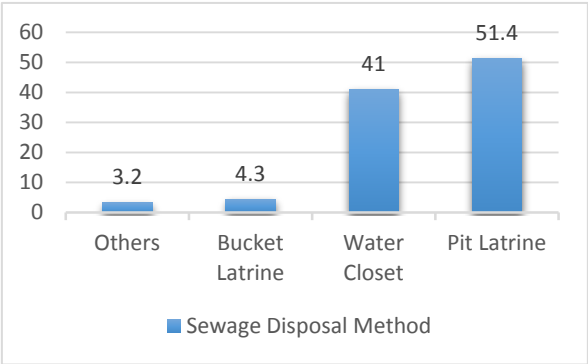


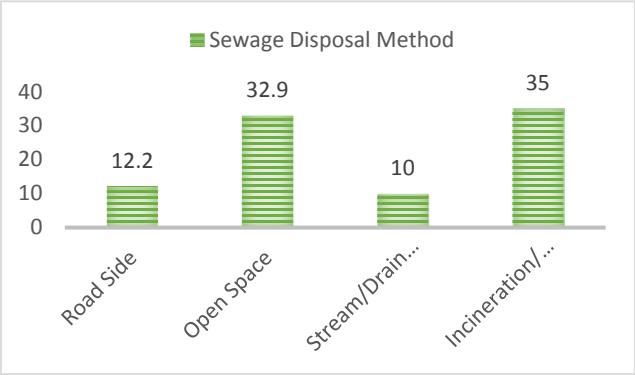
Fig 2: Source of Water Supply Fig 3: Environmental conditions

Source: *Researcher's Field Survey*

On account of sanitary conditions 66.5% reacted to the sanitary condition of their environment being poor, 52% corresponded that economic activities were high which is partly responsible for the high noise levels with 74.6% agreeing that indeed noise levels were high. There were conflicting responses on crime rate yet a significant amount of respondents, 48%, agreed crime was high although mostly property related crime (Petty Theft), the implication being that the populace within and around the area are potential victims of this crime.

Fig 4: Sewage Disposal Method **Fig 5:** Waste Disposal Method





Source: *Researcher's Field Survey*

As shown in Fig.4, findings further revealed that 51.4% make use of pit-latrines, 41% have access to water closet systems, while for those without sewage disposal facility resort to the use of bucket-latrine and 3.2% accounts for those who dispose sewage through drainage channels or dunghills. Refuse disposal methods are equally appalling, due to the indiscriminate dumping of waste in open space and the delayed reaction of the waste management authorities in clearing the waste. Fig. 5, 35% adopt the use of incinerators and 33% resort to dumping refuse in open space. It should be noted that both methods impact the environment negatively in terms of air and soil pollution. 12.2% accounts for road side dumping while 10% dispose of their waste through flowing stream and drainage. Evaluating the adequacy of facilities as shown in fig. 6, 85% accounts for drainages being inadequate, 62% for waste disposal, 78% for poor condition of health facilities while 56.2% account for roads being inadequate in terms of construction and condition.

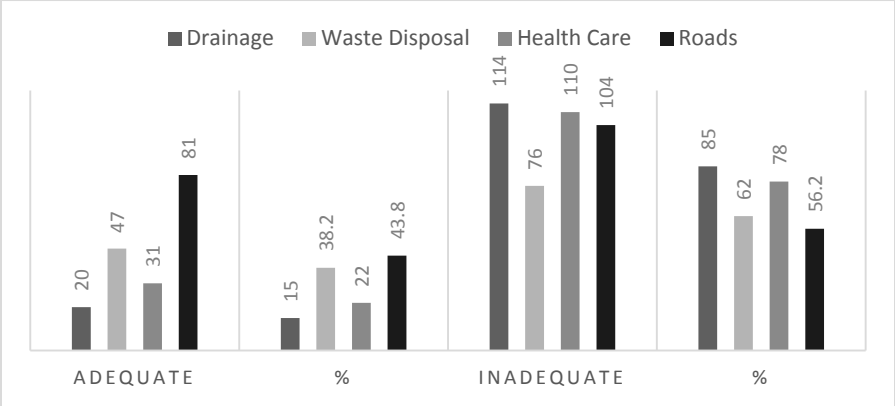


Fig. 6: showing adequacy levels of available infrastructural facilities

Source: *Researcher's Field Survey*

Table 4: Building Quality and Condition

Variables		Frequency	Percentage (%)
Material Used			
Walls **----**	Mud-Brick	89	58.2
	Sand-Crete Block	64	41.8
Total		***(153)***	100
Roofing **---**	Corrugated Iron Sheets	126	82.4
	Asbestos	27	17.6
Total		***(153)***	26
Physical Condition --	Functional	35	22.9
	Defective	61	39.9
	Very Defective	20	13.1
	Dilapidated	37	24.2
Total		***(153)***	***100***

Source: *Researcher's Field Survey*

Findings further revealed that housing conditions and quality in the study area were equally poor.

Table 4 shows 58.2% accounts for the use of Mud-Bricks for their walls while 82.4% use corrugated sheets as roof covers the reasons being financially incapable of opting for quality building materials, meaning most of these buildings are susceptible to housing defects. On the basis of housing conditions, a combined reaction of 53% accounts for buildings needing either minor or major repairs while 24% accounts for old and dilapidated buildings.

Conclusion and Recommendation

Conclusion

This paper after careful appraisal and review of slum situation in the study area, Akure, Ondo State, Nigeria, it was discovered that the study area is an obvious reflection of slum formation in other cities across the country. The study revealed that the government needs to adopt sustainable urbanization with adequate planning that will guide the process of subsequent urbanization exercises. In addition, it findings also revealed that government policies on urban development lack institutional framework for successful implementation. Finally based on the reactions observed from respondents, the most unpredictable, elusive and complex of factors which was discovered in the course of the study as one of the major contributors to slum formation is the human nature. Observations revealed that even though slum dwellers faced numerous life threatening conditions, they were unwilling to leave and in the same vein, some others are drawn to slum environments as a result of the psychological conditioning from bad governance (corruption, sabotage and counter-productive behavior), sentimental socio-cultural ties and most importantly deviant behaviors.

Recommendations

From the foregoing findings as discussed, given careful appraisal, the following recommendations were made:

- The bulk of the task of arresting slum formation rests on the hands of the government by measure of effectively addressing the developmental needs off rural areas thereby discouraging rural-urban migration and in turn reduces pressure on socio-economic services and infrastructure in urban areas.
- Still tasked with the duties of eliminating slums, the government can through private business partnership, if the need be, make adequate housing policies to favor the socially excluded and as a result discourage squatter settlements this should be done in tandem with upgrading facilities in areas exhibiting slum infections.
- Also as a matter of urgency, the constituted authorities should make endeavors in educating and enlightening the slum dwellers on behavioral conducts, environmental sanitation and health education. This will further aid in communicating the relevance of environmental sanitation policies and laws.
- Lastly all stakeholders in the building industry and environmental sciences, should advise all prospective property developers against building in slums areas and also encourage them to comply with building regulations and environmental policies.

Observations made from of this study concludes that concerted efforts by government and relevant environmental organization to identify and set up the necessary machinery to prevent slum formation in new and old areas alike.

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Policy Interpretation, Project Management Practices and Performance of Construction Projects

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Abstract- The study sought to determine whether the performance of construction projects was influenced by school infrastructure policy interpretation and whether project management practices mediated that relationship. A cross-sectional survey using a correlational design was used. The target population comprised of 920 head teachers and 86 District Education Officers (DEOs) in all the 13 regions of Somaliland. Purposive sampling and proportionate stratified random sampling with replacement were used to sample 272 schools while simple random sampling was used to sample 20 DEOs. Data collection was by self-administered questionnaires for head teachers and semi-structured interviews for DEOs. Questionnaires pilot testing was done on 28 head teachers in Awdal region. The response rate was 90.8% (247 head teachers) for questionnaires and 100% (20 DEOs) for interviews. Variable relationships were tested using t-tests at 5% level of significance. School infrastructure policy interpretation exerted a significant direct effect ($b = -0.3215$, $p < 0.001$, $R^2 = 0.4183$) on the performance of construction projects. Project management practices mediated the relationship with a significant positive indirect effect of 0.4548, CI [0.3505, 0.5642]. A direct negative linear relationship existed between school infrastructure policy interpretation and the performance of construction projects. Policy interpretation exerts its influence on the performance of construction projects through project management practices.

Index Terms- Policy interpretation, project performance, mediation, construction projects, school infrastructure policy.

INTRODUCTION

The importance placed in education globally can be seen in its inclusion in global goals such as sustainable development goals and in government investments and budgetary allocations to education ministries and departments worldwide. Many governments use the school system to deliver education services to their citizens. This requires establishing school infrastructure which in turn requires undertaking school infrastructure construction projects. School construction projects take the form of establishing new infrastructure facilities, expanding existing facilities, maintenance repair or rehabilitating of old facilities. The success of such projects can be measured using indicators such as timely completion, completion within budget, client satisfaction, meeting scope and quality standards among others. Different authors have advocated different project performance indicators among them: Freeman and Beale (1992), Shenhar, Levy, and Dvir (1997); Lim and Mohammed (1999), Sadeh, Dvir, and Shenhar (2000),Vandevelde, Dierdonck and Debackere (2002), Chan, Scott and Lam (2002), Shenhar, Tishler, Dvir, Lipovetsky and Lechler (2002) and, Patanakul and Milosevic (2009). These performance indicators gravitate around; project budget management, schedule management, the realization of project objectives, meeting standards, and client and stakeholder satisfaction. This study adopted the Chan and Chan (2004) blend of objective and subjective indicators: realization of project deliverables, variations from project plans and set standards, attaining project functionality, and satisfaction of the client, contractor, end-users, design team and construction teams with the project outcome.

In order to ensure the quality of school facilities, governments establish school infrastructure policy to set process, output and other standards for school infrastructure. The policy makes various provision and requirements for schools to adhere to when establishing school infrastructure and when undertaking school infrastructure construction projects. Interpreting the policy entails interpreting the policy substance requirements and the resource requirements necessary to successfully implement the policy. These interpretations should be done carefully so as not to constrain or extend the policy provisions and the spirit of the policy (Coglianese, 2012). In the case of school infrastructure policy, the following policy substance need to be interpreted: the provisions of the policy, infrastructure projects covered in the policy, quality standards set, stipulated project financing activities, stakeholder and partnerships engagements, development planning, and school management obligations for school construction projects (Brown, Stern, Tenenbaum and Gencer (2006). Even when the schools are using the same school infrastructure policy, policy interpretations tend to vary among the implementers. This can be attributed to: varied policy exposure, differences in education levels and training specializations of implementing managers, individual effort made to understand the policy by managers, personal interest in the policy, variations in school management experience working with the policy, access to the policy, policy substance language and vocabulary and, policy substance clarity or ambiguity among others. Policies can be given as one document or as provisions and mentions in a different policy and regulatory documents (Coglianese, 2012). When the policy substance is scattered over different policy documents, policy

users may not have access to all the documents and may be unaware of the full extent of the policy. This can increase policy interpretation variations even more. Policy interpretation can be indicated by users' and implementers' access of the policy, existence and use of policy interpretation guidelines, policy users' education and sensitization on the policy, existence of policy disputes and litigations, existence of significant policy ambiguity, uncertainty in the policy substance, policy existence form, and extent of consistency in the determination of resource requirements for policy implementation by the users.

Project management practices unfold around the project cycle and are key in determining the project's performance. The relationship between project focused policies and project management practices are two-way. When project regulatory policies are set, they influence and even change project management practices that project managers deploy. In the reverse, the practices that project managers use and deploy can be what causes the need for regulatory policy intervention by the government. When a regulatory policy is enacted, it changes existing practices and existing practices also inform the need for a policy or a policy review. The study sought to assess the influence of school infrastructure policy interpretation on the performance of construction projects in primary schools in Somaliland with project management practices mediating the relationship.

LITERATURE REVIEW

Once a policy is instituted, policy users and implementers interpret the policy substance in terms of what the requirements are and the resources needed to fulfil those requirements (Coglianese, 2012). Depending on the existing situation and current practices in an organization, the resource or cost interpretation of a policy may vary from one organization to organization. Different parties may interpret the same policy differently hence one policy may attract a mixture of support and criticisms. Policy ambiguity refers to provisions in the policy being unclear as to their intended meaning or having more than one interpretations. Where the policy is ambiguous, the results can be detrimental to both policy objectives and organizational objectives. School infrastructure policy substance ambiguity can result to delay of new projects, failure of existing projects, back-passing and jostling between the parties involved, a halt in mounting new school infrastructure projects, slack service delivery, and blame games among the regulators and the policy implementers (Dubois, 2014). Such policy ambiguities can also result in policy uncertainty among the regulated parties and eventually different interpretations of the same policy. When the resource interpretation of the policy is lacking, policy implementation faces many handles and realization of policy goals is frustrated. This has been witnessed in numerous African countries that introduced free primary education policy in line with international millennium goals without interpreting the infrastructural resource requirements necessary to support the free primary education and ensure quality was not compromised. This was the case in Malawi (Kadzamira and Rose, 2001), Kenya (Ngware, Oketch, and Ezeh, 2011), Tanzania (Moshi and Vavrus, 2009) and South Africa (Marishane, 2013). Policy uncertainty refers to omitted aspects of the policy or gaps in the policy provisions. Uncertainty creates a silence in policy requirements, the result of which is policy non-application in the omitted aspect allowing policy users and implementers to practice as they see best. In the case of construction projects, uncertainty in school infrastructure policy can result to non-performance of construction projects as schools' delay mounting new projects and halt existing projects in the short run as they adopt a wait-and-see approach on whether the policy uncertainty to be cleared. The study was anchored the punctuated equilibrium theory of policy and program theory of project management.

The study sought to analyze the following models.

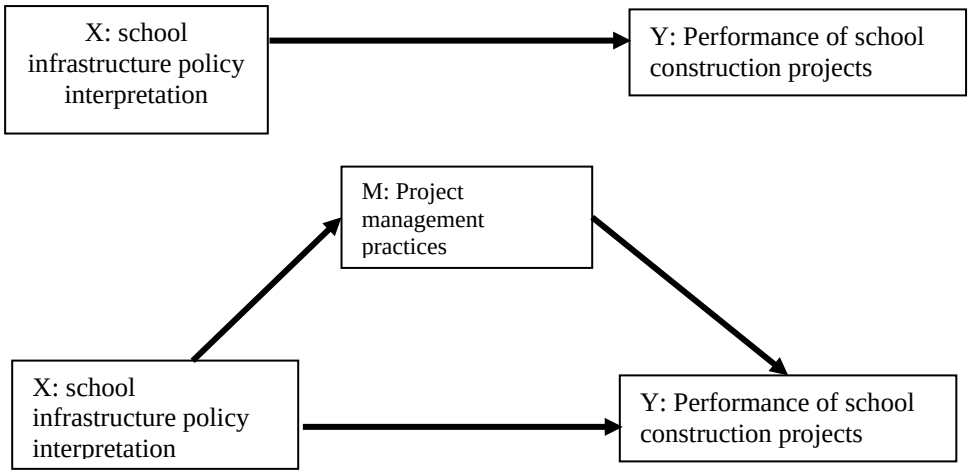

Figure 1: Models of analysis

METHODOLOGY

The study was cross-sectional survey research using correlational convergent parallel design. The target population was 920 public primary schools. Each school has a head teacher who also often doubles in as the project manager for the school's construction projects. Headteachers are supervised by District Education Officers who are in charge of public schools in a district region. To draw a sample, the study used the sample size formula for a large population ($n=z^2(P)(Q)/(\text{level of statistical significance})^2$) and then applied the Cochran finite population correction at 5% level of significance. Somaliland is demarcated into 13 regions which have 86 districts and 920 public primary schools (MoEHE, 2015). The determined sample was 272 schools multistage sampling was used. Purposive sampling was used to sample 7 regions with a total of 56 districts which have 735 primary schools. The criteria used for purposive sampling of regions was: physical accessibility, national geographical spread, a high number of primary schools, the balance between rural and urban schools, secure, and not engaged in armed conflict. A sample of 272 schools was drawn from 735 schools using proportionate stratified random sampling with replacement. In the 272 schools, expert sampling was used to pick the head teacher as the organizational respondent. Simple random sampling was applied to pick 20 DEOs for interviews from the 56 districts, purposively sampled. The 272 head teachers filled questionnaires that were dropped and picked later. The questionnaires were anchored on a 5-point Likert attitudinal scale. Each variable was measured using 10 Likert scale items and one open-ended question. Semi-structured interviews were used to collect data from 20 DEOs. Pretesting of the questionnaire was done on 28 head teachers. Reliability was ensured by the Cronbach alpha coefficient of internal consistency: $\alpha = 0.924$. Construct validity was ensured by the use of proven variable indicators in constructing the questionnaire items. Content validity was ensured through peer review. Path analysis was used to assess the variable relationships and path coefficients were used to test hypotheses. Andrew Hayes *Process* tool was used to analyze the mediation effect. The following three equations were used to analyze the total effect, direct effect and indirect effect.

$Y = a_0 + cX + e_1$ ..... total effect X_1 on Y

$M = a_1 + b_1 X + e_2$ ..... first part of the indirect effect

$Y = a_2 + c' X + b_2 M + e_3$ ..... direct effect and second part of indirect effect

Where Y is the dependent variable, X is the independent variable, M is the mediator variable, a_0, a_1 and a_2 are model constants, c is the total effect of X on Y, $b_1 = P_{21}$ and is the effect of X on M, $c' = P_{51}$ the direct effect of X on Y controlling for M, $b_2 = P_{52}$ the effect of M on Y while, e_1, e_2 and e_3 are disturbance terms.

FINDINGS AND DISCUSSIONS

Of the 272 schools surveyed 253 questionnaires were completed and returned. Of these, 6 were dropped due to gaps in responses. The usable sample was 247. This represents a 90.8% response rate. The high response rate was attributed to the short period between drop time and pick time of the questionnaire which was 1 to 2 days. Shapiro Wilk test was used to test the data for normality. Data for policy interpretation, $D(247) = 0.991$, $P = 0.113$; project management practices, $D(247) = 0.995$, $P = 0.585$; and performance of construction projects, $D(247) = 0.994$, $P = 0.454$; were all normally distributed. Multicollinearity was tested using tolerance value (TV) and VIF: policy interpretation, $TV = 0.657$, VIF=1.523; project management practices $TV=0.574$, VIF =1.741; indicating absence of multicollinearity. Homogeneity of variance was tested using the Levene statistic. For policy interpretation, $F(29, 212) = 1.087$, $P = 0.355$; project management practices $F(29,212) = 0.890$, $P = 0.633$ indicating that the variances of the explained variable (Y) were stable for different levels of the independent variable. The independent of error terms tests were also done using the Durbin Watson statistic which returned $D = 2.070$, indicating the absence of autocorrelation.

The study sought data on projects completed in a period of 5 years prior to the study. The school's responses were summed up for each variable on a scale of 10-50 and grouped into three categories: disagree, not sure and agree. The results are shown in Table 1 below.

Table 1: Data collected on model variables

Variable	Response category	Frequency	Percent	Mean	Standard Deviation
Performance of construction projects	Disagree/low (10-26)	68	27.5	29.60	7.12
	Not sure (26-34)	109	44.2		
	Agree/high (34-50)	70	28.3		
	Total	**247**	**100.0**		
School infrastructure policy interpretation	Disagree/low (10-26)	64	25.9	30.64	8.67
	Not sure (26-34)	91	36.9		
	Agree/high (34-50)	92	37.2		
	Total	**247**	**100.0**		
Project management practices	Disagree/low (10-26)	40	16.2	30.88	5.33
	Not sure (26-34)	133	53.8		
	Agree/high (34-50)	74	30.0		

	Total	**247**	**100.0**		

On the performance of construction projects, the respondents took a lukewarm position with a mean score of 29.60 with a response spread around the mean of 7.12. Of the 247 schools, 68 had low performance in their construction projects, 70 had high performance, while 109 had some of their construction projects attaining low performance and others attained high performance. On policy interpretation, 64 of the 247 schools reported having had school infrastructure policy interpretation issues, 92 schools had not had such issues while 91 schools were not sure if they had had policy interpretation issues with regard to the school infrastructure policy. The mean was 30.64 and the standard deviation 8.67 indicating the respondents took a lukewarm position and the responses were more spread around the mean than the other two variables. Further analysis showed that most schools with policy interpretation issues were from rural regions. Of the 247 schools surveyed 74 indicated their project management practices were sufficient to yield high performance of their construction projects, 40 schools indicated inadequate project management practices that resulted to low project performance while, 133 schools were not sure whether their project management practices could lead to high or low performance of their construction projects. With a mean of 30.88 and the responses spread around the mean being 5.33, the response was slightly in favour of project management practices that yielded high performance of construction projects. This shows that project management practices exerted a positive influence on the performance of construction projects

Policy interpretation was positively correlated with performance of construction projects but the correlation was not significant ($r = 0.64$, $p = 0.319$, $\alpha = 0.01$) indicating that it is not a key predictor of performance of construction projects without a mediating variable. The total effect was computed using linear regression analysis. The results are shown in Table 2.

Table 2: Regression Coefficients for Total Effect of Policy Interpretation on Performance of Construction Projects.

	Unstandardized Coefficients		Standardized Coefficients			Correlation		
Model	b	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part
Constant	27.999	1.668		16.783	0.000			
PI	0.052	0.052	0.064	0.999	0.319	0.064	0.064	0.064

Note: Dependent Variable: Performance of Construction Projects; n =247, $\alpha = 0.05$.

The total effect of policy interpretation on performance of construction projects with no other variable in the model was not significant: $c = 0.052$, $t = 0.999$, $P = 0.319$ (> 0.05) and $R^2 = 0.004$. The total effect model was: $Y = 27.999 + 0.052X + e$; $e_1 = 0.052$. This shows that no significant relationship exist between school infrastructure policy interpretation and performance of construction projects when there are no other variables in the model.

Path analysis was used to determine the direct and indirect effects exerted by policy interpretation on the performance of construction projects using the Hayes *Process* model 4 (Preacher, Rucker and Hayes, 2007). The results are shown in Table 3, Table 4 and Figure 2.

Table 3 shows the results of the regression of X on M.

Table 3: Regression coefficients for the indirect effect of policy interpretation on project management practices

	Coefficient.	se	t	p	Confidence interval	
					LLCI	ULCI
Constant	20.0068	1.0213	19.5899	0.0000	17.9952	22.0184
Policy interpretation	0.3549	0.0321	11.0614	0.0000	0.2917	0.4181

Note: n =247, $\alpha = 0.05$

In the X →M relationship, policy interpretation predicts project management practices ($b_1 = 0.3549$, $t = 11.0614$, $p < 0.001$). The value of R^2 was 0.3331 ($p < 0.001$), showing that 33.31% of the variations in M could be explained by variations in X. This shows that school infrastructure policy interpretation is an important predictor of the project management practices used in school construction projects.

The effect of M on Y and the direct effect of X on Y were analyzed. The results are presented in Table 4.

Table 4: Regression coefficients for the direct effect of policy interpretation and indirect effect of project management practices on performance of construction projects.

	Coefficient	se	t	p	Confidence interval	
					LLCI	ULCI

Constant	6.9218	2.0468	3.3817	0.0008	2.8901	10.9335
Policy interpretation	-0.3215	0.0491	-6.5419	0.0000	-0.4183	-0.2247
Project management practices	1.0535	0.0799	13.1811	0.0000	0.8961	1.2110

Note: n =247, α = 0.05

For the relationship between the independent variable and the dependent variable controlling for the mediator (X│M→Y), X significantly predict Y, (b = -0.3215, t = -6.5419, p<0.001). R^2 was 0.4183 (p<0.001) indicating that 41.83% of the variations in Y could be explained by the variations in both X and M. The following mediation equations were constructed:

$$M = 20.0068 + 0.3549X + e_2 \qquad e_2 = 0.0321$$
$$Y = 6.9218 - 0.3215X + 1.0535M + e3 \qquad e_3 = 0.129$$

(e is the disturbance term)

Policy interpretation had a negative direct effect on the performance of construction projects of c' = -0.3215 (p<0.001) showing that the independent variable had a direct negative effect on the dependent variable when the mediator is in the model. The unstandardized indirect effect of X on Y through M was 0.3739 which when fully standardized, was 0.4548, CI [0.3505, 0.5642], showing that policy interpretation exerted a significant influence on the performance of construction projects through project management practices.

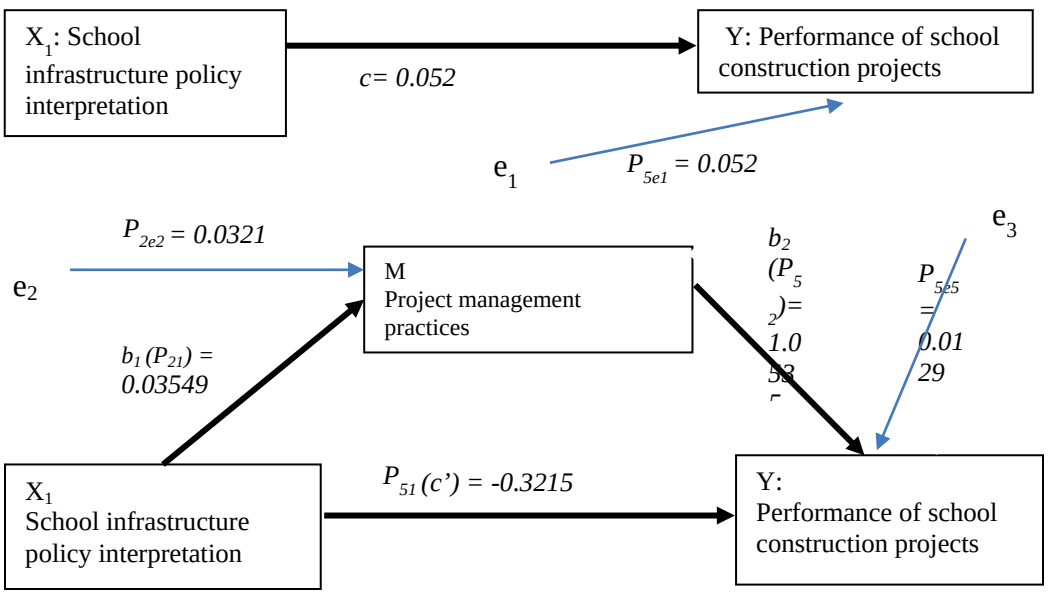

Figure 2: Path analysis model.

Figure 2 depicts the path coefficients for the model. The following hypothesis was tested:

H_O: X has no influence on Y. $H_O: p_{51} = 0$

H_A: X has a significant influence on Y. $H_A: p_{51} \neq 0$

With the value of p_{51} = -0.3215, p< 0.001, **H_O** was rejected and **H_A** accepted. Policy interpretation was found to exert a significant influence on the performance of construction projects when project management practices are in the model as a mediator.

CONCLUSION

The results show that the direct relationship between school infrastructure policy interpretation and performance of construction projects is moderate negative and linear. This indicates that when school infrastructure policy interpretation improves and the policy is better understood, the performance of construction projects reduces taking into account changes in project management practices. This can be attributed to resource requirements aspect of policy interpretation. When the policy is properly interpreted, the resource and costs required to implement it and comply with its requirements at the school become clear. These costs add on to project costs resulting to an increase in the overall project costs which in turn may cause a reduction in project performance such as mounted projects delaying to complete and new projects delaying to start due to an increase in the projects' budgets.

The study further concludes that school infrastructure policy interpretation has a significant positive indirect relationship with the performance of construction projects through project management practices. When project management practices are taken out of the model there is no significant relationship between policy interpretation and performance of construction projects. This explains that school infrastructure policy works by influencing the project management practices that school management uses to implement school construction projects. Since policies tend to be restrictive, controlling, and often set standards to be met, school management adjust their project management practices in light of policy requirements and in some cases, in anticipation of new policy requirement. These changes in project management practices affect the number of projects mounted, speed of project implementation, number of projects completed, and number of projects delayed among other project performance parameters hence the positive indirect effect. The insignificant total effect of school infrastructure policy interpretation on the performance of construction projects aligns with reality in that, when there are no project management practices in the school, it follows that there are no projects being implemented.

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Annexe: Data collected from the field

This section presents the data that was collected from the field

1. Performance of Construction Projects

The following indicators were used to measure the performance of construction projects: realization of set standards, the realization of planned deliverables, completed projects' variance from the initial plans, the functionality of completed projects, end-user satisfaction and, construction team satisfaction with the completed projects. Quantitative data on the variable was collected by questionnaires administered on head teachers. To collect quantitative data, the questionnaire used 10, 5-point Likert type items to measure the performance of construction projects at an interval scale with Strongly Agree (SA)=5, Agree (A)=4, Not sure (NS)=3, Disagree (D)=2 and Strongly Disagree (SD)=1. Quantitative data was analyzed into frequency distributions. The mean, the standard deviation and the composite mean were computed. An open-ended question was also used. The data is presented in Table 1.

Table 1

Performance of Construction Projects

	Statements	SA	A	NS	D	SD	MEAN	STDV
1	All of the school construction projects completed in my school have realized their planned standards (+)	78 (31.6%)	105 (42.5%)	41 (16.6%)	4 (1.6%)	19 (7.7%)	3.89	1.110
2	The school construction projects completed in my school have realized their planned deliverables (+)	56 (22.7%)	57 (23.1%)	57 (23.1%)	47 (19.0%)	30 (12.1%)	3.25	1.326
3	Most of the construction projects in the school are completed with minimal variance from the initial plan (+)	2 (0.8%)	42 (17.0%)	12 (4.9%)	134 (54.2%)	57 (23.1%)	2.18	1.002
4	All completed infrastructural projects have attained the intended functionality (+)	30 (12.1%)	97 (39.3%)	57 (23.1%)	3 (1.2%)	60 (24.3%)	3.14	1.360
5	In some cases, teachers were not satisfied with the projects' outcome (-)	4 (1.6%)	45 (18.2%)	33 (13.4%)	105 (42.5%)	60 (24.3%)	3.70	1.079
6	School managementhas expressed satisfaction with the project outcome of construction projects in the school (+)	30 (12.1%)	151 (61.2%)	44 (17.8%)	19 (7.7%)	3 (1.2%)	3.75	0.811
7	There have been some cases where the project design team has expressed dissatisfaction with the project outcome of some school construction projects (-)	75 (30.4%)	153 (61.9%)	1 (0.4%)	18 (7.3%)	0 (0%)	1.85	0.760
8	There have been some cases where contractors have expressed dissatisfaction with the project outcome of the school construction projects they were implementing (-)	76 (30.8%)	153 (61.9%)	0 (0%)	16 (6.5%)	2 (0.8%)	1.85	0.786
9	Some school construction projects undertaken by the school have received negative MoEHS inspection reports (-)	77 (31.2%)	151 (61.1%)	1 (0.4%)	16 (6.5%)	2 (0.8%)	1.85	0.792
10	We have not had cases where projects being implemented were discontinued for failure to comply with standards (+)	81 (32.8%)	143 (57.9%)	7 (2.8%)	13 (5.3%)	3 (1.2%)	4.16	0.809
	Composite mean and standard deviation						**2.96**	**0.983**

Notes: n =247. Negative items are reverse scored.

2. Policy Interpretation

In this study, policy interpretation was measured using the following indicators: policy interpretation guidelines, stakeholder attitude on the policy, regulatee's policy sensitization, policy interpretation disputes and regulatees' perceived policy ambiguity. Data on the variable were collected through 10 Likert type questionnaire items administered on head teachers using the scale: Strongly Agree (SA)=5, Agree (A)=4, Not sure (NS)=3, Disagree (D)=2 and Strongly Disagree (SD)=1; and semi-structured interviews with DEOs. One open-ended question was also used. The data is presented in Table 2.

Table 2

Policy Interpretation.

	Statements	SA	A	NS	D	SD	MEAN	STDV
1	In as far as I know, there are no policy interpretation guidelines for the MoEHS school infrastructure policy (-)	2 (0.8%)	26 (10.5%)	40 (16.2%)	85 (34.4%)	94 (38.1%)	3.98	1.020
2	I don't have the entire policy as it exists in different policy documents some of which I don't have a copy (-)	162 (65.6%)	65 (26.3%)	14 (5.7%)	0 (0%)	6 (2.4%)	1.47	0.810
3	Of the primary Head Teachers I know, most of them believe the school infrastructure policy is good for the school (+)	80 (32.4%)	78 (31.6%)	38 (15.4%)	44 (17.8%)	7 (2.8%)	3.73	1.174
4	I have been trained /educated/sensitized on the school infrastructure policy (+)	1 (0.4%)	24 (9.7%)	61 (24.7%)	72 (29.1%)	89 (36.1%)	2.09	1.014
5	My school complies with all the requirements of the school infrastructure policy (+)	4 (1.6%)	62 (25.1%)	0 (0%)	170 (68.8%)	11 (4.5%)	2.51	0.971
6	I am conversant with the content of the school infrastructure policy (+)	16 (6.5%)	7 (2.8%)	56 (22.7%)	91 (36.8%)	77 (31.2%)	2.17	1.101
7	I know of some existing disputes / litigations/adjudications regarding the school infrastructure policy (-)	18 (7.3%)	13 (5.3%)	64 (25.8%)	92 (37.3%)	60 (24.3%)	3.66	1.122
8	There are some clauses in the policy that have more than one interpretation (-)	14 (5.7%)	11 (4.5%)	48 (19.4%)	91 (36.8%)	83 (33.6%)	3.88	1.100
9	There are some aspects of school construction projects that are not covered in the infrastructure policy(-)	14 (5.7%)	52 (21.1%)	95 (38.5%)	56 (22.6%)	30 (12.1%)	3.15	1.064
10	I find the school infrastructure policy easy to apply (+)	84 (34.1%)	110 (44.5%)	23 (9.3%)	28 (11.3%)	2 (0.8%)	4	0.982
	Composite mean and standard deviation						**3.069**	**1.0707**

Notes: n =247. Negative items are reverse scored.

3. Project Management Practices

Project management practices were indicated by stakeholder involvement in project identification, stakeholder participation in design and planning, project financing sources and, close-out practices after completion. It was measured using 10 Likert-type items on the following scale: Strongly Agree (SA)=5, Agree (A)=4, Not sure (NS)=3, Disagree (D)=2 and Strongly Disagree (SD)=1. Data was collected from head teachers and DEOs in the sampled districts. Responses for the individual items were analyzed into a frequency distribution and the mean, standard deviation and composite mean calculated. The results are shown in Table 3.

Table 3

Project Management Practices

	Statements	SA	A	NS	D	SD	MEAN	STDV
1	Most of the projects we undertake are identified by our stakeholders (+)	0 (0%)	0 (0%)	2 (0.8%)	119 (48.2%)	126 (51.0%)	1.50	0.517
2	We do not consult with stakeholders when selecting projects (-)	7 (2.8%)	161 (65.2%)	0 (0%)	78 (31.6%)	1 (0.4%)	2.62	0.976
3	We do not engage experts to design the projects (-)	7 (2.8%)	169 (68.5%)	0 (0%)	70 (28.3%)	1 (0.4%)	2.55	0.948
4	We always involve our stakeholders in project planning (+)	57 (23.1%)	123 (49.8%)	13 (5.3%)	9 (3.6%)	45 (18.2%)	3.56	1.372
5	We engage the community to finance school construction projects (+)	75 (30.3%)	115 (46.6%)	37 (15.0%)	20 (8.1%)	0 (0%)	3.99	0.883
6	MoEHS has financed most of the school construction projects in my school in the last five years. (+)	0 (0%)	0 (0%)	7 (2.8%)	119 (48.2%)	121 (49.0%)	1.54	0.554
7	As the Head Teacher, I oversee all project implementation activities for school construction projects in the school (+)	75 (30.3%)	135 (54.7%)	37 (15.0%)	0 (0%)	0 (0%)	4.15	0.657
8	We do not engage external parties to implement school construction projects in the school (-)	6 (2.4%)	4 (1.6%)	50 (20.2%)	73 (29.6%)	114 (46.2%)	4.15	0.963
9	As the Head Teacher, I ensure that the work site has been fully cleaned up before accepting the project as completed (+)	102 (41.3%)	115 (46.6%)	28 (11.3%)	2 (0.8%)	0 (0%)	4.28	0.693
10	School construction projects completed are not inspected against the school infrastructure policy requirements for compliance before being accepted (-)	10 (4.1%)	166 (67.2%)	0 (0%)	70 (28.3%)	1 (0.4%)	2.54	0.961
	Composite mean and standard deviation						**3.09**	**0.852**

Notes: n =247. Negative items are reverse scored.

The Effects of Indonesian Macroeconomic Indicators and Global Stock Price Index on the Composite Stock Prices Index in Indonesia

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Abstract- This study was to analyze the effect of Gross Domestic Product (GDP), the rupiah exchange rate against the US dollar, inflation, interest rates, Dow Jones Index, BSE Sensex Index, Nikkei-225 Index, and Shanghai Index on the composite stock prices index in Indonesia. The study used secondary data obtained from www.yahoo.finance.com, Central Bank of Indonesia, and the Indonesian Central Bureau of Statistics. Data was collected in the quarter period from January 2010 - December 2018 with 36 data numbers per each variable. Multiple linear regression analysis technique was used for the analytical method. The results showed GDP, exchange rates, the Shanghai index had a significant positive effect, the Nikkei-225 index had a significant negative effect to the JCI. Inflation, interest rates, and the BSE Sensex index had insignificant negative effect to the JCI. The variables that were worthy of consideration for investors in purchasing shares on the Indonesia Stock Exchange were GDP, the rupiah exchange rate against the US dollar, the Dow Jones index, the Nikkei-225 index, and the Shanghai index because it significantly affects the JCI. The suggestion for further research was to include other economic variables such as the money supply, unemployment rate, and stock indices of developing countries.

Index Terms- Indonesian Macro Economic Indicators, Global Stock Index, Indonesian composite of stock price index

I. Introduction

Investment is an activity to place funds both in financial and non-financial instruments to obtain an increase in investment value (Balagobei, 2017). Stock is one form of investment in the capital market that provides two benefits, namely capital gains and dividends (Khajar, 2015). The movement of shares in the capital market can be seen from the stock index. The stock index fluctuates in accordance with internal and external conditions of a country. External influences are caused more by global factors due to globalization especially in the field of trade and international economic cooperation. Fundamental analysis is needed to forecast stock performance before investors engage in investment activities (Baresa *et al.,* 2013). Stock valuation analysis must be considered several macroeconomic variables that affect a company's ability to generate profits (Tandelilin, 2010). There are three stages in fundamental analysis, namely the analysis of macroeconomic factors that affect the performance of the entire company, followed by industry analysis, and company analysis to find out whether the securities issued are profitable or detrimental (Tandelilin, 2010).

The research was conducted by Chia Liang *et al* (2013) showed a positive short-term and long-term relationship between exchange rates (US Dollars) and stock prices in five ASEAN countries. The significant influence of the macro economy on the stock index is largely determined by the fundamental conditions of the country and the relationship of one country to another. Comprehensive research related to the influence of macroeconomic variables on the index of composite stock prices in Malaysia, America and China have been carried out by Acikalin *et al* (2008); Geetha *et al* (2011); Chia Liang *et al* (2013); Duy (2015); Balagobei, (2017). The results of the study indicate that macroeconomic indicators such as inflation and interest rates negatively affect stock prices, while the exchange rate and GDP have a positive effect on stock prices. Fluctuations due to external conditions occur because of liberalization process in investment. Investment liberalization implies an increasingly connected Indonesian capital market with foreign capital markets, both regionally and globally (Tarigan *et al*., 2015). The liberalization process occurs because of the existence of trade and economic cooperation relations between countries that influence each other in accordance with the proportion of economic dependence. The dynamic condition of the capital market is one of the main indicators of economic changes in the world as reflected in the index of share prices of each country. The movement of index value is one of the factors that can be used in analyzing the level of capital market integration between countries (Tarigan *et al.,* 2015).

Based on the background and previous research that there are differences of opinion among researcher is interested to further analyze the "The Effects of Indonesian Macroeconomic Indicators and Global Stock Price Index on the Composite Stock Prices Index in Indonesia".

II. Literature Riview and Hypothesis

1.1 Investation

Investment is one component of aggregate expenditure, so an increase in investment will increase aggregate demand, national income and employment opportunities. Investment can be divided into two, namely investment in financial assets and investment in real assets (Wiksuana, 2017). Stock is one of the financial market instruments carried out in the capital market (Mark, 2017). The goal is to get a return on investment in the form of dividends and capital gains. Investment theory states "high risk high return, low risk low return". Risk is a form of uncertainty about an investment. Uncertainty is intrinsically contained in every economic activity (Wild & Wild, 2012). The risks faced in every investment decision require investors to be careful and conduct careful analysis and consideration in making stock investments.

2.2 Fundamental Analysis

The prospect of the company depends on the overall economic situation. Stock valuation analysis must be considered several macroeconomic variables that affect a company's ability to generate profits. Top-down analysis can be done by investors in stock valuation to determine the company's prospects.

2.2.1 Economic and Capital Market Analysis

Economic analysis is carried out because of the tendency for a strong relationship between what happens in the macroeconomic environment and the performance of the capital market. The purpose of macroeconomic analysis is to make an allocation of funds investment decisions in the form of shares in several countries or in the country. The ability of investors to understand and forecast macroeconomic conditions is very useful in making investment decisions (Baresa *et al*., 2013). The macroeconomic variables that are worthy of analysis are Gross Domestic Product (GDP), Inflation, Rupiah exchange rate against the US dollar, and interest rates.

2.2.2 Industrial Analysis

Industrial analysis aims to compare the performance of various industries to find out the types of industries that provide the most promising prospects (Jones, 2013). Industrial analysis is important to minimize risks and identify industries that have profitable prospects. Assessing the industry can be done through two steps, namely first estimating expected earnings per share (EPS) from the industry and the second estimating the expected price earnings ratio (P / E) (Jones, 2013). The factor that influences the amount of profit obtained by an industry is the intensity of competition in the industry. The intensity of competition determines the ability of the industry to still obtain a rate of return above the average.

2.2.3 Company Analysis

Analysis of the company provides an overview of company value, internal characteristics, company quality, management performance, and future company prospects (Jones, 2013). The results of the analysis of company shares are then compared between intrinsic value and market value. Stocks are said to be undervalued and are worth buying if the market value is lower than the intrinsic value. Information on financial statements issued by companies is one of the easiest and cheapest types of information obtained in conducting company analysis. Information of financial statement is enough to describe the development of the condition of the company so that investors can calculate the amount of earnings growth that the company has achieved against the number of company shares (Baresa *et al*., 2013).

2.3 Integration of Economic and World Capital Market

The world economic and financial system is increasingly integrated with the expansion of international trade in commodities, services, and financial assets. The linkage between trade in commodities and services arises from the existence of export-import activities carried out by almost all countries, both regional and global. All countries try to remove trade barriers related to the flow of capital, goods and services. Policies to strengthen economic cooperation are carried out by eliminating discrimination, uniting policies related to various instruments, such as import duties, taxes, currency, laws, standardization so that global economic integration slowly occurs (Wild & Wild, 2012). Integration of international trade triggers financial integration with an increasing trend (Tadaki *et al*., 2016). The dynamics of capital markets are one of the main indicators in changing the economy in the world (Putyinceva *et al*., 2016). According to Wild & Wild (2012) the formation of economic integration has an impact on reducing the boundaries in the flow of products, labor, and capital on an international scale. In a cointegration relationship between capital markets there is a causal relationship where changes in one capital market will affect other capital markets or influence each other (Chia Liang *et al*., 2013). Integrated capital markets between countries have several advantages, including the increase of foreign investment which also increases the value of shares.

Based on the background, literature review, and previous research, the following hypotheses can be formulated:

H1: Gross Domestic Product (GDP) has a significant positive effect on the Indonesian Of Composite Stock Prices Index.

H2: The rupiah exchange rate against the US dollar has been positively to the Indonesian Of Composite Stock Price Index.

H3: Inflation has a significant negative effect on the Indonesian Of Composite Stock Price Index.

H4: Interest rates have a significant negative effect on the Indonesian Of Composite Stock Price Index.

H5: The Dow Jones Index has a significant positive effect on the Indonesian Of Composite Stock Price Index.

H6: The BSE Sensex Index has a significant positive effect on the Indonesian Of Composite Stock Price Index.

H7: The Nikkei_225 index has a significant positive effect on the Indonesian Of Composite Stock Price Index.

H8: The Shanghai Index has a significant positive effect on the Indonesian Of Composite Stock Price Index.

III. Research Method

This type of research is associative/explanatory research that aims to test the hypothesis of the influence of independent variables on the dependent variable. The independent variable in this study is Indonesian composite stock prices index. The independent variable consists of the Dow Jones index (American), the BSE Sensex index (India), the Nikkei_225 index

(Japan), and the Shanghai (Chinese) index. The source of research data is secondary data obtained from www.finance. yahoo.com for Dow Jones index data, BSE Sensex index, Nikkei_225 index, Shanghai index. Gross Domestic Product Data obtained from www.bps.go.id. Data on IDR / US exchange rates, inflation and interest rates are obtained from www.bi.go.id. The population in this study is the Indonesian joint stock price index (CSPI). The method of collecting data is through a census by investigating population elements one by one. Data on Indonesia's macroeconomic indicators and global stock indices are taken quarterly for the 10-year period of 2010-2018.

IV. Results and Discussion

4.1 Results

The test results using multiple linear regression analysis indicated that the test value simultaneously (Test F) was 39,560 with a significance of 0,000. These results indicate that the regression model built can be used to predict the rise and fall of the JCI. The independent variables in this study have an effect simultaneously on the JCI.

Table 1. Statistical Test Results

Model		Unstandardized Coefficients Beta	Standardized Coefficients Beta	T	Sig.	Information
1	(Constant)	1716.597		1.262	.218	
	PDB	.003	.995	2.933	.007	Significant positive
	Exchange rate	.306	.705	2.318	.028	Significant positive
	Inflation	-74.222	-.136	-1.635	.114	No Significant
	Interest rate	-45.473	-.053	-.468	.644	No Significant
	Dow_Jones	.154	.741	1.740	.009	Significant positive
	Nikkei_225	-.009	-.045	-.123	.043	Significant negative
	BSE_Sensex	-.020	-.136	-.605	.550	No Significant
	Shanghai	.143	.085	.876	.038	Significant positive
F Test					0.000	Simultaneous effect
Adjusted R^2					0.960	

Table 1. Shows that the variable GDP, Exchange Rate, Dow Jones Index, Nikkei_225 index, and Shanghai index have significance α <0.05 and B coefficient shows the direction of the independent variable relationship with the index of the Indonesian joint stock price. Based on multiple linear regression analysis while the equations that can be built are as follows:

Y = 1716,597 + 0,003 GDP + 0,306 Exchange Rate - 74,222 Inflation - 45,473 Interest rate + 0,154 Dow Jones - 0,020 BSE Sensex - 0,009 Nikkei225 + 0,143 Shanghai + e

The coefficient of determination (R2) of 0.960 or 96.0% shows the variable GDP, Exchange Rate, Dow Jones Index, Nikkei_225 index, and the Shanghai index explains that IHSG changes of 96% and the remaining 4% were explained by other variables not included in this study.

4.2 Discussion

4.2.1 The Effect of Gross Domestic Product (GDP) on JCI

GDP has a significant positive effect on the JCI. The higher the GDP value of Indonesia, the higher of composite stock prices index in Indonesia will also be higher. The relationship of the variable moves in the same direction. The results of this study were in line with the research conducted by Lee *et al* (2006); Acikalin *et al* (2008); Singh *et al* (2011); Jiangang *et al* (2013); Jareno & Loredana (2016). The increasing number of consumer goods causes the economy to grow and increase the scale of the company's sales turnover, because people were consumptive. Increased sales turnover has an effect on increasing profits. The profits obtained by the company also increased so that it affected the JCI movement.

4.2.2 The Effect of the rupiah / US dollar exchange rate on the JCI

The Exchange Rate of Rupiah / US Dollar has a significant positive effect on the JCI. The higher the Exchange Rate of Rupiah / US Dollar Indonesia, Indonesian composite stock price index will also be higher, and vice versa. The relationship of the variable moves in the same direction. The results of this study were supported by Acikalin *et al* (2008); Geetha *et al* (2011); Tangjitprom (2012); Chia Liang *et al* (2013); Dar *et al* (2014); Alam & Kashif (2014); Oktarini (2016); Jamaludin (2017); Balagobei, (2017). The strengthening of the rupiah exchange rate against foreign currencies will reduce the cost of importing raw materials and reduce the prevailing interest rates. The company will get a bigger profit by exporting industrial products because of the increase in the value of the rupiah. This condition will encourage an increase in profits earned by the company so that it will automatically increase stock prices.

4.2.3 The Effect of inflation on the JCI

Inflation has a negative but not significant effect on the JCI. Changes in inflation value did not significantly change the JCI value. The relationship of the variable moves unidirectio nally. The general increase in prices of goods will have an impact on the decline in public consumption due to a decline in real income. Ozbay (2009) research results; Singh *et al* (2011);

Greeta *et al* (2011); Chia Liang *et al* (2013); Alam & Kashif (2014); Ahmad & Ramzan (2016); Jamaludin *et al* (2017); indicates that inflation has a negative effect on the composite stock prices index. The decline in people's purchasing power was detrimental to producers which causes a decrease in the company's production level. If the increase in production costs was higher than the price increase that can be enjoyed by the company, the company's profitability will decrease.

4.2.4 The Effect of interest rates on the JCI

Interest rates have a negative but not significant effect on the JCI. Changes in interest rates did not significantly change the JCI value. The relationship of the variable moves unidirectionally. Amarasinghe research results (2015); Vuong (2015); Wahyudi *et al*., (2017); Yin *et al*., (2017); Khan & Imran (2018) show that interest rates negatively affect the stock price index. When interest rates rise, the operating costs will also increase, thereby reducing the profitability of the company to make a profit. This condition did not provide prospects for investors in placing their funds in the capital market, consequently the stock price will decline.

4.2.5 The Effect of the Dow Jones index on the JCI

The Dow Jones index has a significant positive effect on the JCI. The relationship of the variable moves in the same direction. America was the second export destination after China. Indonesia-America's total trade in the last 5 years (2014-2018) recorded growth of 3.84% (Ministry of Trade, 2018). The total trade value in 2018 was 28,602,881.7 thousand US Dollars. The condition of the American economy was reflected through the Dow Jones index. Research results of Khajar *et al* (2015); Murti, 2017; Deitiana & Stela, 2009; Kartika *et al* (2012) showed that the Dow Jones Index had a positive and significant effect on the JCI.

4.2.6 The Effect of Sensex BSE index on JCI

BSE Sensex Index has a negative but not significant effect on the JCI. Changes in the BSE Sensex Index did not significantly change the JCI value. The relationship of the variable moves unidirectionally. The results of this study were in line with the results of research conducted in Asia by Horta *et al*, 2014 and Khajar, 2015 that the BSE Sensex index has an effect on the JCI. The results study of Kumar & Puja (2012) and Nisha (2017) state that the conditions of Indian macroeconomic fundamentals influence the Sensex BSE index according to the characteristics of the variable itself. The total trade between Indonesia and India over the past 5 years (2014-2018) recorded a growth of 5.31% (Ministry of Trade, 2018). The total trade value for 2018 was 18,742,588 thousand US Dollars. Indonesia's level of dependence on India was still quite low considering that export growth was smaller than imports so that if there was a turmoil on the Indian economy then Indonesia will not be significantly affected.

4.2.7 The Effect of the Nikkei_225 index on the JCI

The Nikkei-225 index has a negative and significant influence on the JCI. The relationship of the variable moves undirectionally. Changes in the Nikkei_225 index deserve consideration for investors to predict the condition of the JCI. The total trade between Indonesia and Japan over the past 5 years (2014-2018) recorded growth of -0.82% (Ministry of Trade, 2018). The total trade value in 2018 was 37,456,603.5 thousand US Dollars. Indonesia's level of dependence on Japan was still relatively high considering that export growth was smaller than imports so that if there was turmoil in the Japanese economy, Indonesia will be affected in the opposite direction. The results of the research by Harbi *et al* (2016); Oktariani (2016); Deitiana & Stela, 2009; Kusumawati & Nadia, 2017 showed the effect of the Nikkei 225 stock index, which negatively affected the JCI.

4.2.8 The Effect of the Shanghai index on the JCI

The Shanghai index has a positive and significant influence on the JCI. The relationship of the variable moves in the same direction. The total trade between Indonesia and China over the past 5 years (2014-2018) recorded growth of 11.63% (Ministry of Trade, 2018). The total trade value for 2018 is 72,664,763.1 thousand US Dollars. Indonesia's level of dependence on China was very high and Indonesia' was the main trading partner of China. The turmoil that occurred in China greatly influenced the economic condition of Indonesia which was proxied by the JCI. The results of this study were in line with the results of research conducted by (Sidiq, 2010; Khajar, 2015; Harbi *et al*., 2016; Murti, 2017).

V. Conclusion

The research model that was built was able to explain 96% related to the rise and fall of the IHSG and the remainder was explained by other variables not included in this study. Independent variables that were worthy of being taken into consideration for investors to purchase shares on the Indonesia Stock Exchange were Gross Domestic Product (GDP), the exchange rate of Rupiah / US dollar, Dow Jones index, Nikkei-225 index, and the Shanghai index. These variables significantly affect the movement of the JCI.

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Effect of Constructivist Teaching Method on Students' Academic Performance in Metalwork in Technical Colleges in Yobe State, Nigeria

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ABSTRACT

This study determined the effectiveness of Constructivist teaching method on students' performance in metalwork in technical colleges in Yobe State, Nigeria. The study adopted quasi-experimental research design in which intact classes were used. Two research questions were raised to guide the study, two hypotheses were formulated and tested at 0.05 level of significance. The sample size was 58 students selected from the two technical colleges in the state. The instrument used for data collection was Metalwork Performance Test (MWPT) which was validated by three experts with a reliability coefficient of 0.82. Mean was used to answer the research questions while ANCOVA was employed to test the hypotheses at 0.05 level of significance. The study found that students in experimental group performed higher than those in control group. This implies that constructivist teaching method is more effective than lecture method in teaching measurement and marking out; and drilling process. The study therefore recommended that Metalwork teachers should be trained to use constructivist teaching method; also the National Board for Technical Education should consider reviewing its curriculum to incorporate constructivist method of teaching her programs.

Key words: Constructivist, Teaching Method, Performance, Students, Metalwork

1.0 INTRODUCTION

The ability of Nigeria to realize the vision of becoming one of the twenty largest economies in the world is largely dependent on her capacity to transform her youth into highly skilled and competent citizens capable of competing globally (Eneh, 2011). A major part of the responsibility for preparing such a workforce rests on the nation's education sector. Therefore, to realize this vision and in order to be competitive in the global economy, Nigeria needs to develop the appropriate knowledge and skills (Federal Ministry of Education, 2012). Technical education is the foundation of nations' wealth and development. It is a type of education that is meant to produce semi-skilled, skilled and technical manpower necessary to restore, re-vitalize, energize, operate and sustain the national economy and substantially reduce unemployment (Ogumbe, 2015). Technical Education is a form of education involving in addition to general education the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of the economic and social life. Technical education is an aspect of education that leads to acquisition of practical and applied skills as well as basic scientific knowledge through training.

The goals of Technical Vocational Education and Training (TVET) as contained in National Policy on Education (FRN, 2013) are as follows:

i. Provide trained manpower in applied science, technology and business particularly at craft, advanced craft and technical level;

ii. Provide technical knowledge and vocational skill necessary for agricultural, commercial and economic development; and

iii. Give training and impart the necessary skills to individual for self-reliance economically

The above stated goals of TVET are expected to be achieved after technical education recipients undergo and receive proper training. Technical colleges train craftsmen in auto-mechanic, plumbing, carpentry and joinery, cabinet making, painting and decorating, fabrication and welding, electrical installation, radio and TV repair, building construction and a few other areas. On completion of the program the recipients can obtain work in industries, further their education or establish businesses of their own (NBTE, 2011). In technical colleges many subjects are incorporated to meet the requirement of various trades' e g metalwork. The methods of delivery of these trade related courses is the major concern as it is not like any other theoretical subjects. Metalwork is a practical process of transforming metals to form various shapes and sizes, parts, assemblies, or large-scale structures. The term covers a wide range of work from large ships and bridges to precise engine parts and delicate jewelry. It therefore includes a correspondingly wide range of skills, processes, and tools. Modern metalworking processes, though diverse and specialized, can be categorized as forming, cutting, or joining processes, furthermore today's machine shop includes a number of machine tools capable of creating precise and useful work piece.

According to United Nation Education Scientific and Cultural Organization, UNESCO (2001), on completion of metalwork module in technical college, the students should be able to;

1. Understand workshop safety rules and their application in handling and using hand tools, portable power tools and machine tools.
2. Know the physical properties, manufacturing process and application of ferrous and nonferrous metals in common use.
3. Select and use common measuring, marking out, cutting and striking tools.
4. Understand the basic working principles of drilling machine and be able to use it for various types of screws treads rivets, and be able to rivet and cut screws by hand. Understand the application of various types of screw threads and rivets, and be able to rivet and cut screws by hand.
5. Understand the ISO system of tolerances and fits, and their application in engineering production.
6. Produce simple engineering components using casting process.
7. Understand the essential features and working principles of the center lathe and carry out basic operations such as turning, stepped turning facing, taper turning, knurling, chamfering and undercutting.

The success in understanding and acquiring the above mentioned themes depend on the effectiveness of instructional method. The use of varieties of teaching methods is a must for teachers if learning is to be effective and efficient, and hence there is need for a good teacher to be multi-talented in other to be conversant with the use of various teaching methods in the teaching and learning process (Dorgu, 2015). Contrary to this speculation, most of teachers in technical college are becoming addicted to use of particular teaching method particularly lecture method of teaching.

The word *lecture* comes from the latin word *lectus*, from the 14th century, which translates roughly into "to read." It wasn't until the 16th century that the word was used to describe oral instruction given by a teacher in front of an audience of learners (Paris, 2014). Lecture method according to Mele (2018) is the art of telling factual information, principles and theories to audience without minding whether the audience understands the information being or not, and that learners are expected to add flesh on the principles or the theories on their own through personal research. In other words Lecture method of teaching is the one in which the teacher, or some other knowledgeable person supplies information to students. There is little or no students' participation, students are merely required to listen and understand the information being given and that is why is also called teacher centered (Okoro, 1993). In other words it is an instructional method where an instructor who possesses the knowledge on a given topic delivers all relevant information to students verbally. During a typical lecture, an instructor stands before a class and present information for the students to learnt (Kelley, 2018).

This method of teaching according to Center for Instructional Development and Distance Education CIDDE (2014) provides an economical and efficient method for delivering substantial amounts of information to large numbers of student; it offers current information (more up to date than most texts) from many sources; and provides a summary or synthesis of information from different sources as well as creating interest in a subject as lecturers transmit enthusiasm about their discipline. In term of effectiveness, lecture method being the most widely practicing method of teaching had been found to be less effective in students' academic achievement compare to other method of instruction (Oviawe, 2010; Ameh & Dantani, 2012; Musa & Hassan, 2015). Center for Instructional Development and Distance Education (2014) proposed the following hints to be observed for a successful delivering of lecture;

i. Present an outline of the lecture (use the blackboard, overhead transparency or handout) and refer to it as you move from point to point.
ii. Repeat points in several different ways. Include examples and concrete ideas.
iii. Use short sentences.
iv. Stress important points (through your tone or explicit comments).
v. Pause to give listeners time to think and write.
vi. Use lectures to complement, not simply repeat, the text.
vii. Learn students' names and make contact with them during the lecture.
viii. Avoid racing through the last part of the lecture. This is a common error made by instructors wishing to cram too much information into the allotted time.
ix. Schedule time for discussion in the same or separate class periods as the lecture.
x. Prepare because preparation reduces stress, frustration, insecurity and consequent ineffectiveness.

Constructivist views learning as a constructive process in which the learner is building an internal illustration of knowledge, a personal interpretation of experience. This representation is flexible always open to modification and not rigid, its structure and linkages forming the ground to which other knowledge structures are attached to. Learning is then an active process in which experience has an important role to play in understanding and grasping the meaning of a particular concept (Amineh & Hanier, 2015). They further stated that this view of knowledge does not necessarily reject the existence of the real world, instead it agrees that reality places constrains on the existing concepts, and contends that all individuals' knowledge of the world is the interpretations of their experiences. According to Khalid and Azeem (2012) the constructivist teacher help the students through problem-solving and inquiry-based learning activities with which students formulate and test their ideas, draw conclusions and inferences, and pool and convey their knowledge in a collaborative learning environment. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically ingesting knowledge from the teacher or the textbook. The task of the instructor is to translate information to be learned into a format appropriate to the learner's current state of understanding.

Peter and William (1999) stated that constructivist instructional approach is applicable to teaching of technical education, where students are expected to acquire reliable knowledge and skills. The approach according them emphasize the ability of individuals to construct similar, if not identical, mental models based on similar or identical experiences, this conformed to the requirement of technology education. Olufemi (2008) opined that the constructivist pedagogy could be a better choice if some or all of the following conditions prevailed;

1. The roles of the teacher will not be that of transferring knowledge or 'pouring' in some facts to the learner but in acting as a facilitator who encourages learner by giving tasking activities, organize and set probing questions and experiments while the learner is left to interact with available resources to find meaning of the 'real' world.
2. When course contents are arranged and structured to encourage learner to be left most times alone to have deep understanding of concepts with little and intermittent input from the tutor as demanded of the course goals.

3. In the case where the Centre focus of learning emphasizes the roles of the learner in evaluation and assessment; undertaking tasks, searching knowledge in the sea of information on the net and when sieving information and ideas in order to come up with fresh insight remains the focus of learning activities.

Constructivism promotes social and communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas. Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Students must therefore exchange ideas and so must learn to negotiate with others and to evaluate their contributions in a socially acceptable manner. This is essential to success in the real world, since they will always be exposed to a variety of experiences in which they will have to cooperate and navigate among the ideas of others. Abbas and Karema (2014) opined that this approach has some advantages compare to traditional approach to the sense that it:

i. Makes the learner focus of the educational process by activating the role of learner discovers and looking and performs activities.
ii. Allows the learner the opportunity to debate and dialogue with fellow learners or with the teacher in order to assist the growth of the language of dialogue and make him active.
iii. Links between science and technology, which gives learners the opportunity to see the importance of science for society and the role of science in solving the problems of society.
iv. Makes learners think in a scientific way.
v. Encourages constructivist learning model to develop a spirit of cooperation and work as a team

Constructivism promotes social and communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas. Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Peter, Abiodun and Oke (2010), Akanwa and Ovute (2014) and Duyilemi and Bolajoko (2014) observed that, students perform better when taught using constructivist method of teaching than the conventional methods of teaching technical subjects. Musa and Hassan (2015), Oguguo (2015) and Ndubuisi (2016) also confirm that, constructivist method of teaching use to be more effective in terms of performance than the conventional methods of teaching.

Despite the huge investment by Nigerian government on technical colleges program aimed at improving the image and performance of technical college students, the performance of the students in metalwork has not been encouraging specifically in Yobe state. One of the technical colleges in Yobe state has the following performance in Metalwork NABTEB examination from 2014 to 2016. In 2014 only 65 students sat for the examination and 38 % passed while 62% failed; in 2015,only 38 students sat for the examination 37% passed and 63% failed; and in year 2016, only 39 students sat for the examination 30% passed and 70% failed. This indicates serious decline in academic performance in the subject.

This persistent poor performance has been partly ascribed to inadequate teaching and instructional methods adopted by technical teachers, and that is why NABTEB chief examiner in his report after May/June 2017 marking exercise suggested that technical teachers should consider other teaching methods in teaching technical subjects (NABTEB, 2017). So it is evident that the subject cannot thrive without appropriate instructional methods. As such, exploring the most effective method between constructivist teaching method and lecture method to teach the subject became a major concern.

1.1 Purpose of the Study

The main purpose of this study is to determine the effect of constructivist teaching method on the academic performance of metalwork students in technical colleges in Yobe state. Specifically, the study intended to;

1. Determine the effect of constructivist method of teaching on the academic performance of students when taught measurement and marking out in metalwork fabrication in technical colleges in Yobe State;
2. Determine the effect of constructivist method of teaching on academic performance of metalwork students when taught drilling process in metalwork fabrication in technical colleges in Yobe state.

1.2 Research Questions

1. What is the performance of metalwork students taught measurement and marking out with constructivists' teaching method and those taught with lecture method in technical colleges in Yobe State?
2. What is the performance of metalwork students taught drilling process with constructivists' teaching method and those taught with lecture method in technical colleges in Yobe State?

1.3 Research Hypotheses

$H0_1$ There is no significant difference in the mean performance of metalwork students taught measurement and marking out with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State.

$H0_2$ There is no significant difference in the mean performance of metalwork students taught drilling process with constructivists' teaching approach and those taught with lecture method in technical colleges in Yobe State.

2.0 METHODOLOGY

The design for the study was quasi-experimental pretest, post-test non-equivalent control group. The design was chosen and considered appropriate for the study because school authorities will hardly allow the researcher to disrupt their normal school setting. Creswell (2012) stated that in such a situation researchers must have to use intact groups since they cannot artificially create groups for the experiment. The geographical area of the study is Yobe State, which is located in Northeastern part of Nigeria. The target population for the study 74 which consists of NTC II in all Government Science and Technical Colleges that are offering metalwork. This covered students from three Government Science and Technical College located in Potiskum, Damagum and Geidam. Purposive sampling technique was employed to sample out 58 NTC II students.

The instrument used for data collection was a Metal Work Performance Test (MWPT) multiple choice test items that consists two sections A and B. Each section has 20 questions making a total of forty (40) researcher-made objective questions. Section A asked questions on measurement and making out while section B on drilling process. The instrument was validated by two experts from Modibbo Adama University of Technology Yola to check the adequacy of the content, logical sequence and suitability of the technical terms used. To ensure a reliability of the instrument test-retest procedure was employed and reliability coefficient of 0.82 was obtained using product moment correlation coefficient. The scores obtained from the pre-test and post-test was analyzed using mean and standard deviation to answer the research questions, while Analysis of covariance (ANCOVA) was used for testing the null hypotheses at 0.05 level of significance. Any group with higher mean in the performance test was taken to have performed better and the method used in teaching them was equally considered better. While for the hypotheses if the p-value is less than 0.05, the null hypothesis was rejected. Alternatively if the p-value is greater than or equal to 0.05, the null hypothesis was accepted.

3.0 Results

3.1 Research Question 1

What is the academic performance of metalwork students taught measurement and marking out with constructivists' teaching method as experimental and those taught with lecture method as Control in technical colleges in Yobe State?

Table 1

Means Performance Score and Standard Deviations of Pretest and Posttest of Experimental and Control Groups on measurement and marking out

Group	Symbol	Pre-test	Post-test	Mean Gain
Experimental Group (Constructivists Method)	N	33	33	
	$\bar{X}$	5.06	13.82	8.76
	SD	1.52	2.11	
Control Group (Lecture Method)	N	25	25	
	$\bar{X}$	4.96	9.92	4.96
	SD	1.37	2.59	

N = Number of Subjects; $\bar{X}$ = Mean and SD = Standard Deviation

Table 1 shows that prior to the use of constructivist method in the teaching of measurement and marking out to metalwork students in the experimental group, the mean score was 5.06 while the standard deviation was 1.52. The control group has a pretest mean score of 4.96 and the standard deviation of 1.37. The standard deviation of 1.52 for the experimental group and 1.37 for the control group indicates that there is slight variation in test scores of experimental group than in control group. But after the treatment which was teaching the students, the posttest mean scores for the experimental students is 13.82 while for the control group is 9.92 with the standard deviation of 2.11 and 2.59 respectively. The table also shows that the mean gain difference was 8.76 for experimental group and 4.96 in lecture method. This implies that the students taught measurement and marking out with constructivist teaching method performed better in the achievement test than those taught with lecture method. The result shows that constructivist teaching method is the better method in teaching measurement and marking out compared to lecture method.

3.2 Research Question 2

What is the academic performance of metalwork students taught drilling process with constructivists' teaching method as experimental and those taught with lecture method as Control in technical colleges in Yobe State?

Table 2

Means Performance Score and Standard Deviations of Pretest and Posttest of Experimental and Control Groups on Drilling process

Group	Symbol	Pre-test	Post-test	Mean Gain
Experimental Group (Constructivists Method)	N	33	33	
	$\bar{X}$	4.21	11.79	7.58
	SD	0.96	1.95	
Control Group (Lecture Method)	N	25	25	
	$\bar{X}$	3.96	8.88	4.92
	SD	1.43	2.15	

N = Number of Subjects; $\bar{X}$ = Mean and SD = Standard Deviation

Table 2 shows that, in drilling process section of MWAT, experimental group have a pre-test mean score of 4.21 with a standard deviation of 0.96, while the control group has a pretest mean score of 3.96 and a standard deviation of 1.43. There is closeness in the test scores in experimental group than in control group based on standard deviation of 0.96 for the experimental group as against 1.43 for the control group. In post-test, the mean scores for the experimental group was 11.79, while for the control group it was an increased to 8.88. But despite the increased it was low when compared with the mean of experimental group. The table also shows that the mean gain difference was 7.58 for experimental group and 4.92 in control group. This implies that the students taught drilling process with constructivist teaching method performed better in the achievement test than those taught with lecture method. The finding proves that constructivist teaching method is the better method in teaching drilling process compared to lecture method.

3.3 Hypothesis 1

There is no significant difference in the mean academic performance of metalwork students taught measurement and marking out with constructivists' teaching method and those taught with lecture method in technical colleges in Yobe State.

Table 3

Analysis of Covariance of the Mean Performance Scores of Students Taught Measurement and Marking out with two different teaching method

Source of Variance	Sum of Squares	DF	Mean Square	F	Sig. of F (p-value)
Corrected Model	216.15[a]	2	108.08	19.51	.00
Intercept	618.82	1	618.82	111.69	.00
Pretest (Covariate)	.004	1	.004	.001	.98
Group (Teaching Methods)	215.95	1	215.95	38.98	.00
Error	304.75	55	5.54		
Total	9066.00	58			
Corrected Total	520.90	57			

Table 3 reveals that the F value of pretest is 0.001 with significant of F at 0.98 which is greater than 0.05 indicating that there is no significant different in the covariate. The F-calculated value for teaching methods (1, 55) is 38.98 with p-value of 0.00. Since the p value of 0.00 is less than 0.05, the null hypothesis is therefore rejected. Hence, there is significant difference between the mean performance of students taught measurement and marking out with constructivist teaching method and those taught with lecture method. It means that there is a significant different in effectiveness of constructivist and lecture teaching method in teaching measurement and marking out.

3.4 Hypothesis 2

There is no significant difference in the mean academic performance of metalwork students taught drilling process with constructivists' teaching method and those taught with lecture method in technical colleges in Yobe State.

Table 4

Analysis of Covariance of the Mean Performance Scores of Students Taught Drilling Process with two different teaching methods

Source of Variance	Sum of Squares	DF	Mean Square	F	Sig. of F (p-value)
Corrected Model	124.12[a]	2	62.06	14.95	.00
Intercept	386.06	1	386.06	93.00	.00
Pretest (Covariate)	3.84	1	3.84	.93	.34
Group (Teaching Methods)	114.39	1	114.39	27.56	.00
Error	228.31	55	4.15		
Total	6789.00	58			
Corrected Total	352.43	57			

Table 4 reveals that the F-calculated value of pretest (that the covariate) is 0.93 with p-value of 0.34 which is greater than 0.05. This shows that there is no significant different in the pretest. The table also reveals that F-calculated value for teaching methods (1, 55) is 27.56 with p-value of 0.00. Since the p value of 0.00 is less than 0.05, the null hypothesis is therefore rejected. Meaning there is significant difference between the mean performance of students taught drilling process with constructivist method and those taught with lecture method. This shows that there is a significant different in effectiveness of constructivist and lecture teaching method in teaching drilling process.

4.0 Major Findings

The following are major findings emerged from the study:

1. Constructivist teaching method is better than lecture method in teaching measurement and marking in technical colleges in Yobe State.
2. Constructivist teaching method is better than lecture method in teaching drilling process in technical colleges in Yobe State.
3. There is a significant different in effectiveness of constructivist and lecture teaching method in teaching measurement and marking out.
4. There is a significant different in effectiveness of constructivist and lecture teaching method in teaching drilling process.

4.1 Discussion of Findings

The main concern of the study was to determine the effectiveness of constructivist teaching method. This was done by determining which among the two methods (constructivist and conventional lecture) of instructional delivery is better for metalwork related courses. Both research questions one and two are talking about the two methods, therefore the two questions can be discussed concurrently. The findings revealed that, the constructivist method of teaching performed better than the conventional lecture method in the two research questions. This is because the mean achievement for experimental group is higher than that of control group in all cases. This therefore agree with the findings of Petet, Abiodun and Oke (2010), Akanwa and Ovute (2014), Duyilemi and Bolajoko (2014), Musa and Hassan (2015), Oguguo (2015) and Ndubuisi (2016) who found that, constructivist method of teaching is better than the conventional method of teaching and learning practical related subjects.

This was also confirmed by the results of the hypotheses which showed that, there is significant difference in the mean performance of the students that were taught using constructivist method and that of conventional methods in the favour of constructivist method. All the studies reviewed showed that constructivist method of teaching is always better than that of conventional (lecture) method in teaching and learning technical subjects.

The implication of this finding is that constructivist teaching method, in which students are actively engaged in teaching and learning process is more effective than lecture method in enhancing students' achievement on measurement and marking out of metalwork concepts and also drilling process.

4.2 Conclusion

The study found out that, the use of constructivist teaching method is more effective compared to lecture method in improving the academic performance of metalwork students in technical colleges. Drawing from the findings of this study, it can be concluded that for metalwork students to do well, constructivist method should be employed in teaching metalwork. This will motivate and promote the interest of the students in terms of achieving good results. It will also encourage parents, and teachers would be proud of using the method as an effective means of teaching Metalwork. Moreover, base on this study, there is a dare need for metalwork teachers in the technical college to develop interest in using constructivist teaching method to teach metalwork related subjects.

4.3 Recommendations

In line with the findings of this study, the researcher proffered the following recommendations:

1. Metalwork teachers should be trained to adopt constructivist instructional teaching method for teaching technical related subjects in schools.
2. There should be training and re-training opportunities for the technical teachers through in-service training or workshops/ seminars on regular basis.
3. National Board for Technical Education (NBTE) should consider review of curriculum for National Technical Certificate in order to incorporate constructivist instructional technique as a method of teaching technical courses.

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Development of Information System for a University

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Abstract- Information systems plays a major role in contemporary university. In a university, the management of student information is tedious and boring and it is needed to be computerized. The achievements in the education and the science areas depend on the computerization of the activities of university. The student information system of a university stores and tracks all student data which are needed by the faculty and staff to manage the operations of the university. Information such as grades, attendance records, admission information, and financial aid are tracked through these platforms. This paper presents the development of student information system for a university using ADO.Net technology and Microsoft SQL to help faculty and staff to manage the university operations.

Index Terms- Information System, University Information System, University operations, ADO .net technology,

I. INTRODUCTION

Information that an institution collects or gathers would help making decisions that would benefit their organization in the era of computer technologies. Because of this, database systems are now used by many organizations that can help in storing data. It is a reliable data storage and retrieval. With the help of computers, data management and analysis is faster and easier than a manually managed data. At present, the number of university students are increasing, the management of student information is crucial. The current paper based work is tedious and not efficient.

An information system is a working system that is processes and activities of information system is for capturing, transmitting, and storing, retrieving, manipulating, and displaying information. Thus, information systems provide informational products for customers of internal and external of organization using information, technology and other resources [1].

Student information system (SIS) is a one type of management information system which can help in education establishments for managing student data. Student information systems can provide services and capabilities for registering students in specific courses; keeping results of tests and scores of assessments, keeping student grades and transcripts, building student schedules; tracking student attendance; managing many other student-related data needs in a university. For the development of Higher Education Institutions, Student Information System plays an important role for the academic decision making purpose and other academic tasks. Because of the development of Science and Technology, information is essential in our daily life.

This study aims to develop and maintain a functional, reliable, usable, efficient, maintainable and secure student information system. This system will be able to help the Register and staffs of student affair department of the University of Computer Studies, Myitkyina to reduce the tasks mainly on the delivery of enrolment procedures and the keeping of student records and to eliminate the problems of the current manual system.

II. RELATED WORK

A new type of information management system is presented in [2]. That system was implemented for identification and management of student based on fingerprint identification. The two parts in their work are terminal and host. The fingerprint identification module is composed in terminal part with the micro controller. As the host computer, personal computers or large servers can be used according to the number of users. SQL server was used for storing and managing of student information. The terminal fingerprint sensor uses optical fingerprint recognition module, while the microcontroller uses STM32F4 with 192 KB of SRAM. The fingerprint identification sensor collects the finger print information and the microprocessor processes and encrypts the fingerprint information before transmitting it to the server.

Student Information and Score Management System (SISMS) presents in [3]. It can be used for maintaining students' records in universities and educational institutions or colleges.

Role of Information Systems in a University Setup is presented in [4]. In modern knowledge societies, knowledge is power. Therefore, information plays the important role in any organization and management of information is one of the major activities amongst various activities in today's world.

The work in [5] presented a Student Information System for Kalinga State University. Their study was intended for the improvement of the efficiency of the existing Student Information System of Kalinga State University Rizal campus. The system in [5] tried to meet the five requirements; reusability, maintainability, security, usefulness and functionality and evaluation on the system appeal of a quality software only to a moderate extent.

III. PROPOSED UNIVERSITY INFORMATION SYSTEM

Among the resources of a university, Information Systems (IS) have become a basic one and plays an important role for all the stakeholders. That is because of the need for collecting of data, storing of data processing and transmission of information, information systems are important in any organization. Here, universities need the information systems which are able for storing, updating and deleting of student data through a simple interface.

In the existing system, all actions are written down. The students have to write down their personal information in the registration from every time they enroll, and pass the records to register and accounting division. The purpose of this paper is to present the development of student information system for computerized record keeping of student information and future for online student registration system.

The system presented in this paper is in order to replace the current manually and paper based student registration and record keeping process in Student Affairs Department of University of Computer Studies, Myitkyina, shown in Figure 1.

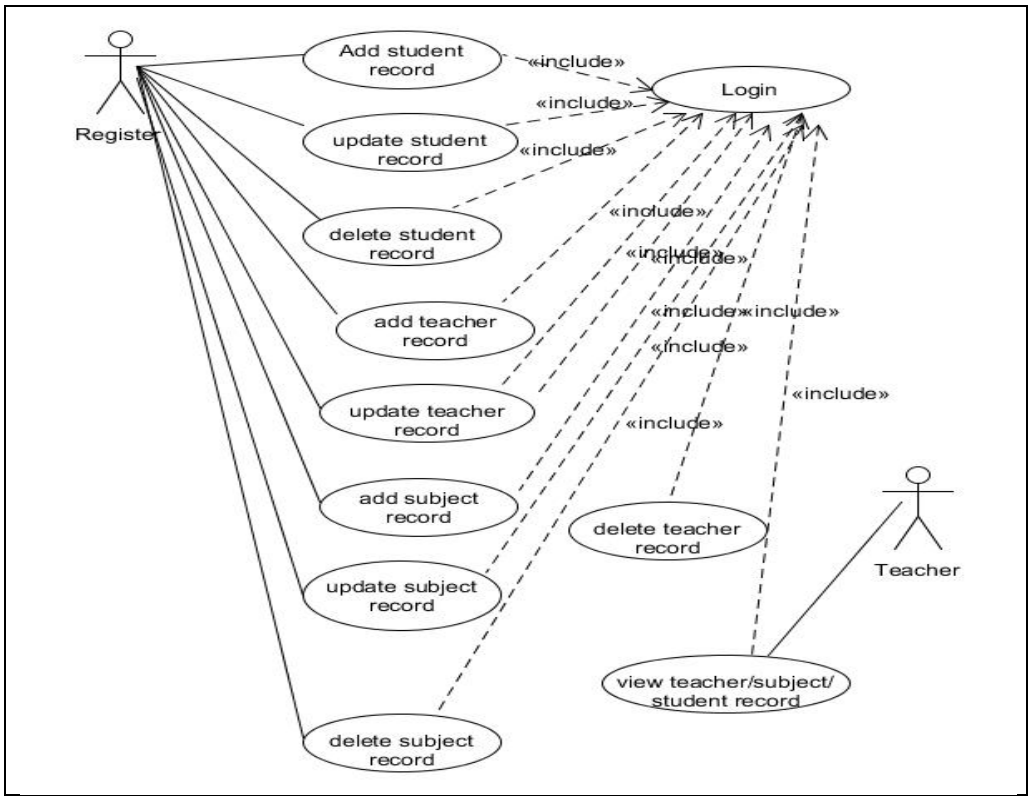

Figure 1. Processes of University Information System

Figure 1 shows the processes in a university information system. The Register and authenticated staff from student affair department can add, update and delete the student, teacher and subject information. These information are stored in university database as shown in Figure 2.

The database in Figure 2 is designed for storing and retrieving information of students who are registered for specific course, which teacher teaches for which course and time table for each major and year of the University.

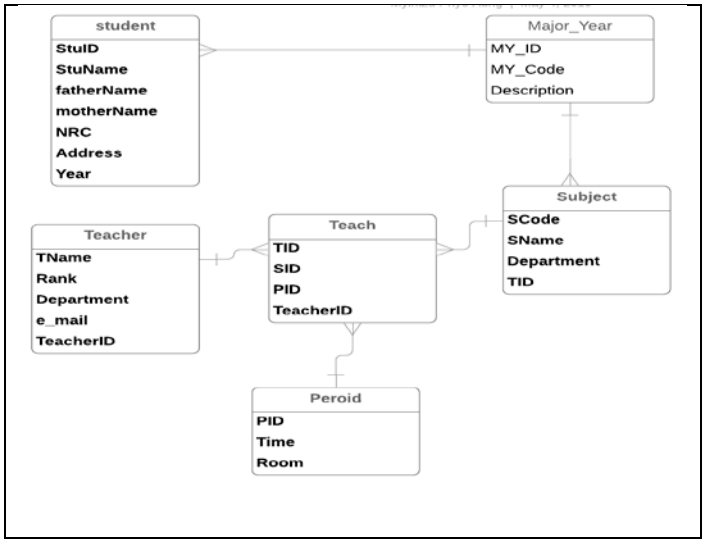

Figure 1. ER diagram for University Information System

IV. TECHNOLOGY USED

With the development of Science and technology, the information system is essential in our daily life. It is needed to replace the existing manual work with the computerized system for student registration. The system presented in this paper used the RDBMS and ADO .NET to implement the information system for students of University of Computer Studies, Myitkyina.

ADO.NET

ADO .NET is a very important feature of .NET framework which is used to work with data that are, stored in the database, such as Microsoft SQL files. ADO DOT NET is a set of classes that expose data access services for .NET Framework. ADO .NET can be represented as a set of computer software components that are mainly used to access data and the data services which are based on the disconnected Datasets and the XML. It is also a part of the base class library which includes the Microsoft .NET Framework. ADO .NET contains a number of classed that provides various methods and attributes to manage the communication between the applications and the data sources. ADO .NET provides a set of features, such as connection and commands that can be used to develop the highly efficient data services and many other important services in .NET applications [6].

RDBMS

RDBMS stands for the Relational Database Management System which is the basis of SQL and all the modern database system such as the MS SQL server, IBMDB2, Oracle, MySQL and Microsoft Access. Most RDBMS use the SQL language to access the database [7].

SQL Statements

SQL is mainly used to communicate with the database. It is the standard language for relational database management systems. SQL statements are mainly used to perform the task such update the data on a database, or to retrieve the data from a database [8].

V. IMPLEMENTATION OF UNIVERSITY INFORMATION SYSTEM

A. LoginPage

In the Login page, the user needs to fill the security information (such as User Name and Password) to access the system. If the User Name and Password is correct, the user can enter to the Selection Page.

Figure 3. Login Page

B. Selection Page

From the Selection Page, the user can choose to go to Insert Page, Update Page, Delete Page and Show Page for insertion, updating, deleting of student information.

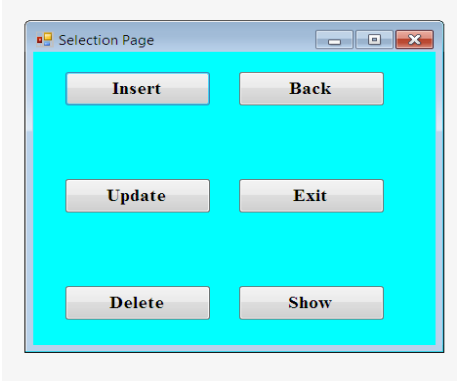

Figure 4. Selection Page

C. Insert page

Student Information such as student name, roll number, address, year major etc. can be added by using Insert Page.

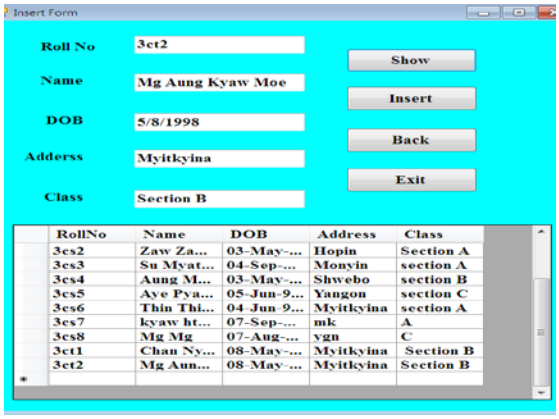

Figure 5. Insert Page

D. Update Page

In Update Form student information such as Address can be updated by using student's roll number.

Figure 6. Update Page

E. Show Details Page

In the **Show Details Form**, detail information of a student can be seen by clicking the detail button if the roll number of the student is known.

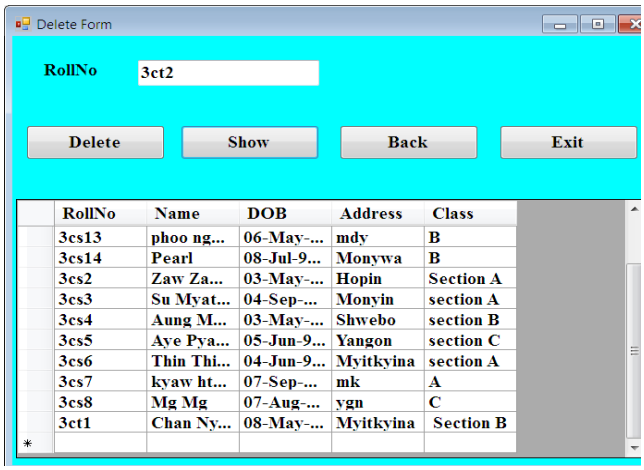

Figure 7. Show Detail Page

VI. CONCLUSION

Because of the development of modern Information and Communication Technologies (ICT), there is a need for the academic world to enter the era of information society. There are many systems in universities such as academic management system, examination system, online learning systems, student information system, faculty information system etc. The common idea of these all systems is for capturing the relevant data and representing and visualizing them in accordance with the requirement of the users. In this paper, student information system have been developed to maintain the information and other content of a digitized Information using ADO .NET technology and Microsoft SQL. This system is mainly intended to be used by the staffs from student affair department and faculties of university. Currently this system is intended to be used by authenticated staffs of student affair department for helping their academic activities. Later, the system can be extended to online student registration and management system.

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Evaluation of Strategies for Enhanced Use of Socio-Cultural Activities on Quality Pre-Academic Skills in Kakamega South Sub – County, Kenya

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Abstract- Social interaction between children and more knowledgeable members of society is essential for children to acquire ways of thinking and behaving. Although socio-cultural activities enhance learning in pre-school children, some teachers and parents in Kakamega South Sub-County have not embraced them in relevant learning areas such as language, poetry, outdoor activities and mathematics. This study aimed at establishing the influence between socio-cultural activities and pre-academic skills among ECDE learners in Kakamega South Sub-County. The specific objectives were: to determine the main socio-cultural activities affecting pre-academic learners and to evaluate existing strategies used to improve the use of socio-cultural activities for quality pre-academic skills. The study focused on learning theory of Albert Bandura and social cultural theory of Lev Vygosky. Descriptive survey design was employed with a sample size of 384 respondents. Simple random sampling was applied to the stratified samples to identify respondents among pre-school teachers and learners. The data collection instruments included questionnaires, interview schedules, key informants interviews and FGDs. Data analyses were done using both descriptive and inferential statistics by employing SPSS. The results obtained reveal that the main socio-cultural activities affecting attainment of pre-school academic skills include dances (18%), marriage ceremonies (17%), drama (17%), music festivals (16 %) and singing games (16%). The study identified planning socio-cultural activities outside school programmes (42%) and sensitizing communities on pre-school education (16%) as the main strategies needed for improving the quality of pre-academic skills in Kakamega south sub county. The findings of this study contribute to knowledge in addition to guiding teachers, parents and the Ministry of Education (MOE) in pre-school curriculum review at both County and National levels. These results will further be used to enhance nurturing of pre-school learners in Kakamega South Sub-County.

Index Terms- Pre-school learners, learning areas, social interaction, children activities, moral behaviour

I. Introduction

Culture is categorized as a system that controls social values in young children, adults and the aged and is transferred from one generation to another after it has been translated into symbols (Manali, 2011). Socio-cultural aspects like storytelling, music, folktales and play are believed to form a strong foundation to societal behaviours. Reflective practices help in learning, developing and managing desirable and undesirable attitudes (Maffini 2012) where parents, teachers and guardians intervene directly to help children behave positively. Children who grow in alcoholic families and maintain their families' celebrations and rituals are less likely to become alcoholics themselves. However, those who grow up with an alcoholic parent who does not maintain tradition are likely to become alcoholics. Wise parents provide children with a variety of outlets so that they develop many skills (Brooks, 2004).

Use of folktales was a method that helped children learn safety and instilled fear in children from the environment they interact with hence improving their ability to think and make judgment (Boudinot, 2005). Goodman (2006) posits that social culture holds many different habits within a group of people. It is important to remember in connection with socialization that there is considerable reciprocity between those who socialize and those who are being socialized (Koller & Richie, 1978). During the early childhood years of development children need to lay foundation on understanding ideas which strengthen communication skills and language such as listening, speaking, writing, and reading and promotes sharing of knowledge learned Wright and Nueman (2009). It is during this growth stage that children expand their skills by engaging the immediate family, educators and peers on diverse aspects within the surrounding environments.

Students who acquire vocabulary skills find it easy to cope with early years education and primary education when given the opportunity to explore more complicated ideas, relationships, behaviours and emotions (Wright & Nueman, 2012). Formulating a sense of social competence is vital in a young child's development (Han & Kemple, 2006). Young children may face difficulty in acquiring social skills if they delay in conceptualizing communication skills. Low socio-economic environments and lack of experiences with text are responsible for the disparity in literacy of young children today (Wright & Nueman, 2009).

Use of play activities, particularly those with articulation of sounds, increases the child's exposure to phonetic concepts (Pepper and Weitzman, 2004). Parents and teachers prepare the child's vocabulary through diverse ways. Children can be encouraged to interact with letters, sounds, and words through;

flash-cards, letter cards, sounds of animals, modeling letters, letter cut-outs and letter puzzles. This study sought to understand how children express their feelings while taking part in socio-cultural activities for enhanced quality pre-academic skills in Kakamega South Sub – County, Kenya.

II. RESEARCH METHODOLOGY

2.1 Study Area

The study site covered areas inhabited by Idakho's, Maragoli, Tiriki and some Isukha ethnic groups of Kenya. These groups have diverse socio-cultural activities such as bull fighting, brewing and circumcision. Kakamega South Sub – county has two divisions namely South Ikolomani and North Ikolomani divisions. The study area was located in Kakamega south sub-county of Kakamega County, Kenya.

2.2 Research Design

Descriptive survey design was adopted while focusing on children in pre – schools in Kakamega South Sub – county (Carter & Douglas, 1954). Both qualitative and quantitative research methods were employed to collect data. The research instruments involved the use of questionnaire, focus group discussions (FGDs) and interview guides and the data collected were analyzed using both inferential statistics and descriptive methods by employing the statistical package for social sciences (SPSS).

2.2.1 Sampling procedure

The target population comprised both public and private ECD centers, teachers and parents in Kakamega South Sub – county. There were a total of 109 ECD centers of which 79 were public and 30 were private schools. The ECD centers in Kakamega south sub-county had 308 teachers. The study area was divided into two strata (south and north divisions). Subsequently, simple random sampling was used to select samples from all other categories. To identify samples in each category, papers representing each category were folded put in a container and thoroughly mixed. Then four public pre-schools and two private pre-schools were picked in each division. The teachers and pre-school learners were sampled in the same way considering gender (Ligeve & Poipoi 2012).

2.2.2 Sample size

Since the study used a descriptive survey research design, a sample size of 10% (Gay, 1981) was identified from each of the categories observed. In order to determine the actual samples for each category simple random sampling was used. The target population for ECDE learners was above 10,000. The sample size was obtained using the following formula (Muganda and Mugenda, 2003):

$$n = \frac{z^2 pq}{d^2}$$

Where:

n = the desired sample size (if the target population is greater than 10,000)
z = the standard normal deviation at the required confidence level
p = the proportion in the target population estimated to have Characteristics being measured
q = 1-p
d = the level of statistical significance set

$$n = \frac{(1.96)^2(0.50)(0.50)}{(0.05)^2}$$

= 384 respondents

The sample size for each category is as shown in Table 2.1 below:

Table 2.1: Sample size for ECDE categories

Category	Sample size
Key informant-Sub county ECDE director (1)	1
Parents	4 (per school)
Private ECDE Schools (30)	3 (10%)
Public ECDE Schools (83)	8 (10%)
ECDE Teachers (308)	31 (10%)
ECDE Learners (10,000)	384 (Mugenda & Mugenda, 2003)

2.2.3 Research Instruments

The study used the following research instruments; questionnaires were used since they can be administered to many respondents at the same time in addition to accumulating a large amount of data (Orodho, 2009). The instruments were administered to teachers while focus group discussions (FGDs) were administered to parents using an interview guide. Interview schedules were used on pre-school learners and some of the pre-academic skills were observed in the field. Document analysis was done after collecting quantitative data. Information collected from all the groups was treated with confidentiality.

2.3 Data collection procedure

Questionnaires were administered to the respondents in the field by the researcher. On the otherhand, interviews were carried out through interview guides to collect data from the learners. Where interview schedules were not applicable, the researcher requested the E.C.D.E teachers to use observation schedules to collect data as they took part in the socio-cultural aspects (storytelling, folktales, music and play). The study sought consent from the respective respondents including teachers, parents and other stakeholders who were assured that the exercise was voluntary and a respondent was free to withdraw from it at any time and stage. However, for pre-school learners who are minors permission was sought from their parents, guardians or teachers before administering the questionnaires and interviews to them. The researcher acknowledged all work cited in the current study (Creswell, 2002). All information collected was treated with confidentiality. The researcher organized focus group discussions (FGDs) which had respondents from different

categories (teachers, parents, education officers) and collected data on the influence of socio-cultural activities on pre-academic skills among E.C.D.E learners. The key informants (E.C.D.E Officers) gave their views on the questionnaires given.

2.3.1 Validity of Research Instruments

Validity refers to the precision and relevance of inferences obtained using the research instruments. Mugenda and Mugenda (2003) assert that experienced researchers should be involved in establishing the applicability of research tools. The results obtained using the instruments were examined by experts who advised the researcher accordingly on how to improve the instruments before commencing with the study. This ensured that accurate and representative field data focusing on the research variables was collected.

2.3.2 Reliability of Research Instruments

Reliability is the measure of the level to which a research instrument gives consistent results after carrying out repeated trials (Mugenda and Mugenda, 2003). To enhance the accuracy of instruments, the questionnaire, interview guide, focus group discussions guide and observation checklist were pre-tested on a representative small sample in Lurambi Sub-County. The split-half method was used for reliability test. The study piloted in a few pre – schools which were not included in the piloting programme.

The study interviewed children aged (3 – 6) years, teachers and parents. This exercise offered an opportunity to make necessary adjustments and include the respondents concerns. The results from the pre-test study were used to calculate the Pearson's coefficient of correlation the value obtained ($r > 0.65$) was within acceptable levels.

2.4 Data Analysis Techniques

The study used a combination of descriptive and inferential statistics to analyze the data collected. Descriptive methods included use of mean standard deviations, frequencies and percentages. These were done using the SPSS statistical software package.

III. RESULTS AND DISCUSSIONS

3.1 Socio-demographic characteristics of the respondents

Socio-demographic characteristics had direct impact on the study, to the extent that they helped to understand the level of children participation in socio-cultural activities and how these activities affected the children's performances. Healy (2000) posits that demographic data are obtained from the respondents' aid in understanding sample characteristics in addition to establishing the representativeness of the target population. The demographic characteristics considered included age, gender and level of education. All these are discussed in the following sections.

3.1.1 Distribution of respondents by gender

This study aimed at establishing how gender was distributed among the respondents. The data was analyzed and presented as shown in Table 3.1.

Table 3.1: Gender distribution of respondents

	Male		**Female**	
Category of respondents	N	%	N	%
ECDE learners	180	47%	204	53%
Parents	16	36%	28	64%
Teachers	12	39%	19	61%
Total	208		251	

The results show that there were 47% (180) male ECDE learners and 53% (204) female ECDE respondents, then 36% (16) male parents and 64% (28) Female parents. The results further show that there were 39% (12) male teachers and 61% (19) female teachers. The gender disparity in this study is in favour of female except for the ECDE learner's category. The results show that the number female gender was dominant in this research and this disagrees with Dorsey (1989) findings that there is poor female gender representation in the teaching profession because women have generally lower qualification than men when it comes to the recruitment of teachers.

It is argued that occasionally teacher's gender may affect the child's performance (Smith, 2004). Communications between the teacher and the pupil could be influenced and shaped by teacher's gender (Dee, 2004), consequently the teacher acts as a gender-specific role-model, despite his or her actions under learning circumstances. Dee (2004) in a study that correlated teacher gender and child performance affirmed the large effects of teacher's gender on student's test performance.

3.1.2 Distribution of the Respondents by age

The study focused on the age of the ECDE learners. Results from the analyzed data are presented in Figure 3.1.

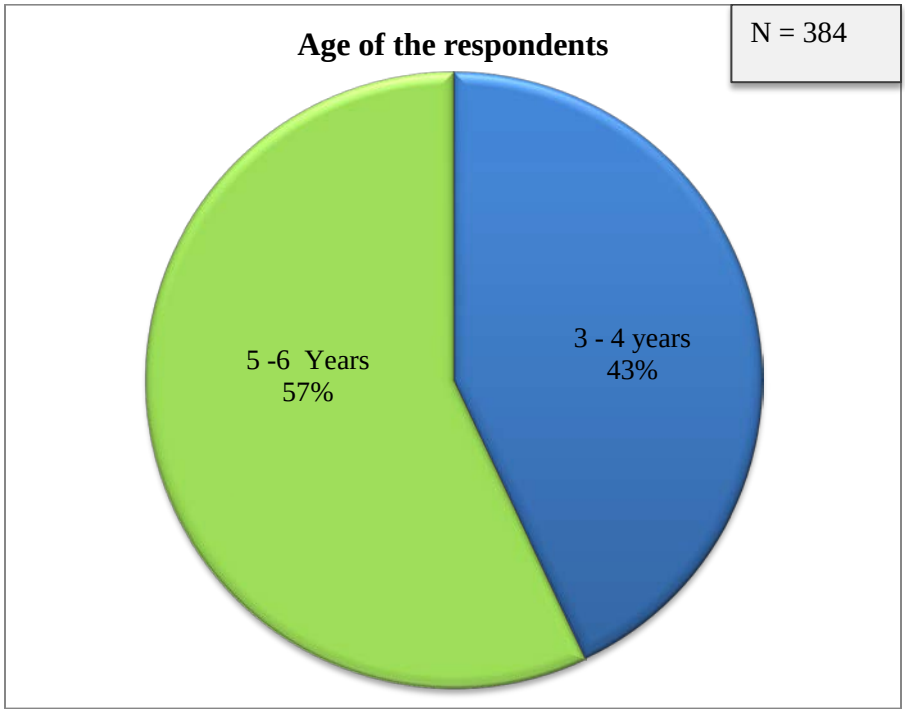

Figure 3. 1: Age distribution of the respondents

These results reveal that respondents in this category were between the ages of 3 – 6 years. The learners between the age bracket 3 – 4 years were 43% (165) and 57% (218) were between 5-6 years.

3.1.3 Teachers teaching experience

This section sought to establish the level of teacher's experience. The results in Table 3.2 indicate that 11% (4) had acquired 3 to 4 years of teaching experience, 26% (9) had 5 to 6 years of teaching experience while 63% (18) had 7 years and above respectively. The research shows that teachers had good experience to handle the curriculum and helping the students towards working hard in class. The teachers experience has a direct impact on the learners' performance.

Table 3.2: Distribution of teachers working experience

Teachers working Experience		
	Frequency	**Percentage**
3-4 years	4	11%
5-6 years	9	26%
7 years and above	18	63%
Total	31	100%

Stringfield & Teddlie, (1991), found out that the attributes of experienced teachers include having good background of experience in addition to the ability to contribute insight and ideas in teaching and learning, coupled with openness to correction and self-regulation in classroom. Furthermore, experienced teachers are known to be flexible and can capture the attention of varying categories of learners with different capabilities.

3.1.4 Academic qualification

The academic qualification of teachers in this research was analyzed and presented as shown in Figure 3.2.

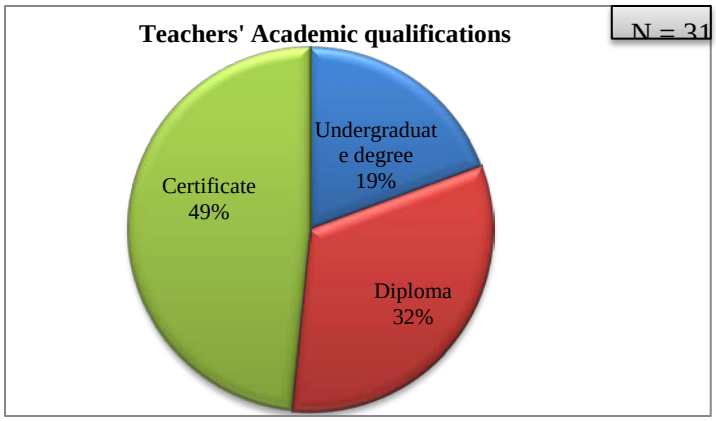

Figure 3. 2: Academic qualification of ECDE teachers

The results show that 19% (6) teachers had an undergraduate degree, while 32% (10) had a Diploma level. The results further shows that 49% (15) had a certificate level. The results show that the teachers had the required qualifications to train the pre-school learners. The teachers' qualification was directly proportional to learners' good performance. These findings agree with Maundu (1986) who pointed out there exist a

significant relationship between teacher qualifications and pupil performance in KCPE in Kenya. There is a clear link between good performance and qualified teachers in addition to resources availability in learning institutions. Akinsolu (2010) affirms that the learner is able to acquire more pre- academic skills when exposed to highly experienced teachers.

3.1.5 Learners Education Level

Age of the respondents was determined through the questionnaire where they were asked to indicate their ages. The study revealed that 4% (15) were in pre-care, 25% (96) of the children were in baby class, 34% (65) were in pre-unit while 37% (131) were in middle class, which reflects their education level. This middle pre-unit class at 37% is the age that was observed to be highly involved in play activities, therefore the age allows greater opportunity for language acquisition (Pepper and Weitzman, 2004). Education is key to achieving sustainable development while at the same time is responsible for harnessing attitudes and behaviours. In the spirit of the Hyogo framework for action (2005), governments and civic society were encouraged to use education in facilitating knowledge and innovation which would strengthen resilience in achieving different goals.

3.2 Observation Checklist showing how the learners responded on socio-cultural aspects.

Some of the respondents (ECDE learners) could not give answers to the interview schedule used; therefore observation checklist was used to capture the data (Table 3.3).

Table 3.3: Socio-Cultural aspects that learners are involved in

Aspects of socio-cultural activities	No. of learners involved	Percentage (%)
Proverbs	8	4
Play	101	53
Folktale	6	3
Storytelling	10	5
Riddles	8	4
Singing games	29	15
Music	15	8
Rhythm	6	3
Drama	10	5
Total	**193**	**100**

The study indicated that ECDE learners 101 (53%) interacted with their environment through play whether simple or complex. A study by Pepper and Weitzman, 2004 cites that it is during play that children discover their interests, acquire cognitive motor, speech, language and social emotional skills. The study observed that children when given freedom, they get involved in play that may either be simple or complex structured or unstructured. Within the play other aspects of socio cultural activities would be realized and are accompanied with a set of rules. Therefore the growth of language and cognitive skills are realized which leads to complex imaginary play. This makes the children develop from make-up believe play to cooperative play (Pepper and Weitzman, 2004). Examples of songs within the play are as follows:

"Ndiegu yatsia khusuma yima mwana
mwana yasia khusuma yima Ndiegu
Ndiegu baba ukhaliranga guu
tsunu tsunu tsunu"

(*Ndiegu is a father who looked for food and denied the child to have some but when the child got some food, he denied the father too. The father started crying. The child questioned why the father should cry yet he/she learned from him).*

Riddle:
"Esiomika Nisinyala!"
(What is at hand should be functional)

Children appreciate their social cultural activities and others from the nearby culture which creates an enjoyable learning environment. This is enhanced when children interact with the elders who are knowledgeable and rich in socio-cultural aspects (Bredekamp & couple, 1981) for example:

A child question: Prikicho
The rest: Bandura; Nikuje?
The child's answer: Hapana
The rest: Nikuje?
The Child: Ndio.

(The researcher observed that one of the learners lay down his/her face facing downwards then starts calling "Prikicho" and the rest respond "bandura" as they are seen hiding until the child responds "Ndio" the child starts to search for them)

One of the parents from FGD had this to say:

My children may be exposed to the social cultural activities because they can learn and grow in their societies once they get a good understanding of their social interactions. They also learn one another's activities and understand them; this promotes intercommunity cohesion and unity.

3.3 Socio- cultural activities affecting pre-academic learners

The study sought to establish the socio-cultural activities affecting pre-academic learners in Kakamega south Sub-County. The respondents who comprised of teachers, parents and pre-school learners were asked to list socio-cultural activities, which take place around children's environment and call for their participation in Kakamega south Sub-County. The results were analyzed and presented in each respondents category; teachers, parents and students.

3.3.1 Teachers response

The response from teachers on the socio-cultural activities were analyzed and results presented in Figure 3.3.

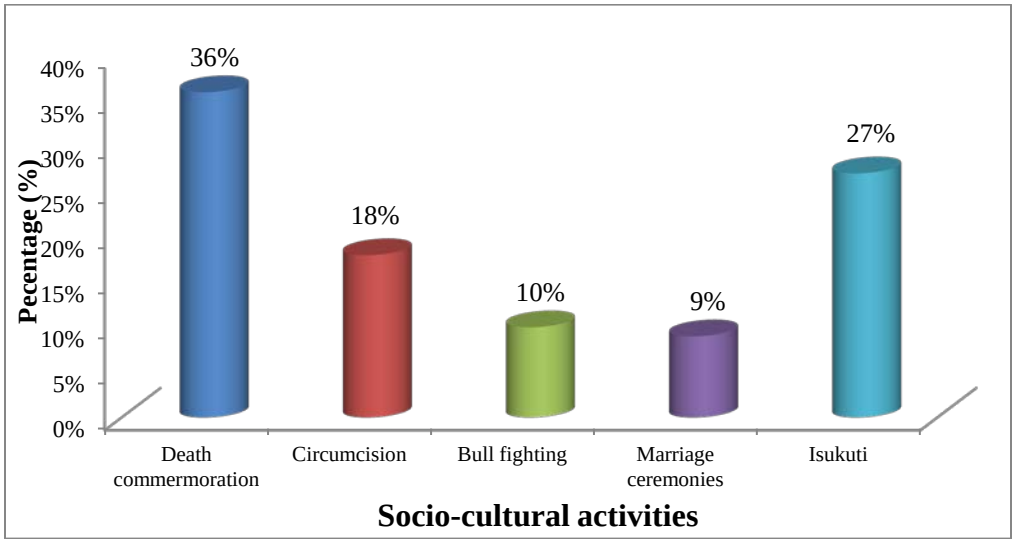

Figure 3.3: Socio-cultural activities from teachers' response

The results show that according to the teachers, the socio-cultural activities included death commemoration 36% (11), Isukuti dance 27% (8), circumcision ceremonies 18% (6), bull fighting 10% (3) while marriage ceremonies were at 9% (3) respectively. This response reflects the socio-cultural activities which take place in Kakamega South-Sub County; these events affect pre-school learners in one way or the other depending on the interactions. The strength of social interaction and the authentic cultural experiences for children has been strongly emphasized Vygotsky (1978). In the theory of development, children's growth may be determined through biological growth patterns in addition to culture and individual experiences. Studies have shown that cognitive development Sowers, (2000) does not occur in isolation particularly for the child.

3.3.2 Parents response

The parents' response on the socio-cultural activities were analyzed and presented as shown in the Figure 3.4 below.

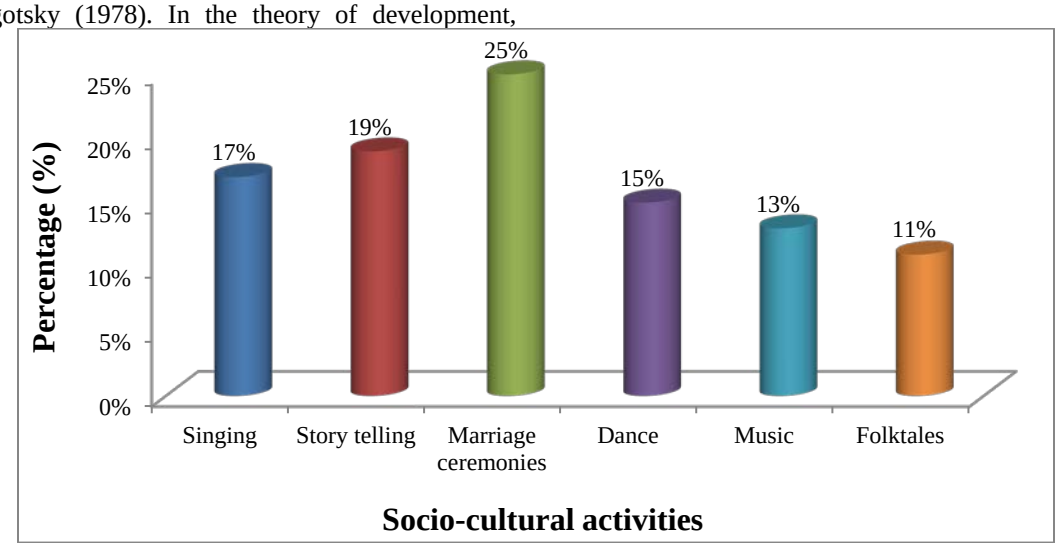

Figure 3.4: Showing socio-cultural activities from parents' response

The results show that there were a number of socio-cultural activities which take place around children in Kakamega South Sub-County. It was revealed that contribution of socio-cultural activities vary with marriage/wedding ceremonies leading with 25% (11), storytelling 19% (8), singing games 17% (7), folktales 11% (4), music festivals 13% (6) while isukuti dance contributes 15% (7) respectively. Parents' responses introduced an important socio-cultural feature of storytelling. Folk-tales are well formulated and shared therefore they enhance the learning process. A Common version entails characters–human or animal–partaking in a story with a good opening statement, climax, and end. A good song requires involvement of the audience through a chorus, quite often choruses require group activities which may include rhythmic clapping, cock fighting, dancing and teasing each other. The end is usually a moral puzzle for the learners to solve, in addition to promoting moral judgment while developing moral standing (Vitz, 1990). To motivate children the stories must leave them in suspense however, if familiar with the storyline, allow them participate through group audience and activities. Children should be guided on how to pay attention in addition to following instruction while

allowing them to actively participate in the learning process (Abdi, 2007; Kadodo, 2011).

3.3.3 ECD learners response

The ECDE learners were asked to indicate the socio-cultural activities in which they participate. The responses in Figure 3.5 indicated that children participation in kids play was rated at 25% (96), storytelling 19% (73), singing games 17% (65), folktales 11% (42), Christmas dramas 13% (50) respectively. The results further reveal that participation of children in choir was 15% (50). After they have interacted for a length of time, they have a great influence on behaviour and language skills (Bredekamp and Couple, 1981).

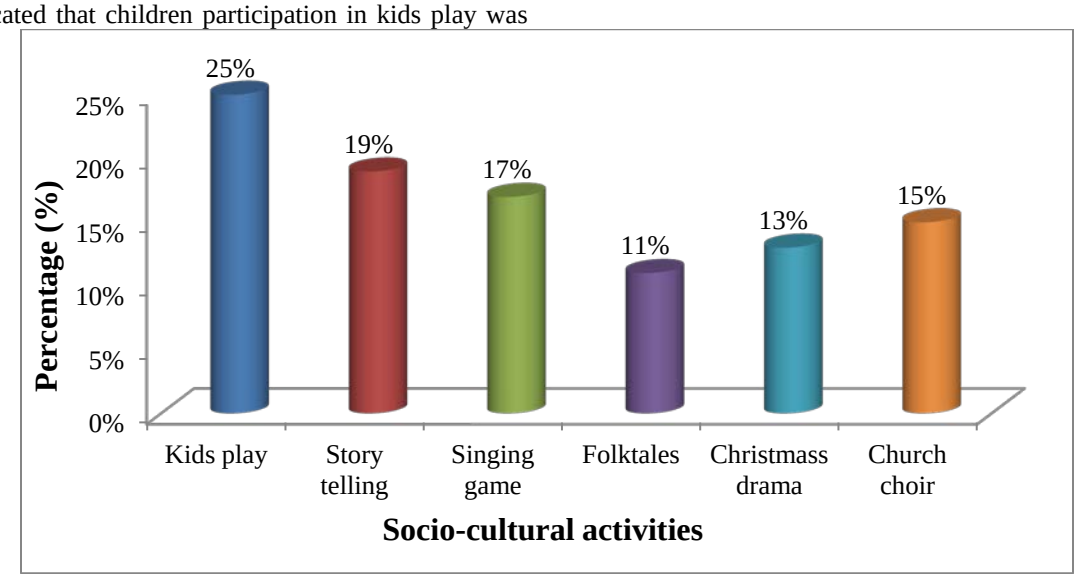

Figure 3.5: Socio-cultural activities from Children's' response

The study revealed that these activities help socialize children and integrate them in the society. According to Manali (2011), culture as a social control that makes people shape their standards and behavior. Cultural values influence one's principles and philosophies and form the founding principles of life. Culture is a link between people and their value systems which explains its importance. The values and traditions of one society might vary with those of another society.

3.4 Strategies used to improve pre-academic skills in learning situations

The findings in previous sections have shown that socio-cultural activities have influences on pre-academic skills of early learners. The data obtained from teachers and parents on strategies used to improve pre-academic skills was analy presented in the following sections.

3.4.1 Parents response

The parent respondents suggested various strategies which would help minimize the negative effects of socio-cultural activities on pre-school children as presented in the Figure 3.5. Parents suggested that socio-cultural activities like circumcision should be rescheduled in order to avoid interference with school programmes, 42% (18), sensitization of the community on pre-school education 16% (7), provision of spiritual guidance 11% (4), improvement of learning infrastructure in ECDE 8% (3) and provision of free ECD education, 6% (3), would attract more pre-school children to school. In an FGD, a parent reported that:

Some socio-cultural activities are scheduled in a way that they affect the normal schooling programmes. Activities like circumcision ceremonies go beyond scheduled time thereby interfering with schooling of pre-school children whose families are directly involved. Bull fighting activities too affect schooling by resulting in injuries and drawing children attention from school to such activities. It also causes parents to divert their financial commitment from school fees to betting games during bull fighting.

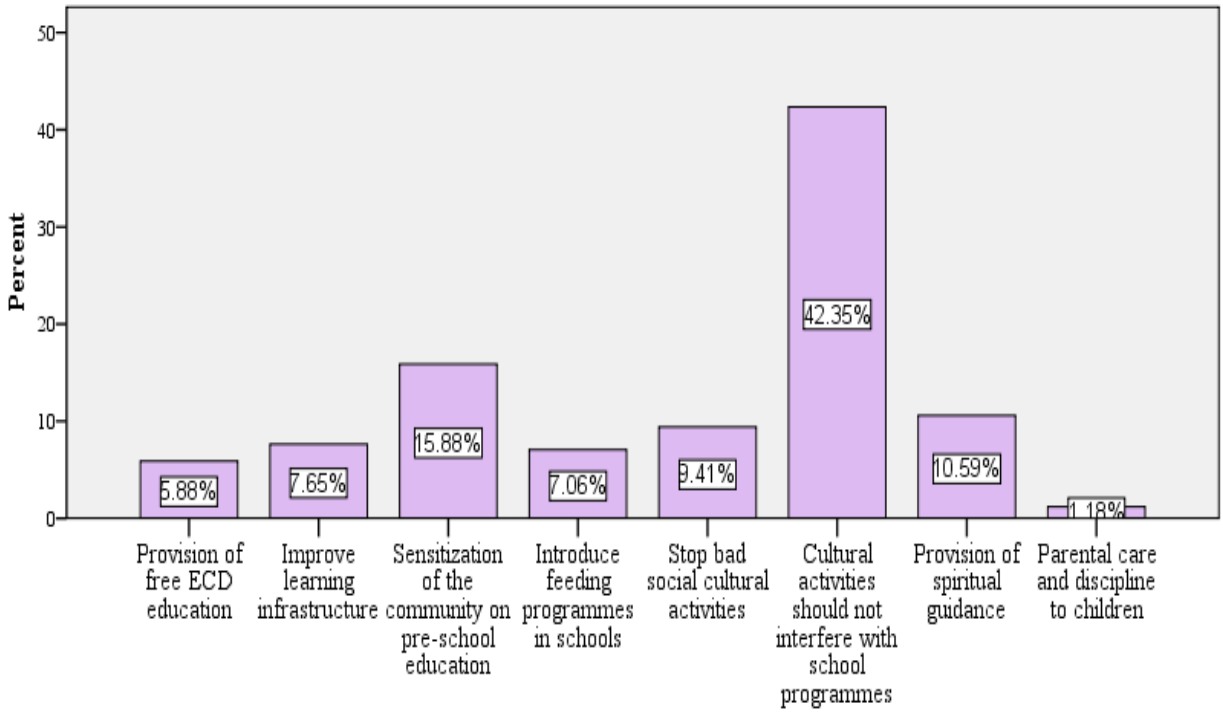

Figure 3.5: Strategies to improve ECDE learning in Kakamega South Sub-County, Kenya

Possible strategies to avoid interfering with school programmes could involve restricting some of these activities to take place outside the school calendar. Community awareness on pre-school learning needs to be encouraged. On the other hand, the socio-cultural activities which are retrogressive should be stopped. Alcohol brewing and local community dances influence chances of rape, cause trauma, and psychological torture to pre-school children, causing school dropout and poor school enrolment.

3.4.2 Teachers responses

The teachers' responses on the strategies used to improve pre-academic skills in learning situations are presented in Figure 3.6.

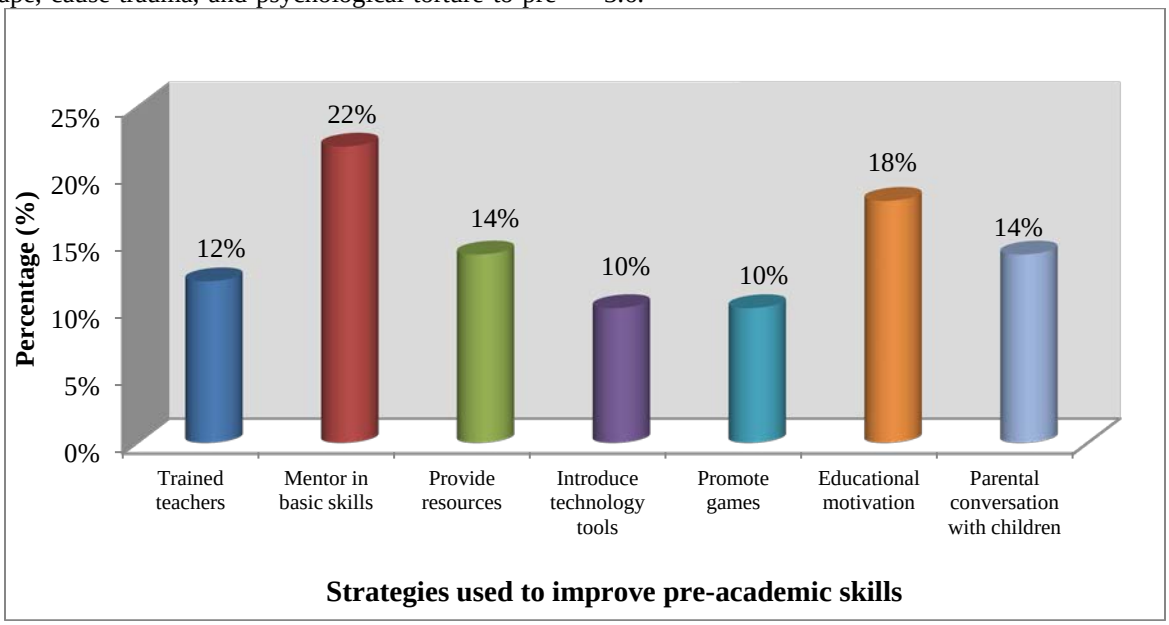

Figure 3.6: Strategies used to improve pre-academic skills

The results show that teachers recommended various strategies including; mentoring basic skills 22% (7), education motivation 18% (6), encourage parental communication with children 14% (4), provision of learning resources 14% (4), deployment of trained ECDE teachers 12% (3), introducing children to technology tools 10% (3), and promoting individual and group games for children 10% (3) respectively.

The strategies presented by teachers are linked towards parent-child close relationship, teacher professional approach and resource mobilization. Parents and teachers are among the first interventionists Ramey & Ramey (2004) in cases of delayed infants and young children development. Teachers have initial responsibility to identify resources needed to promote learning and building confidence among learners as well as providing support groups for the parents and children.

Downs *et al.* (2007) discuss the results of a study that focused its teaching on teaching methods for learners that have development disabilities. Their findings indicate that many children that have been exposed to a variety of teaching methods have shown positive results and have posed higher achievement. The key methods identified include strategies where children interact with their peers, modeling activities and intermittent reinforcement. Such methods if adopted need to be implemented to enhance conformity and regularity. However, it is a difficult job for both educators and parents since proper training is required to implement these teaching strategies. Children have different and unique learning abilities and educators have a responsibility to handle them cautiously to avoid disadvantaging slow learners (Downs *et al.*, 2007), likewise caregivers and parents should be able to keep this in mind when implementing the intervention strategies. Many young children are naturally curious about scientific information and at the time when they join pre-schools they already have acquired investigative and problem solving skills. Those who take part in exploration and experimental activities develop skills that are important for further learning and particularly in reading and science. Currently young children actively participate in scientific technology which is important for their future acquiring of pre academic and social skills.

It is common for pre-schoolers to get involved in interactive games on smart phone and laptop, the technology has advanced very fast in the world today. Presently the world of smart phones, laptops, computers and iPads is normal life used to introduce children to science language and scientific information and skills. According to Wright and Nueman (2009), it is during early years in life that young children build their foundation of understanding scientific content as they interact and develop communication skills and language skills. This is the time when they eagerly question the way everything works. If given an environment that is supportive they engage in language activities, mathematical practices, exploration and experiments.

When pre-scholars are encouraged to sing children songs and singing games that have sounds it speeds up the phonological awareness (Wright & Nueman, 2009). Normally teachers and parents who use alphabetical principle and help the children to sound out letters always help the child acquire phonological awareness. There are many ways that can be used to help children practice phonological awareness and alphabetic principle such as modeling letters, flash cards and letter puzzles.

IV. Conclusion and Recommendations

The results indicate that there are several socio-cultural activities which take place in Kakamega South Sub-County within which socio-cultural aspects are found. Children engage in a number of activities within a plethora of diverse interactions among age mates and families with both rural and urban experiences. The most common socio-cultural activities practiced are; wedding ceremonies, marriage ceremonies, singing games, folktales within which storytelling, drama, kids play, folktales, music, and dance are expressed. These socio-cultural activities which children interact with identify with their culture.

The results further show that there must be coordinated efforts between the parents and teachers, who are the first people in a pre-school child's life. Parents are required to share and communicate with children, encourage them to play together and make new friends. The world of today has gone digital and children aspire to acquire scientific information early in their lives and this should be an advantage to introduce technology to them.

Based on the findings obtained from the analysis it is recommended that parents and teachers should be at the fore front in helping children understand the role of socio-cultural activities in enhancing pre-academic skills. Consequently teachers should be encouraged to embrace socio-cultural activities in the learning process as indicated in the syllabus and try to elaborate on what happens during certain occasions in comparison with neighbouring communities' culture.

The teachers' body needs to develop a strong guiding and counselling unit to help learners understand why socio-cultural activities are important and assist them achieve their cognitive skills when it comes to mental development. This helps in building future knowledge on socio-cultural activities from neighbouring communities.

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Dynamic Model of Household Wastewater Management to Reduce the Pollution Load of Biological Oxygen Demand (BOD)

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Abstract- The increase in population and rapid development in various sectors is directly proportional to the amount of waste produced. The high number of residents will result in increased use of clean water, then the increased use of clean water will increase the amount of waste produced. On the other hand, the amount of infrastructure and facilities for managing household wastewater is very limited. The number of family heads who have access to communal scale wastewater treatment is 3,542 households out of 320,656 households in Makassar City or only 1.1% of households that are served by communal wastewater treatment plants. As a result, waste water sourced from household activities, especially those classified as used water or grey water, is channeled directly into environmental media. The purpose of this study was to formulate a model for household wastewater management. The analytical method used to determine the decrease in BOD and the projected reduction in BOD is done using the dynamic model approach. The results showed that the decrease in BOD pollution load through management stages, namely: reduction of wastewater by 7,53%, recycle or reclaim by 48,63%, and reuse of wastewater by 71,28% from unmanaged conditions or bussiness as usual of 409,996.6 tons/year so that the BOD pollution load entering the environment is equal to 28.72%.

Keywords- Dynamic model, household wastewater management, BOD pollution load

I. Introduction

Makassar City is the Capital of South Sulawesi Province with population number of 1,668,314 people and population growth of 1.003% per year [1]. The increase in population and the rapid development in various fields is directly proportional to the amount of waste produced. The high number of residents has an impact on increasing use of clean water, and the increase in the use of clean water can increase the amount of waste water produced. About 80% of the clean water used in the household's daily life is disposed of as waste water [2], [3]. Wastewater generated from household activities or other activities that produce waste water when dumped directly into environmental media has the potential to cause pollution [4], [5], [6].

Domestic wastewater is waste water sourced from households, offices, and commercial activities. This wastewater is the largest source of water pollutants in urban areas. For example in DKI Jakarta it reaches 80% of the total source of water pollution and only 3% of the total wastewater treated before being discharged into the environment [7]. The same is explained by [8], that around 9 million residents of the City of Jakarta produce around 1,300,000 m^3 of waste water per day, and less than 3% of which has been treated before being discharged into the environment. Likewise in Semarang City, as much as 94% of greywater wastewater is discharged into the drainage and 6% is absorbed into the soil [9]. Conditions such as the City of Jakarta and Semarang also occur in Makassar City because of the lack of waste water management facilities and infrastructure. The number of family heads or household who have access to communal scale off-site systems is 3,542 households [10] of 320,656 households in Makassar City [11]. Thus only 1.1% of households are served by communal wastewater treatment plants (WWTP) or have been processing household waste before being disposed of into environmental media. Waste water sourced from household activities, especially those classified as used water (gray water), is channeled directly to the quarterly, tertiary and secondary drainage, and eventually flows into the primary drainage or river flow and enters the sea [12], [13], [14].

Makassar City is divided by primary drainage or flood canal from south to north, where the two ends of the canal are emptied into the sea. The referred canal is the Jongaya Canal in the south which ends at Losari Beach and Panampu Canal in the north which empties into Paotere Beach . The results of monitoring canal water quality at several points in Makassar City indicate that some parameters have exceeded the required standards, specifically fecal coliform and total coliform parameters [15]. The high coliform content in water indicates that water or waters have been polluted by human waste disposal [16], [17], [18], [19], [20], [21].

The construction of the canal was originally designed to drain surface runoff because the topographic conditions were relatively flat (1 to 5 m MSL), so that when the sea water was installed the drainage water could not flow into the sea. Therefore, flood channels are designed to temporarily accommodate surface runoff and after the sea water recedes, the floodgates at both ends

of the canal are opened, so that water can flow into the sea. But the conditions that occur at this time are the initial idea of the canal design not being able to function optimally but rather being a place for holding urban waste. The same condition occurs in the city of Jakarta, where the city of Jakarta has its canal network built to control floods but currently has been partially filled with mud and rubbish [8]. Domestic wastewater management is still based on wastewater disposal, supposed to be based on the management and reuse of wastewater [22], [23], [24], [25], [26]. [27], [28], [29].

Wastewater sourced from households consists of feces, urine and used water (kitchen laundry, washing machine, bathroom, etc.). A mixture of faeces and urine is known as excreta, an excreta mixture with toilet rinse water is known as black water, while used water is known as gray water [19]. The management of domestic wastewater in the form of black water is carried out by managing family latrines equipped with cubluk or individual or communal septic tanks [19]. According to [8], that in Jakarta there are more than 1,000,000 septic tanks, but this is not well translated and handled with groundwater that has been contaminated with coliform bacteria from feces. Drainage of septic tank transfers illegally without drainage water lines [30], [31], [32], [33], [34], [35], [36], [37], [38].

Processed wastewater can be utilized according to its designation, for example for fire protection, to refill aquifers [39], irrigating agricultural land for the production of food crops and vegetables, and irrigating fish ponds [40], flushing the toilet, watering the yard, washing the car [41]. In addition, reuse of used water can reduce water pollution. The potential for used water from households is 50 - 80% of total water use, the most common in urban areas for flushing toilets of 30% of water use [41]. The advantages of reusing domestic wastewater are: (a) provision of nutrition, (b) reliability of water supply, (c) contribution to urban food supply, (d) farmer income, and (e) household livelihood [42]. While the disadvantages of reusing wastewater are environmental impacts and health risks. These losses are mostly related to the use of uncontrolled wastewater which causes the spread of pathogens related to excreta, chemicals, and other undesirable components. The negative effects that are often found in soil are salinization, codification, accumulation of heavy metals and various compounds which have a negative impact on agricultural production in the long term. Helminthiases (infections with worm parasites) are recognized as the biggest health risk from the use of wastewater irrigation [43]. The most common helminthiasis is ascariasis, which is endemic in Latin America, Africa, and the Far East. Other diseases related to the use of wastewater include cholera, typhoid fever, shigellosis, gastric ulcer, giardiasis, amebiasis, and skin problems. Biological health risks are more quickly felt while chemical risks require a delay in the onset of disease, such as the effects of chronic toxins or various types of cancer. Secondary risks may also arise from habitat creation to facilitate vector survival and proliferation and subsequent increases in vector-borne distribution disease in the irrigation area.

Reuse of wastewater also has a political aspect as the Singaopre government is very careful to use the word "waste water" and is replaced with the word "used water" in any information conveyed to the public. Likewise "wastewater treatment plants" are renamed "reclamation installations water ". This communicative strategy is part of a master plan to cover the water balance deficit in Singapore by increasing the quality of urban wastewater to water quality [44].

The integration of rainwater harvesting with the management of greywater can contribute to reducing consumption of drinking water, reducing wastewater treatment needs, contributing to economic savings for water users and operators of wastewater treatment systems [45], [46], [47], [48], [49], [50], [51].

This study aims to formulate a model for household wastewater management.

II. RESEARCH METHODE

A. Method of collecting data

The population in this study is households that live along canals that produce waste water that will enter the canal and then enter the coastal waters of Makassar City. Data on socio-cultural aspects that will be obtained from the population are the behavior of household wastewater management which includes the behavior of clean water use, reduction of household wastewater generation, treatment or recycle and disposal or reuse of treated household wastewater. Determination of the sample is done by cluster random sampling [52], which is determining the sample area, then determining the sample of respondents in each area randomly. In this study the "sample area" is households that live along the canals that have treated wastewater using communal WWTP infrastructure.

B. Study Area

Distribution of clusters (area) consists of 5 areas, as follows: 1) one area towards the estuary of the Jongaya Canal, namely Jl. Teluk Bayur WWTP, 2) one area toward the Panampu Canal estuary (Pasar Terong WWTP), 3) two areas at the junction of the Jongaya Canal - Sinrijala - Panampu, namely Rappocini 1 and Bontolebang WWTPs, and 4) in the middle of the Jongaya Canal (Jl Dg. Ngeppe WWTP). Distribution of cluster (area) sampling can be seen in Figure 1.

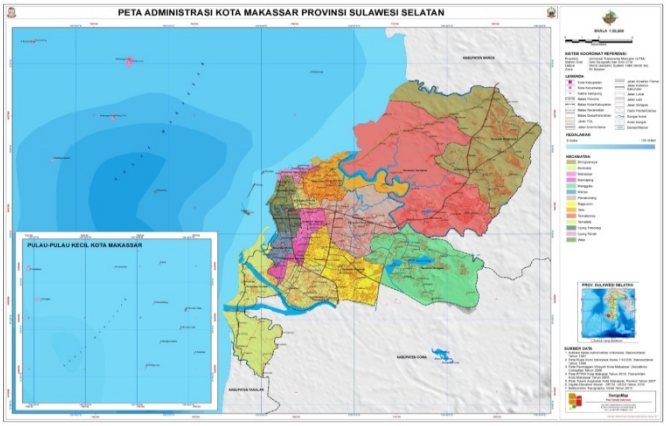


Figure 1. Study area of Research at Makassar City

Determination of samples for technical aspects was carried out by purposive sampling in 5 sample areas. Based on observations in the field, 2 sample areas were selected which had the effectiveness of wastewater treatment that was better than the others. In each of the two sample areas 7 households and 8

households were selected to measure the quantity and quality of household wastewater generated every day.

C. Simulation

This study uses a dynamic model simulation to analyze alternative household wastewater management that can reduce the BOD pollution load into environmental media. Dynamic models are a way of thinking about systems as interconnected networks that influence a number of components that have been determined over time. Simulation is a quantitative procedure that describes a process by developing a model and implementing a series of planned trials to predict process behavior over time, so that analysis can be carried out for the new system without having to build it or change the existing system, and do not need to interfere with the operation of the system. In general simulations are used for dynamic models that involve multiple time periods [53]. Based on this explanation, a household waste water management model that is suitable for environmental conditions is formulated as the research locus. The data obtained is simulated using the Powersim Studio 10 Academic.

III. RESULT

Several variables from the research results and secondary data used in the simulation model, in detail are presented in Table 1.

Table 1. Variables Used in Model Simulation

Variable	Variable Value	Data Source
Total population	1,668,314 person	[1]
Population growth	1.003 % per year	[1]
Total of family head (KK)	467,405 KK	[1]
Waste water generation (TAL)	90.96 litre/person/day	[54]
BOD fraction of TAL (FBOD)	0.016 kg/person/day	[54]
BOD fraction of wasterwater reduction (FPK BOD)	Decreasing BOD 15%	[54]
BOD fraction of wastewater reuse (FPM BOD)	Decreasing BOD 5%	[54]
BOD fraction of effluent WWTP	0.007 kg/person/day	[54]
Effectiveness of WWTP performance (FK WWTP)	43.75%	[54]
KK that have access to the WWTP	1.235%	[54]
Average WWTP capacity	1.183 ton/years	[10]
Modeling periode	2013 up to 2038	-

A. Sub Model of Use of Clean Water and Waste Water Generation

The population growth of Makassar City averages 1.003% every year. The population of Makassar City in 2013 was 1,647,558 people, in 2017 there were 1,714,659 inhabitants and projected that by 2038 there would be 2,114,451 people. Increasing the population will also increase the use of clean water, then increase waste generation and the amount of BOD content. The simulation results show that the pollutant load of BOD wastewater generation in 2013 was 319,441.73 tons, in 2017 it increased to 332.451.84 tons and projected in the year 2038 will reach 409,966.60 tons. For details, can be seen in Figure 2 and Figure 3.

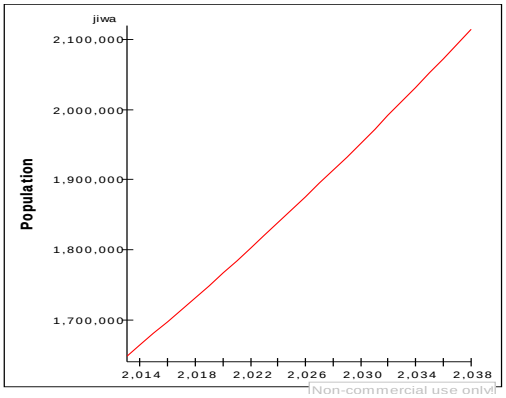


Figure 2. Projection of population growth of Makassar City until 2038

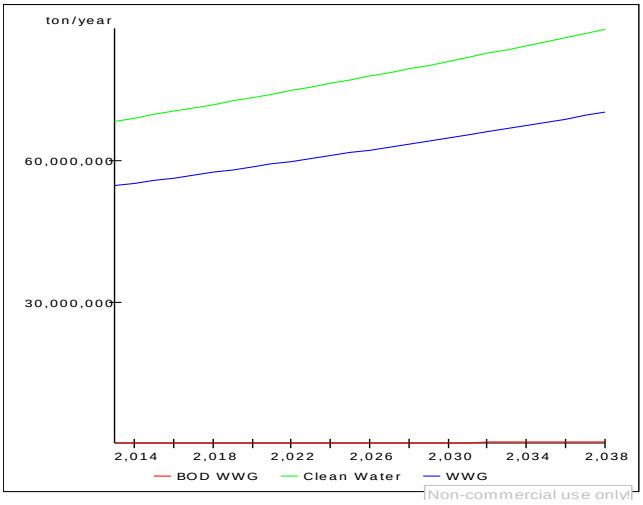


Figure 3. Clean water use, waste water generation (WWG) and BOD pollution load of waste water generation

Validation of the population growth model is done to see the performance of the model. The validation results show that the absolute mean error (AME) value is 0.015 and the absolute variance error (AVE) value is 10.27 or the validation level is good for the BOD sub model load pollution in waste water generation. For details, can be seen in Table 2.

Table 2. Performance validation of sub model the BOD pollution load of waste water generation

Yeasrs	Actual (person)	Simulation (person)
2013	1.647.558	1.647.558
2014	1.652.304	1.664.083
2015	1.653.386	1.680.774
2016	1.658.503	1.697.632
2017	1.668.314	1.714.659
Mean	1.656.013	1.680.941
AME	0.015	
AVE	10.27	

B. Sub model of decreasing BOD pollution load through wastewater reduction

The variables used in the sub-model of decreasing BOD pollution load through reducing wastewater are the reduction of wastewater to flush the yard or streets, water the garden or plants, and flush the toilet. Extension variables are not simulated in reducing wastewater because it will not directly affect the

decrease in BOD pollution load, but will only affect the reduction of waste water fractions. For details, can be seen in Figure 4.

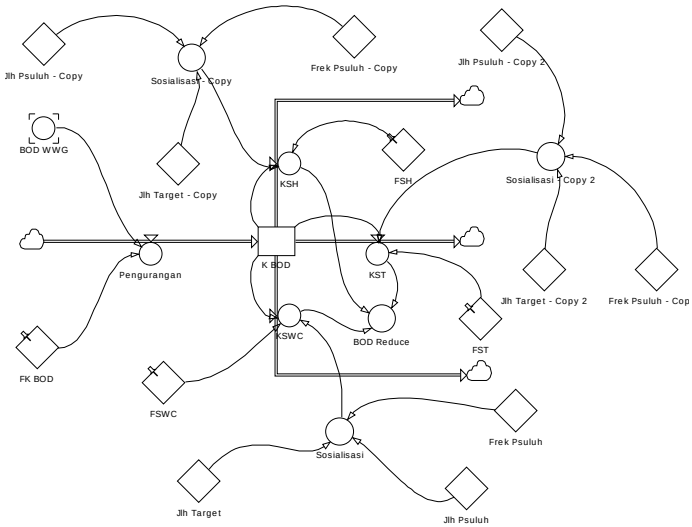


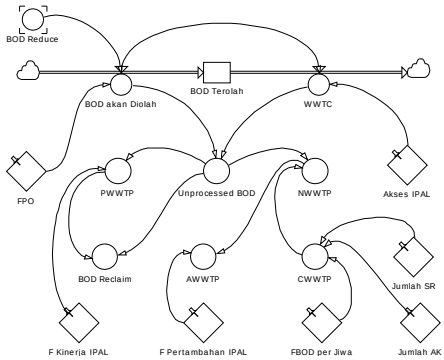
Figure 4. Stock flow diagram of decreasing BOD pollution load trough wastewater reduce

Increasing the population will be followed by increasing BOD pollution load contained in wastewater. Simulation results show that at the end of the year the simulation of BOD pollution load is projected to reach 409,966.60 tons, but the pollution load can be reduced by reusing wastewater for several daily activities, such as flushing toilets, watering plants or parks, watering yards and roads , and used for livestock consumption. The reduction of wastewater by reusing waste water will reduce the BOD pollution load in wastewater [23], [41].

The simulation results of waste water reduction sub model showed that in 2013 the reduced BOD pollution load was 47,916.26 tons, in 2017 it was 155,315.81 tons and at the end of the simulation in 2038 it was projected to increase to 379,122.26 tons. For details, can be seen in Figure 5 and Figure 6.

C. Sub model of decreasing BOD pollution load through waste water treatment

The variables used in the sub-model of decreasing BOD pollution load through wastewater treatment consisted of BOD processing capability, unprocessed BOD, WWTP requirements, IPAL increase, WWTP capacity, and WWTP performance. The inter-variable relationship is described in the stock flow diagram (SFD) of reducing BOD pollution load through wastewater treatment in Figure 7.



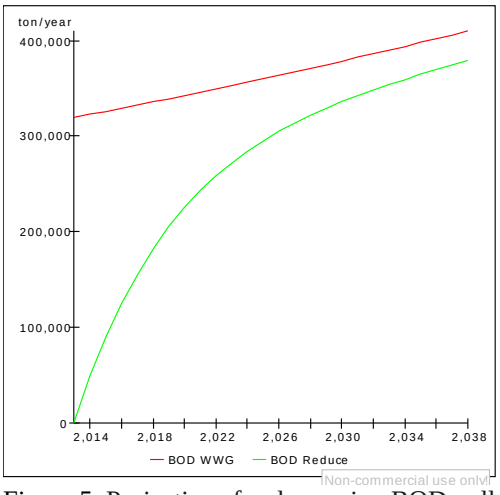
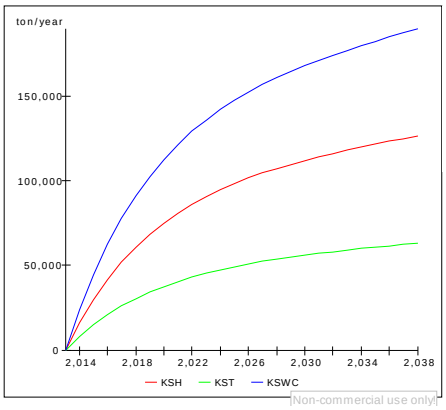


Figure 5. Projections for decreasing BOD pollution load through wastewater reduce



KSH = watering yard or road
KST = watering park or plants
KSWC = flushing

Figure 6. Projections decreasing BOD pollution load through wastewater reduce for watering park, plants, yard, road, and flushing toilet

Figure 7. Stock flow diagram of decreasing BOD pollution load through waste water treatment or recycle wastewater

Increasing population will also increase waste water generation. Increased waste water generation is not accompanied by an increase in wastewater treatment facilities or wastewater treatment plants (WWTPs). Simulation results showed that the processing capacity of wastewater BOD in 2013 was 154.92 tons, increasing to 1,918.15 tons in 2017 and projected at the end of the simulation in 2038 to reach 4,682.16 tons. Unprocessed wastewater BOD load in 2014 was 47,324.49, increasing to 153,397.66 in 2017 and projected at the end of the simulation in 2038 to reach 374,440.10 tons. For details, see Figure 8.

To reduce the BOD pollution load that enters the environmental media, WWTP infrastructure is needed. Based on the data obtained, the average capacity of the communal WWTP that has been operating is only able to treat BOD pollution loads of 1.1826 tons/year per unit WWTP [55]. Thus the number of WWTPs needed in 2014 was 40,017 units, in 2017 it increased to 129,712 units and at the end of the simulation in 2038 it was projected to reach 316,624 units. The government's ability to prepare communal WWTP infrastructure until 2017 is only 131

units or an increase of 0.731% per year. For details, can be seen in Figure 9.

The decrease in BOD pollution load contained in wastewater is largely determined by the performance of WWTP. Based on the data obtained, the performance of communal WWTPs to reduce BOD pollution load in wastewater is 43.75%. The pollution load after processing in WWTP shows that in 2014 amounted to 20,704.47 tons, in 2017 it increased to 67,111.48 tons, and projected at the end of the simulation in 2038 to reach 163,817.54 tons. Waste water treatment carried out can reduce the BOD pollution load in 2014 by 26,620.03 tons, in 2017 it increased to 86,286.18 tons, and projected at the end of the simulation in 2038 to reach 210,622.56 tons. For details, see in Figure 10.

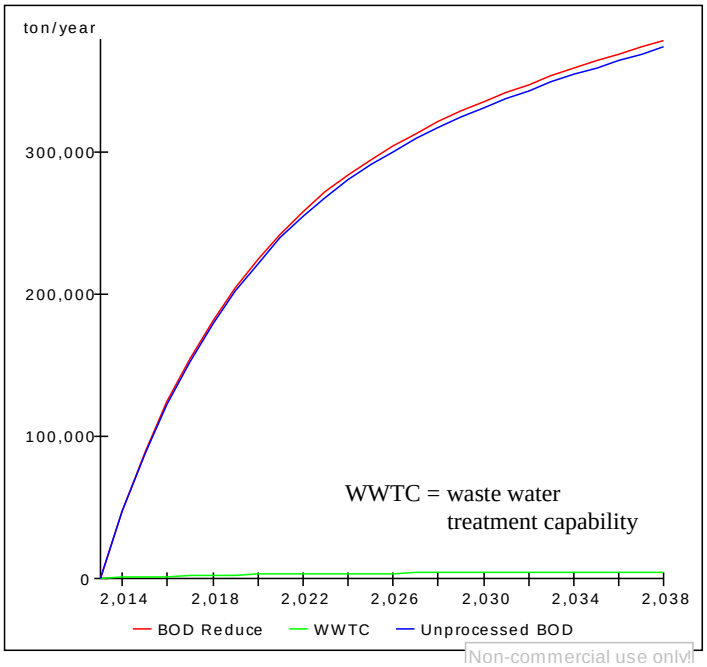


Figure 8. Projected decrease of BOD pollution load through recycle or waste water reclaim

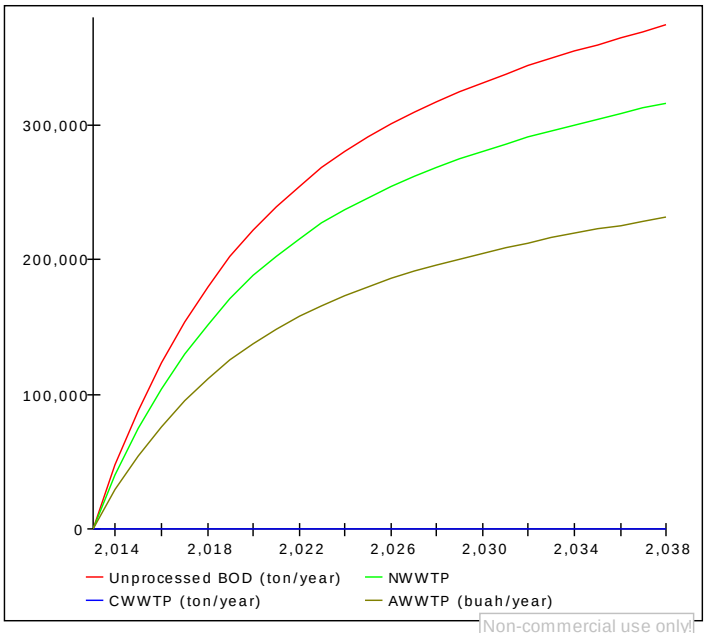


Figure 9. Projected needs and addition of waste water treatment plants to process BOD pollution loads

Where: WWTP = waste water treatment plant; AWWTP = added WWTP (unit/year); CWWTP = capacity of WWTP; NWWTP = need for WWTP

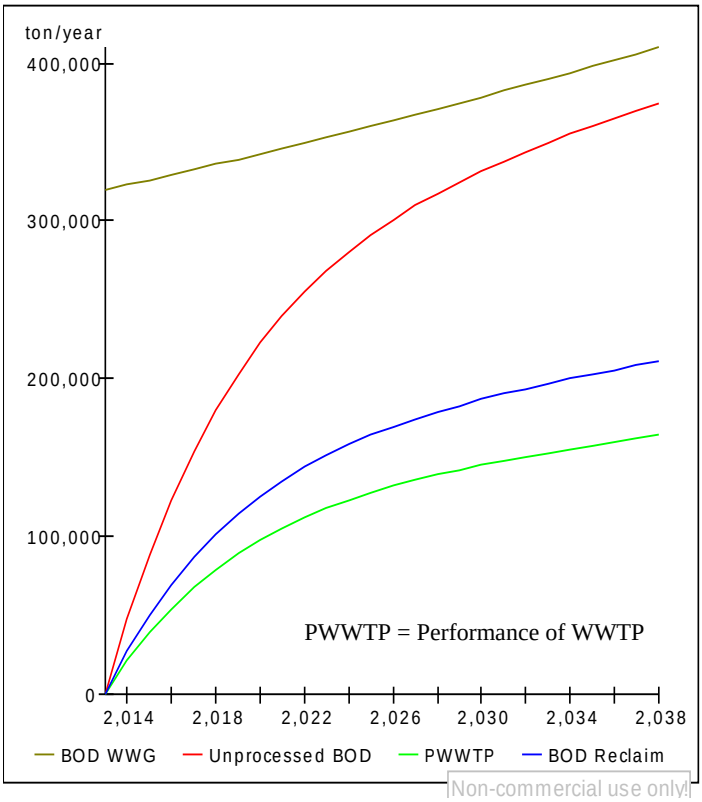


Figure 10. Projected decrease of BOD pollution load after processing using communal WWTP

D. Sub model of decreasing BOD pollution load through waste water reuse

Decreasing BOD pollution load through the use of waste water using variable utilization of wastewater to water the yard or street, watering the garden or plants, filling the fire extinguisher hydrant, injecting it into infiltration wells, BOD entering the environmental media, and counseling. The inter-variable relationship of decreasing BOD pollution load through the utilization of wastewater can be seen in the stock flow diagram Figure 11.

The BOD pollution load that will enter the environmental media even though it has been managed through the stages of reduction, processing and ultimately utilization will continue to increase along with the increase in population. The decrease in BOD pollution load through the utilization of wastewater in 2015 amounted to 1,331 tons, in 2017 it increased to 7,015.33 and at the end of the simulation in 2038 it was projected to reach 117,740.66 tons. Processed waste water that is used to water the yard or street and park or plant is equal in number, namely in 2015 amounting to 665.50 tons, in 2017 it increased to 3,507.66 tons and at the end of the simulation in 2038 it was projected to reach 58,870.33 tons . Waste water that has been treated to date has not been used to fill the fire extinguishing hydrant and injected into infiltration wells. For details, see Figure 12.

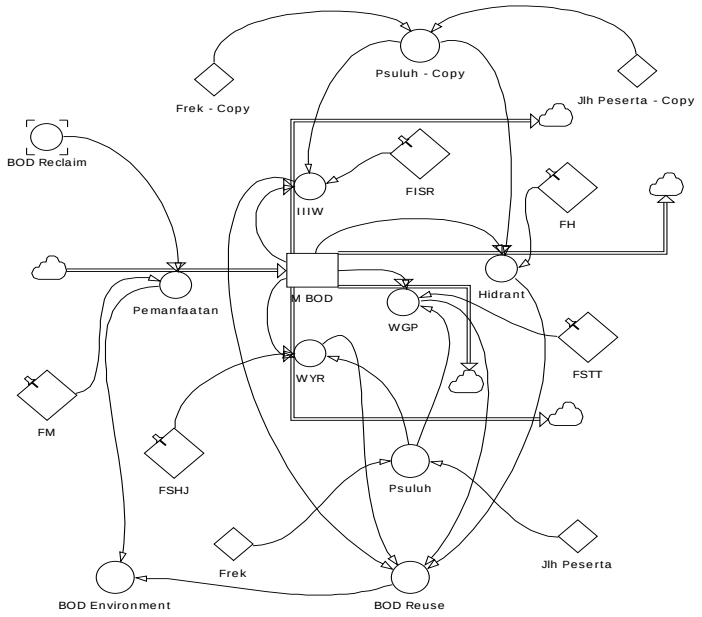


Figure 11. Stock flow diagram of decreasing BOD pollution load through waste water reuse

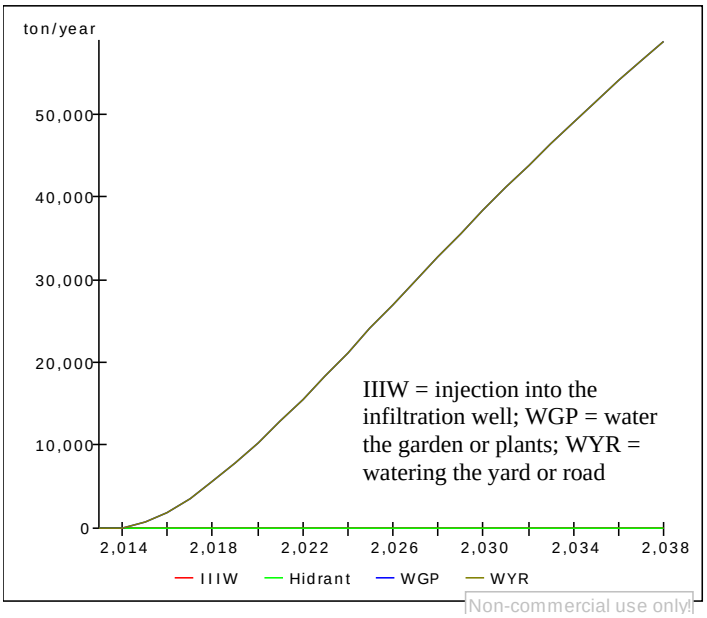


Figure 12. Waste water reuse

The BOD pollution load that enters the environmental media after management (reduction, recycle or reclaim and reuse of watewater) at the start of the simulation in 2013 was 143,304.48 tons, in 2017 it increased to 149,140.94 tons and the final simulation in 2038 was projected to reach 183,914.77 tons. Based on the simulation data, it shows that after waste water management has been carried out a decrease in BOD pollution load of 71.28%. For details, can be seen in Figure 13.

The BOD pollution load has decreased by 71.28% from bussiness as usual or without management, so that the BOD pollution load that will enter the environmental media is 28.72%. The biggest management stage in the percentage of reducing BOD pollution load is waste water treatment that is equal to 48.62%. For details, can be seen in Figure 14 and Table 3.

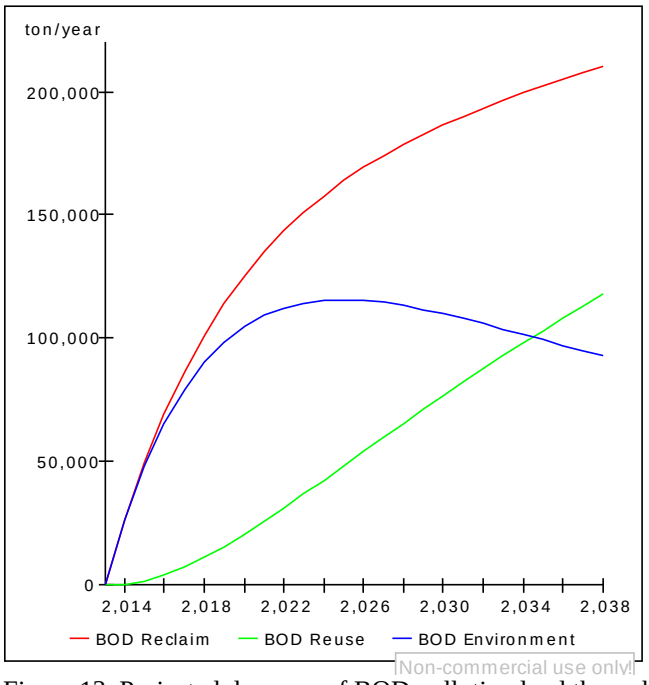


Figure 13. Projected decrease of BOD pollution load through wastewater reuse

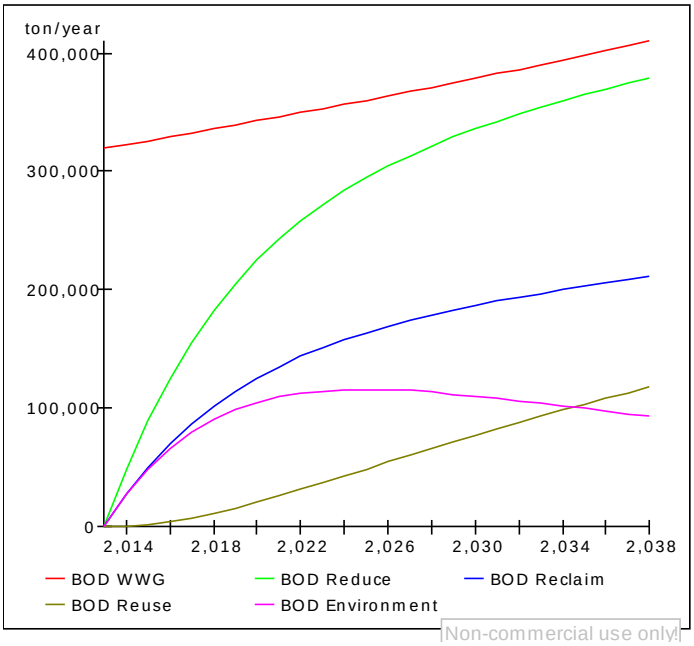


Figure 14. Projected of BOD pollution load that will enter to the environmental media after management

Table 3. Percentage of decreasing BOD pollution load in each management stage

Management stage	BOD pollution load (ton/year)	Percentage	
		Decrease	Accumulation
Without management	409,966.60	-	-
Reduce	379,122.26	7.52	7.52
Reclaim/ recycle	210,622.56	41.10	48.62
Reuse	117.740.66	22.66	71.28
BOD pollution load that enters the environment	92,881.90	28.72	100.00

IV. CONCLUSION

Management of household wastewater to reduce BOD pollution load can be done through the stages of reducing, recycle or reclaim and reusing (3R) wastewater. The reduction in pollution load should be carried out on all domestic wastewater quality parameters.

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Find out the reasons for the mathematical subjects to be difficult during the study of Class IX and to apply it

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Abstract- In this research, the students of Class IX studied the reasons for the difficulties of mathematics to find and apply it.The students of Class IX took pre-test and post-test.From this, I used to remember the use of knowledge, constructivism and practice in nature, in memory of the mathematical symbols Activity,tables and Formula rule properties.

Index Terms- process,add,table

I. Introduction

Students of Class IX are continually confuse in the formulas of the mathematical marking process.To reduce the confusion,To remove the fear of mathematical marked actions,To create the interest of mathematical symbols,To remove fears of tables,In order to keep the Formulas, rules memorized and to make the learner's interest in the subject of mathematics, knowledge based on knowledge and practice of nature becomes more profitable.

II. OBJECTIVES

1.To overcome the fear of mathematical operations.
2.Instant knowledge of the actions of mathematical symbols.
3.To make calculation actions better.
4.Removing the fear of table.
5.Remember the formula rules forever.
6.Strengthening the foundations of mathematics.
7.Perfect solutions of mathematical examples.
8.Creating a Mathematical Approach.

III. METHODOLOGY

Nanasaheb Sahadu Kadu Patil Vidyalaya,Satral taluka-Rahuri ,district-Ahmednagar here the students of class IX A first started discussions with them and found reasons for mathematical difficulties.In this, 74 students of the class registered their participation by registering 102 votes

Sr.No.	found reasons for mathematical difficulties.	Number of students vots	percentage
1	Sign convention process	47	46.08%
2	Tables problem	22	21.57%
3	Formula-rules	18	17.65%
4	others	15	14.70%

After this, they were guided and studing student in the usual way after taking the above incidents.then took unit test no 1.After eight to ten days, students have given an example of marriage arrangement for the sum of rules.Marriage is a combination that means gathering and joining is the sum.Now the people come together and they sit together and they get similar caps.

It is related to mathematical action.
similar people:-Number with the same sign as
Get together:-To add
Sit together:-Add it
Similar caps:-Give a similar sign
Example:-12+15=27
(-12)+(-15)=-27

The same marriage comes from different people.(Example leader) They come to the same marriage but there is a difference between them.

The Differentiation is difference and the difference is subtraction.in this case the respect is given to Reputed person,In this regard, the mathematical sign is added to the action.

Different people:-Numbers with different Sign.
get together:-to add
Difference in that :- To substract
Respect to reputed person:- Sign of large number given to the answer.

Example: (-12)+15=3
12+(-15)=-3

To multiply friends and enemies are told to use the relation between them. In this situation told them that '+' symbol is given for Friend and '-' for Enemy.
1.Friends Friend is our Friend

eg.12 X 5 = 60

2.Enemy's Enemy is our Friend

eg.(-12) X (-5) = 60

3.Enemy's Friend is our Enemy

eg.(-12) X 5 = -60

4.Friend's Enemy is our Enemy

eg.12 X (-5) = -60

In this way we use this for 1 and 10 table .The imformation is given for inverse table of 9 .When they perfectly knew table upto 2 to 8 then how to make the two digit table easy are imformed to them ,According to the below Table

Number in tables	First table	Table produce	Second table
1	9	97	7
4	36	388	28
7	63	679	49
9	81	873	63

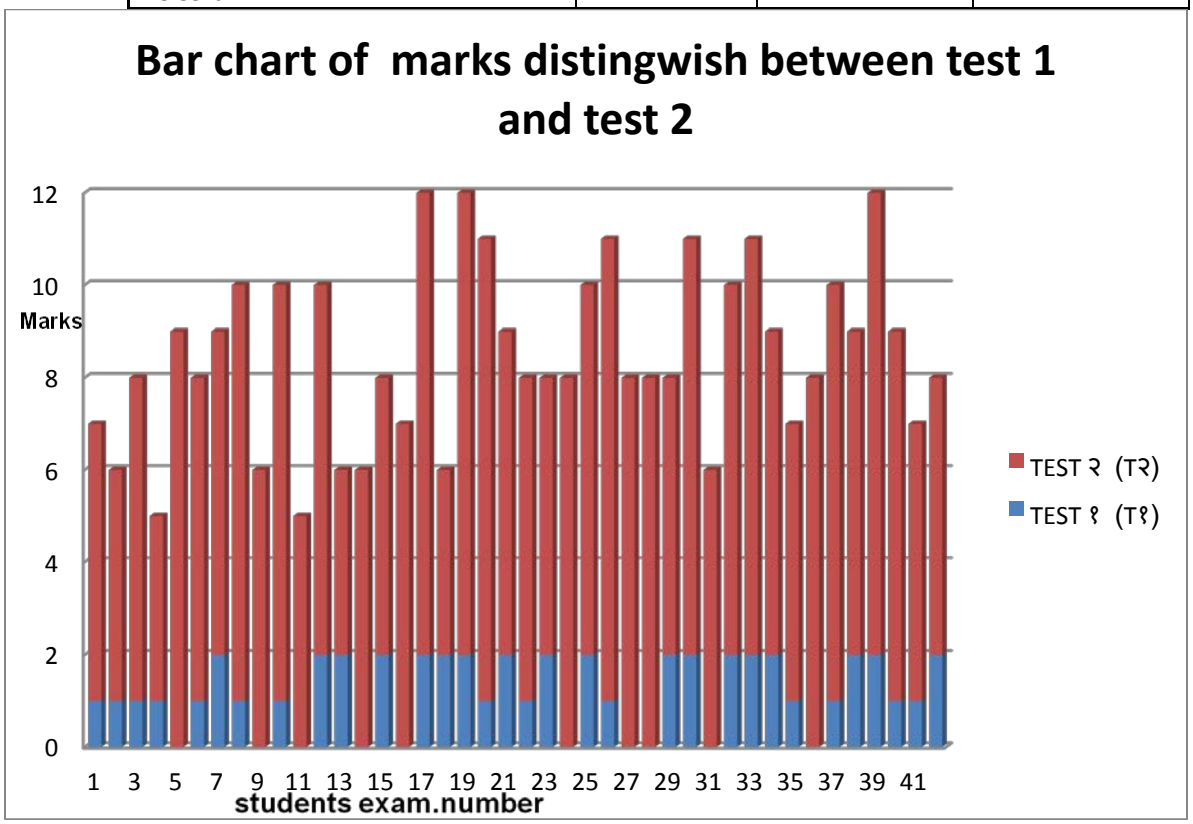
In this case 47 X 97 = (388+67)9 = 4559

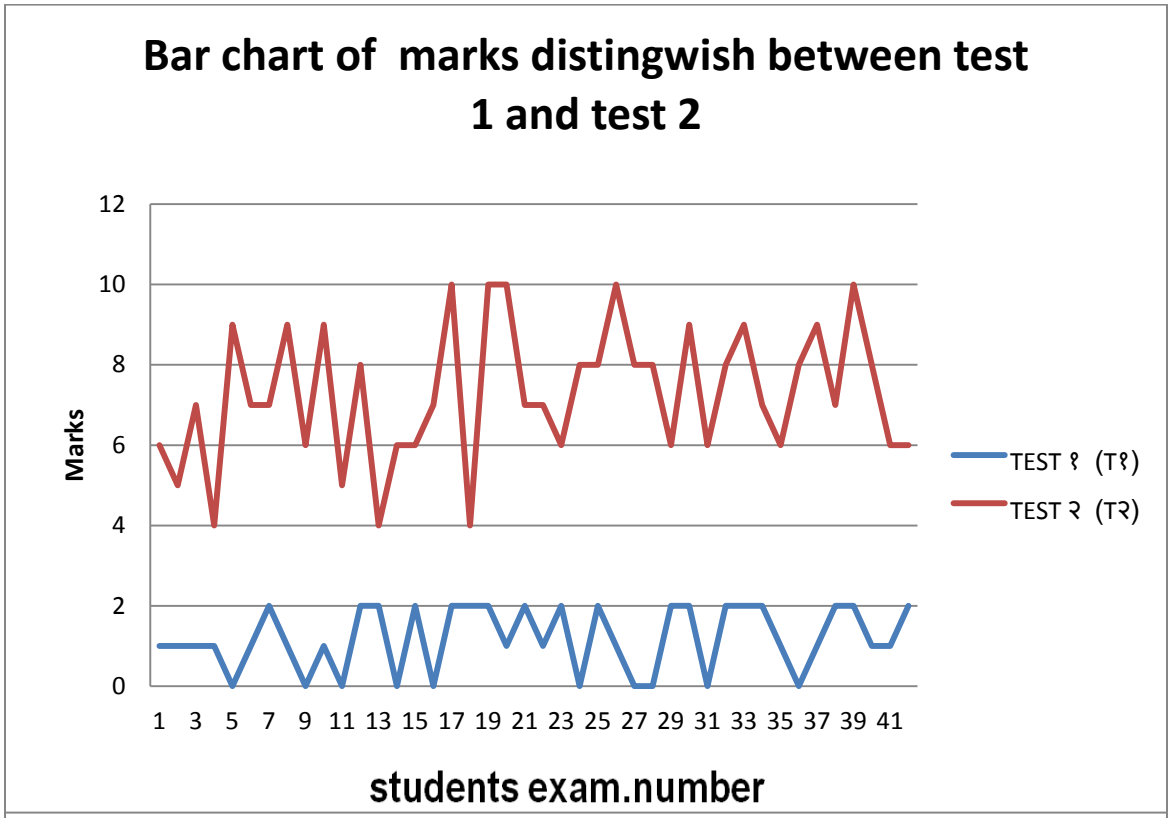
```
  47
 X 97
 ____
  679
 3880
 ____
 4559
```

For the formulas and rules, the use of the knowledge based system was used.After that, take the post-test 2.The graph draws the comparison between test 1 , test 2 and the total Average points.

SR.NO.	STUDENT NAME	TEST १ (T१)	TEST २ (T२)	diff.= T2-T1
1	Bhinhare Pranav Sachin	1	6	5
2	Dighe Aditya Changdev	1	5	4
3	Dighe Sarthak Subhash	1	7	6
4	Dighe Sujit Somnath	1	4	3
5	Dhepe Pramod Tukaram	0	9	9
6	Dukre Bhushan Dattatraya	1	7	6
7	Dukre Rohan Ramesh	2	7	5
8	Dukre Tushar Ashok	1	9	8
9	Harde Shubham Bhausaheb	0	6	6
10	Harde Shubham Sunil	1	9	8
11	Harde Vishnu Vijay	0	5	5
12	Hundare Sameer Nandkishore	2	8	6
13	Kadu Pavan Sanjay	2	4	2
14	Kadu Prajval Tatyasaheb	0	6	6
15	Kulkarni Gaurav Sunil	2	6	4
16	Londhe Tejas Rajendra	0	7	7
17	Musmade Arjun Gokuldas	2	10	8
18	Shinde Harshal Babasaheb	2	4	2
19	Sinare Kruishna Bhaskar	2	10	8
20	Sinare Dnyaneshwar Gopinath	1	10	9
21	Sinare Prashant Popat	2	7	5
22	Sinare Satyam Rajendra	1	7	6
23	Vani Nitin Dnyandev	2	6	4
24	Anap Onkar Sudhakar	0	8	8
25	Antre Chetan prashant	2	8	6
26	Ghodekar Rushikesh Dattatraya	1	10	9
27	Gite Rohan Raibhan	0	8	8

28	Gite Sanket Dattatraya	0	8	8
29	Hajare Rohit Ashok	2	6	4
30	Nidhane Subodh Rajendra	2	9	7
31	Sajan Ritesh Raju	0	6	6
32	Shinde Gaurav Manohar	2	8	6
33	Shinde Jay Bhausaheb	2	9	7
34	Shinde Prathamesh Sampatrav	2	7	5
35	Shinde Shubham Bhagunath	1	6	5
36	Tathe Ashvin Satish	0	8	8
37	Shingote Mahesh Bharat	1	9	8
38	Kahar Kartik Santosh	2	7	5
39	Pandure Aditya Manish	2	10	8
40	Khilari Onkar Pandharinath	1	8	7
41	Vadge Shubham Bhaskar	1	6	5
42	Repale Swapnil Ajit	2	6	4
	Total	**50**	**306**	**256**
	Avg.	**1.19**	**7.29**	**6.1**
	Persent	**11.9**	**72.9**	**61**




Bar chart of marks distingwish between test 1 and test 2
Marks
12
10
8
6
4
2
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41
students exam.number
TEST १ (T१)
TEST २ (T२)

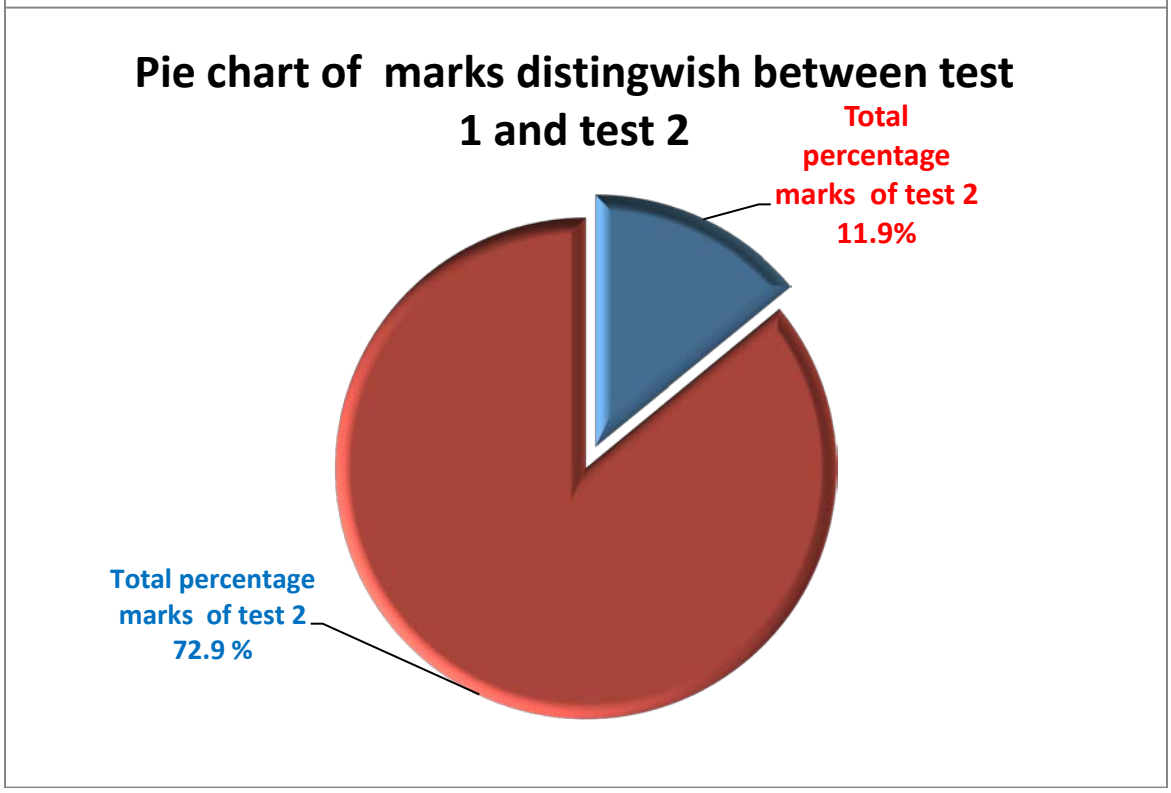

Pie chart of marks distingwish between test 1 and test 2
Total percentage marks of test 2 11.9%
Total percentage marks of test 2 72.9 %

Figure Experimenting with children under the guidance of researcher.

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IV. CONCLUSION

The above experiment revealed that,It is interesting and Lasting forever to study the nature of mathematics rather than teaching the subject using the traditional method of study of knowledge and the practice of trials.

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Modulation of carcinogenicity by *Andrographis paniculata* extract

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Abstract- In the present investigations, the anticarcinogenic activity of Andrographis *paniculata* leaves and whole plant extracts was evaluated using two stage protocol in skin papillioma model in *Swiss albino* mice . It is a widely used medicinal plant and used in various indigenous systems of medicine. The prevention of papillomas in DMBA + *Andrographis paniculata* leaves and whole Plant extract + croton oil treated group was observed in The mice which was initiated by DMBA followed by croton oil . The different parameters like tumor incidence, cumulative number of papillomas, tumor yield and tumor burden were measured which showed decreased in Andrographis extact treated groups. Whole plant extract of *Andrographis Paniculata* showed cytotoxic activity in different concentration starting from 10µg/ml and leaf extract of *the plant* showed in the concentrate from 250µg/ml after 24 hour. The glutathione level was also measured in blood and liver tissues of treated mice which showed increased level in the animals which received the treatment of Andrographis extract along with DMBA + Croton Oil. The results showed that Andrographis extracts have cytotoxic and anticarcinogenic potential in the test systems used.

INTRODUCTION

Medicinal plants are an important flora which are wildly distributed in India. Plant-based medicines still play an important role in the primary healthcare of 80% of the world's population in both underdeveloped and developed countries (De S., 2012).

One of the most dreaded diseases of the recent Century is Cancer that is spreading further with increasing in 21st century. Cancer is an uncontrolled growth of cells resulting in lack of differentiation and ability to invade local tissues and metastasis which are proliferate individually throughout the body. During metastasis, cancer cells enter the blood stream and are carried forward to distant parts of the body where they form other similar growths (Jemal et al., 2008). Cancer involves changes or mutations in the cell genome. These changes (DNA mutations) produce disrupt the delicate cellular balance between cell division and quiescence, resulting in cells that keep dividing to form cancers. Cancer is responsible for several deaths worldwide more than AIDS, tuberculosis, and malaria together (Sener SF., 2005).

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Nature has provided human a variety of useful sources mainly plants for discovery and development of drugs against dreadful diseases (Joselin and Jeeva., 2014). India has been identified as a major resourceful area in the traditional and alternative medicines globally. *Andrographis paniculata* is commonly known as the "king of bitters" because of its taste. It is a herbaceous plant belonging to the Acanthaceae family and is found throughout tropical and subtropical Asia, Southeast Asia (R. A. Kumar et al., 2004); and Asian countries like India, Sri Lanka, Pakistan, Java, Malaysia and Indonesia (Shahid A., 2011; Kabeeruddin M.,1937). In India, *A. paniculata* is known as "Kalmegh" (R. A. Kumar et al., 2004). The genus Andrographis consisits of 28 species of small annual herbs essentially distributed in tropical Asia. *A. paniculata* is the most popular in medicinal plants (Chopra RN et al., 1956) and ranks seventeenth position among their thirty two prioritized medicinal

plants (Anonymous., 2007). *A. paniculata* is an important constituent of at least 26 Ayurvedic formulas in Indian pharmacopoeia (Deng WL.,1978). The medicinal value of A. paniculata plant is due to the presence of active ingredients viz andrographolide and neoandrographolide which are derivatives of diterpenoids present in leaves (Mohammad Abu Bin Nyeem., 2017). This plant contains important bioactive compounds steroids, phenols, terpenoids, alkaloids, saponins, flavonoids and xanthones that showed an important pharmacological activities such as antidiabetes, antidiarrheal, antibacterial, cardiovascular benefits, anti-inflammatory and hepato protective benefits (Jarukamjorn et al., 2010; Mukherjee et al., 2006; Mohammad Abu Bin Nyeem., 2017). Since cancer treatment in traditional medical systems is being considered, therefore we have planned to carry out this study to evaluate the anticarcinogenic effect of Andrographis extract in experimental animals by using *Skin Papilloma and cell toxicity studies using Hela Cells line in Vitro of Andrographis paniculata* leaves and whole Plant extracts.

Materials and Methods

Chemicals

7, 12 - Dimethylbenz (a) anthracene (DMBA), croton oil,3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) were purchased from Sigma Chemicals Co. ,St. Louis, MO. USA. The other chemicals were obtained from local firms and were of the highest purity.

Animals

The experimental study was conducted on random bred, 6-7 weeks old and 24- 28 gm body weight of male *Swiss albino* mice. Animals were maintained under controlled conditions of temperature (24 ± 3^0C) and light (Light: dark, 10 hrs: 14 hrs.). The animals were provided with standard mice feed and tap water *ad libitum*. The experiment was approved by Institutional animal ethic committee before conduction of the experiment.

Preparation of *Andrographis paniculata* Leaves and Whole Plant Extract

Plant material of *Andrographis paniculata* was collected and the specimen was authenticated by the botanist of Deendayal Research Institute, Chitrakoot, Satna, Madhya Pradesh (India). The non-infected leaves and whole Plant was washed, air dried, powdered and extracted separately using 50 % methanol in a separating funnel. Extract thus obtained were vacuum evaporated into powder. These extract was again dissolved in DDW immediately prior topical application.

Experimental Protocol for Anticarcinogesis : One day before the commencement of the experiment, hair on the interscapular region of the mice were shaved. Only the mice showing no hair growth were selected for the study. The animals were randomly allocated into 8 groups comprising of six mice each. The treatment was provided topically on shaved area as described by Berenblum, (1975) and standardized by Agrawal et al *(* 2009) and Sonam and Agrawal (2010)

Treatment Groups

Group 1 (Vehicle control): 100 µl acetone 2 times /week up to 16 weeks

Group 2 (DMBA Alone): - 100 µg DMBA was dissolved in 100 µl acetone and single application was given.

Group 3 (Croton Oil Alone): - 1 % Croton oil was applied on skin 2 times a week up to 16 week.

Group 4 (DMBA + Croton Oil): - 100 µg DMBA was dissolved in 100 µl acetone and single application was given afterwards 1 % Croton oil was applied on skin 2 times a week up to 16 week

Group 5 (*Andrographis paniculata leaves* extract Alone): - Andrographis leaves extract was topically applied to skin at the dose of 3000 mg/kg b. wt up to 16 week.

Group 6 (DMBA + *Andrographis paniculata leaves* extract + Croton Oil): - Single application of DMBA to skin at the dose of 100 µg DMBA in 100 µl acetone afterwards the 100 µl dose of *Andrographis paniculata* extract at the dose of 3000 mg/kg b. wt. was given one hour before the each application of 1% croton oil twice a week up to 16 weeks.

Group 7 (*Andrographis paniculata whole plant* extract Alone): - Andrographis whole plant extract was applied to skin at the dose of 3000 mg/kg b. wt up to 16 week.

Group 8 (DMBA + *Andrographis paniculata whole plant* extract + Croton Oil): - Single application of DMBA at the dose of 100 µg in 100 µl acetone afterwards the 100 µl dose of *Andrographis paniculata whole plant* extract at the dose of 3000 mg/kg b. wt. was given one hour before the each application of 1% croton oil twice a week up to 16 weeks. The animals of all groups were kept under observation for gross and microscopic changes in skin.

The following parameters were observed : Body weight, tumor incidence: cumulative number of papillomas: tumor yield .

And tumor burden:

Biochemical Study: Biochemical alterations were studied in all the groups at the time of termination of the experiment (i.e., at 16th week). The hepatic level of glutathione (GSH) was determined by the method of Moron *et al. (*1979). The GSH content in blood was measured spectrophotometrically using Elman's reagent with 5-5, dithiobis-2-nitrobenzoic acid (DTNB) as a reagent, according to the method of Beutler *et al.*, (1963).

MTT Assay

Extract of whole plant and leaf of *Andrographis paniculata* on Hela cell line was determined by MTT assay as described earlier (Mosmann, 1983). For MTT assay, Hela cells were cultured and treated with different concentrations of extract (0-1000 µg/ml, 5µl/100ul of cell suspension) for 24 hours. 2 hours prior to the termination of experiment, MTT was added to cell culture at 0.25 mg/ml (5µl of 5mg/ml in 100µl of cell suspension) concentration. At the end of the experiment, culture supernatant was removed and cell layer was dissolved in DMSO and further read in a plate reader (BioTek Instruments Inc, Vermont, USA) at 550 nm and 660 nm.

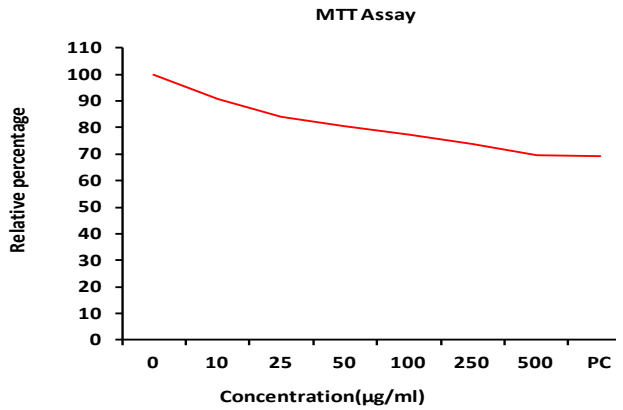
Result

The result of the anticarcinogenic studies have been summarized in Tables 1 and 2. Single topical application of DMBA followed by croton oil, produced skin papillomas, which started appearing from the sixth week onward. The tumor incidence in the DMBA + croton oil treated mice (carcinogen control) reached 100% by the end of the experiment (16 weeks). The cumulative number of papillomas in carcinogen control mice was recorded as 35. The average number of papillomas per mouse (tumor yield) as well as the papillomas per papilloma-bearing mice (tumor burden) was found to be 5.83 which was reduced in the group which received the treatment of *A. Paniculata* leaves and whole Plant extracts at the dose at 3000 mg/kg body weight (groups VI and VIII). The tumor incidence in Andrographis leaves and whole plant ecxtract groups was found to be 66.66% and 83.33% by the end of the experiment (16 weeks). The values of cumulative number of papillomas and tumor yield were recorded as 17and 21 and 2.66 and 3.5 respectively. Vehicle Control, *Andrographis paniculata* Leaves extract alone and Whole Plant extract alone, Croton oil alone and DMBA alone groups did not induced any tumor incidence.

The increased glutathione (GSH) activity was noticed in blood and liver in the *Andrographis paniculata* Leaves and Whole Plant extract animals as compared to carcinogen control animals (Table 2).

The cytotoxicity of the plant was determined by Hela Cell lines in Vitro model. The highest non cytotoxic dose of whole plant extract of *Andrographis paniculata* after 24 hours of treatment was observed 25µg/ml by MTT assay . Whole plant extract of *Andrographis Paniculata* at highest *concentdration* (500µg/ml) showed 69 % cell death. The highest non cytotoxic dose of leaf extract of *Andrographis paniculata* after 24 hours of treatment was observed to be 250µg/ml by MTT assay (Fig. 2). Leaf extract of *Andrographis Paniculata* showed 74% cell death at concentration of 1000 µg/ml (Fig 1 & 2).

Figure 1: Effect of whole plant extract of Andrographis Paniculata on HeLa cell line for 24h by MTT Assay



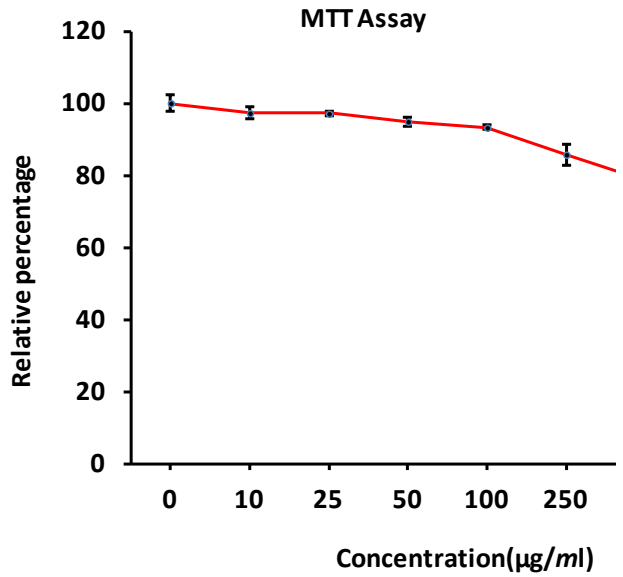


Figure 2: Effect of leaf extract of *Andrographis paniculata* on HeLa cell line for 24h by MTT Assay

Discussion

The present studies demonstrates anticarcinogenic and cytotoxic potential of Andrographis paniculata extract for DMBA-induced skin tumorigensis and in Hela cells in Vitro Skin carcinogenesis model in experimental animals has been found to be a useful when for investigating the chemopreventors influences both mechanistically and operationally (Morse EC, Stoner G. 1996). Topical application of TPA (active constituent of croton oil) has been reported to increase production of free radicals (Huachen et al., 1991). This is perhaps due to the free radical oxidative stress that has been implicated in the pathogenesis of a wide variety of clinical disorders (Das, U.N., 2002). Hydro-alcoholic extract of A. paniculata was reported by Singh RP *et al*. and indicated the chemopreventive potential of A. paniculata against chemotoxicity on drug metabolizing enzymes, antioxidant enzymes, glutathione content, lactate dehydrogenase (LDH), and lipid peroxidation in the liver of Swiss albino mice. A positive anticancer and immunomodulatory activity of the methanolic extract were also repored by Kumar *et al*.(2004) for human cancer cells. The plant extract may have inhibited the metabolism of DMBA to its active form, delayed the promotion phase of carcinogenesis, or down regulated reactive oxygen species formation (Kausar H, et al., 2003; . Sancheti G et al., 2005; Kumar M et al., 2006). There are few reports on the cytotoxic and antiproliferative effects of *Andrographis paniculata* up on in vitro cell lines .It also increased expression of p53, bax and caspase-3 and decreased bcl-2 expression as shown by immunohistochemical analysis was reported (Harjotaruno et al., 2007). All these data suggest that *Andrographis paniculata* as a novel, potential agent in the area of cancer chemoprevention . Further research is required in this direction.

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Table1.- Effect of *Andrographis paniculata* Leaves and Whole Plant extract on Cumulative No. of Papilloma in *Swiss albino* mice

S.No.	Groups	Body Weigh(Mean +_SEM)		1st appearance of Papilloma (In days)	Cumulative No. of Papilloma	Tumor Incidene (%)	Tumor Burden	Tumor Yield
		Initial	Final					
I	Vehical alone	27.78±1.06	31.48+-0.94	0	0	0	0	0
II	DMBA alone	27.03±0.97	30.5±1.08	0	0	0	0	0
III	Croton Oil alone	26.95±1.53	30.43±1.41	0	0	0	0	0
IV	DMBA +CO(Control)	27.41±0.76	30.4±0.80	37	35	100	5.83	5.83
V	A.P. Leaves extrat alone	27.31±1.10	30.93±0.71	0	0	0	0	0
VI	DMBA +A.P.Leaves +CO	27.05±1.20	28.18±1.47	58	17	66.66	4.25	2.66
VII	A.P.Whole Plant extrat alone	26.73±1.14	30.08±1.04	0	0	0	0	0

VIII	**DMBA +A.P. A.P.Whole Plant extrat +CO**	**26.08±2.15**	**27.13±2.23**	**53**	**21**	**83.33**	**4.20**	**3.5**

Table2 -The level of Glutathione (GSH) in Blood and Liver of *Swiss albino* mice(DMBA-induced Papilloma) treated with *Andrographis paniculata* Leaves and Whole Plant extract

S.No.	**Groups**	**Glutathione (GSH)**	
		Leve lBlood (µg/ml)	**Liver (µg/ml)**
I	**Carcinogen Control (DMBA + CO)**	**1.65±0.04**	**14.95±9.75**
II	**DMBA +A.P.Leaves extrat +CO**	**2.12±0.42**	**46.33±28.36**
III	**DMBA +A.P. A.P.Whole Plant extrat +CO**	**3.27±0.05**	**45.07±44.79**

Spatial Analysis of Diarrhoea in Brebes District, Indonesia

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Abstract- Diarrhea cases in Brebes District by the year 2016 increased more than 60% from year earlier. The objective of this study was to determine the priority intervention areas of diarrhea cases related to environmental sanitation, behavior and community access parameters based on the Brebes District Health Profile, 2016. Priority areas display spatial information in thematic maps that provides benefits, convenience and control through the output categorized into three levels of good, moderate and poor. This study uses spatial analysis methods at the sub-district level utilizing ArcView GIS 3.3 software considering the variety of topography and diverse population densities in Brebes District. The highest incidence diarrhoea (14%) is in Brebes sub-district, while the lowest (2%) is in Salem sub-District. The main priority for intervention is Larangan sub-district with poor category. The third priority is Salem sub-district with Good category, and others categorized in moderate as the second priority. Low community access over water providers aspect (<25%), moderate both in Environmental Sanitation and Healthy Lifestyle. High Community Led Total Sanitation (30.77%) applied in Salem sub-district. Promoting in healthy household, Community Led Total Sanitation, healthy hygiene habits and monitoring over drinking water provider it is expected to prevent diarrhoea in the future.

Index Terms- ArcView GIS, Diarrhoea, Priority intervention area, Spatial analysis

I. Introduction

Diarrhoea remain the second leading cause of death and morbidity in the world. Nearly 1.7 million cases of Diarrhoea occur with a total death of around 525,000 deaths every year. Diarrhoea widespread over developing countries due to several factors such as low awareness of good hygiene and sanitation, unsuitable water for consumption, lack of nutrition and poor of public health status. Almost 780 million people over the world do not have access to proper drinking water and 2.5 billion people live with poor sanitation. Another condition of Diarrhoea can lead to reduced nutrition for growth, and malnutrition conditions make a person vulnerable to disease and experiencing illnesss.[1]

Other contributing factors to the prevalence of Diarrhoea are inadequate clean water, fecal contaminated water, lack of hygiene facilities such as latrines, lack of sewerage system, open defecation, poor environmental hygiene, poor personal hygiene and improper food preparation and storage.[2,3,4,5] Hosts factor in human for Diarrhoea include malnutrition, immunodeficiency, breastfeeding and comorbidities.[6,7] Direct and indirect Factors such as agent, host, environment and lifestyle factors can be a driver of Diarrhoea. Another factor that also plays a role in the prevalence of Diarrhoea in terms of sociodemographic is vocation and education level of mothers of children under five. [8]

Diarrhoea is an endemic disease that contributes to death in Indonesia. Diarrhoea morbidity rates in Indonesia tend to increase, based on diarrhea morbidity survey in 2014 there were 411 incidences per 1000 population. During 2016 diarrhoea outbreaks occurred in 3 provinces and 3 districts caused 198 cases and 6 deaths. Central Java Province contribute 56 cases and 3 deaths occurred during outbreak. Cases handling in Central Java Province showed a relatively small number (10.5%).[9] One of the districts in Central Java is Brebes, which is categorized as a district that needs special attention, because some indicators of environmental, maternal and child health are still low.

Brebes district is the most populated district in Central Java Province. In terms of environmental achievement, coverage of villages applied community led total sanitation is very low in 8.77%, food hygiene vendor 54.36%, heathy household 53.04% and healthy hygiene habit 70.84% and healthy latrine 64.92%. In terms of maternal and child health services, Brebes is the district with the lowest ANC4+ coverage, which was 86.63 and has the highest cases of maternal deaths, which was 52 cases. In the percentage of service for children under five even Brebes district is also among the lowest, which was 26.94 percent and the number of cases of malnutrition with indicators of body weight according to the highest body height is in Brebes district, namely 92 cases. Cases of diarrhoea that handled in Brebes Regency by the year 2016 increased to 76.9% from 12.5% in 2015.[10,11,12]

The Hendrik L. Blum concept of health paradigm stated that the lifestyle and environment plays a role as a causal factor, support, transmission media or aggravate existing diseases.[13] Brebes District has various environmental form of topography and population density between sub-district.[14] Utilization of the Geographic Information System to conduct spatial analysis provides benefits, convenience and control through the output of deployed in thematic map images. Spatial analysis of diarrhoea has not been done at the Brebes District level. Conducting analysis based on environmental conditions supported by developed system information is needed.[15] The analysis goals to anticipate the incidence of diarrhoea outbreaks that have the potential to cause death. The analysis is expected to be effective in determining the necessary health handling related to diarrhoea in Brebes District. The objective of this study was to determine the priority intervention areas of diarrhea cases related to environmental sanitation, behavior and community access.

II. METHODS

This study uses quantitative descriptive method with ecological approach to analyze the association between lifestyle and environment condition in Brebes areas with the incidence of diarrhea at the whole population of the district by the year 2016. The Data source that used is secondary data of Brebes District Health Profile year 2016. The district health profile collected based on the results of the implementation of minimum services in the health sector. The district health profile contains 120 health indicators that describe the situation and condition of public health in Brebes District, including diarrhea incidence and influenced factors. The data profile published on the incidence of diarrhoea and the factors that influence the incidence has not been analyzed spatially.

Diarrhoea cases related to the percentage of people who have access to clean water, the percentage of healthy hygiene habits, the percentage of healthy household (HH), the number of villages with Community Led Total Sanitation (CLTS), the percentage of drinking water providers (DWP) that meet health requirements, the number of food processing sites (FPS), percentage of population with access to proper sanitation / healthy latrine (HL).[2,8,16]

Diarrhoea prevalence were classified based on sub-districts while the priority areas of intervention were analyzed based on scoring and weighting on parameters like Environmental Sanitation Factors (healthy household, Community Led Total Sanitation and food processing sites), Lifestyle Factors (healthy hygiene habit) and Community Access Factors (access to clean water, access to proper sanitation / latrine and quality of drinking water provider). Algorithm for scoring and weighting through mathematical equations, the results of this equation determine where priority areas of intervention that show low, medium and high value with the formula below.

$$X = \sum_{i=1}^{n} (Wi \times Xi)$$

Descriptions:
X = Score of the intervention priority
Wi = Weight on parameter-i
Xi = Score on parameter-i

Analysis was carried out using Arcview GIS 3.3 software produced by ESRI (Environmental Systems Research Institute) so that it can display spatial information and create thematic maps based on obtained spatial data.[3] Outputs of thematic maps that deployed by software describe priority intervention area in three categories which are good (for the lowest X value), moderate (for medium X value), and poor (for the highest X value). This study approval was granted by research ethics and community engagement committee from the University of Indonesia's Faculty of Public Health dated on May 14, 2019 No. KET-354/UN2.F10/PPM.00.02/2019

III. RESULT

Geographically, Brebes District located in the northern part of Central Java Province between 108^0 41' 37,7" - 109^0 11' 28,92" Long and 6^0 44' 56,5" - 7^0 20' 51,48" Lat, with neighbouring locations to the West Java Province and other district namely Cilacap, Tegal and Banyumas. Neighbouring location has influence as a causal factor, support, transmission media or aggravate existing diseases.[13] Diarrhoea outbreak in 2016 occurred in Tegal district that neighbouring with sub-Districts namely Jatibarang, Songgom, Brebes, Tonjong Sirampog, Paguyangan and Larangan. Brebes District population was 1,788,880 people, Calculated with 1,663.39 km2 wide area, the average population density in Brebes District is 1,075.72 people for every square kilometre, meant density is very high population according to UU No. 56/PRP/1960 and the density of inhabitants with close contact between people are potential for rapid spread of communicable disease.[17,18]. The furthest north-south distance is 58 km and east-west are 50 km. There are 292 villages (98.32%) spread in 17 sub-Districts and there are only 5 sub urban villages (1.68%). The condition of the Brebes District area is 87.54% categorized as rural areas, while the population of Brebes District is the largest percentage of the population living in urban areas. Based on the topography, the area is divided into 3 parts, namely coastal areas, lowlands and highlands. The north is a flat coastal area, the middle area is a lowland to hills and the south is a mountainous area.[19,20]

Health facilities in Brebes District consist of 9 Hospitals, 38 Public Health Centre "Puskesmas" in 17 sub-Districts, 22 of them are inpatient facility and has 60 satellite health centers "Puskesmas Pembantu". Mobile health centers consist of 56 units with PKD (Village Health Post) as many as 236 units. The number of Clinics (primary and specialist) is 23 units and GP are 70 units.[10]

The prevalence of Diarrhoea treated in Brebes District in 2016 was 48028 cases. High category area in prevalence of diarrhoea consist of 6 sub-Districts (Bantarkawung, Ketanggungan, Songgom, Jatibarang, Brebes and Larangan) but the highest cases were in Brebes sub-District as many as 6506 cases (14%). While low category in prevalence if diarrhoea consist of 4 sub-Districts (Sirampog, Tonjong, Kersana and Salem) and the lowest cases were in Salem Sub-District as many as 978 cases (2%). The average case in that year was 2825 cases (5.8%). (Table 1)

Table 1. Characteristic of Brebes District by the year 2016.

Sub-Districts	Total Area (Km^2)	Population	Population Density	Cases of Diarrhoea	Percent
Salem	152.09	59 706	393	978	2%
Bantarkawung	205.00	89 158	435	3 942	8%
Bumiayu	73.69	97 980	1 330	2 420	5%
Paguyangan	104.94	100 454	957	1 926	4%
Sirampog	67.03	63 982	955	999	2%
Tonjong	81.26	66 437	818	1 306	3%
Jatibarang	35.18	85 949	2 443	3 782	8%
Larangan	164.68	139 771	849	4 526	9%
Ketanggungan	149.07	137 573	923	5 091	11%
Banjarharjo	140.26	121 574	967	2 234	5%
Losari	89.43	122 581	1371	2 186	5%
Tanjung	67.74	95 819	1415	1 979	4%
Kersana	25.23	59 027	2 340	1 120	2%
Bulakamba	102.93	169 542	1 647	2 733	6%
Wanasari	74.44	149 644	2 101	2 532	5%
Brebes	80.96	160 050	1 977	6 506	14%
Songgom	49.03	69 633	1 420	3 768	8%
Total	1 662.96	1 788 880	1 076	48 028	100%

Source: Brebes District Health Profile year 2016; BPS Statistic of Brebes District year 2016

The environmental sanitation shows that most of area in Brebes District are moderate category (15 sub-Districts). The sub-District with good category in environmental sanitation is Salem. While the sub-District with poor category in environmental sanitation is Banjarharjo. (figure 1)

Areas with high category in lifestyle factors (77.13 - 99.09%) are in 7 sub-Districts namely Tanjung, Banjarharjo, Salem, Bantarkawung, Bumiayu, Sirampog and Ketanggungan. Whereas the percentage are low (35.89 - 55.89%) located in 4 sub-Districts namely Losari, Songgom, Larangan and Tonjong Sub-Districts. The other 6 sub-Districts, namely Brebes, Kersana, Bulakamba, Jatibarang and Paguyangan are moderate (55.89 - 77.13%). (Figure 2)

Most area (11 sub-Districts) in Brebes District have moderate category in community access like access to clean water, healthy latrines and drinking water provider that meets health requirements. Only Songgom sub-District having good category access with 100% coverage on three aspects above. Areas with poor categories for access consist of 5 sub-Districts namely Jatibarang, Bumiayu, Wanasari, Paguyangan, and Larangan. (Figure 3)

The main priority area for intervention is Larangan Sub-District with poor category. The third priority area is Salem Sub-District with good category, and other are included in the second priority with moderate category consist of 15 sub-Districts (Bulakamba, Brebes, Wanasari, Jatibarang, Losari, Tanjung, Kersana, Songgom, Banjarmajo, Ketanggungan, Tonjong, Bantarkawung, Bumiayu, Sirampog, Paguyangan). (Figure 4).

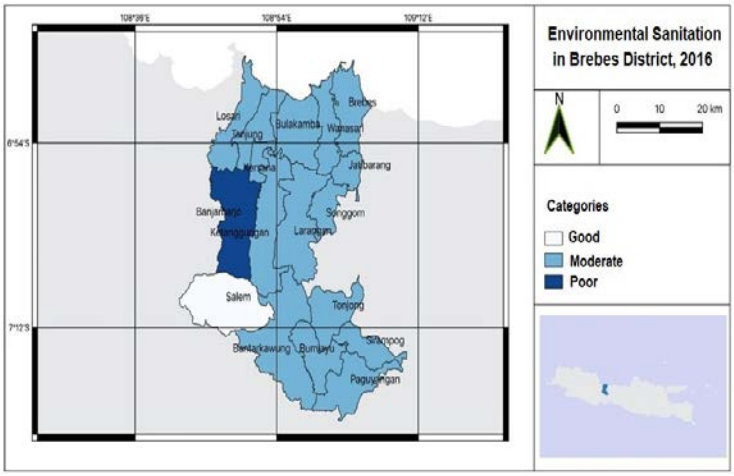

Figure 1. Environmental Sanitation in Brebes District by the year 2016

Description:
Good : healthy household (%) > 62; CLTS (%) > 28; FPA (%) > 55
Moderate : 51> healthy household (%) <62; 7> CLTS (%) < 28; 33 > FPA (%) < 55
Poor : healthy household (%) < 51; CLTS (%) < 7; FPA (%) < 33

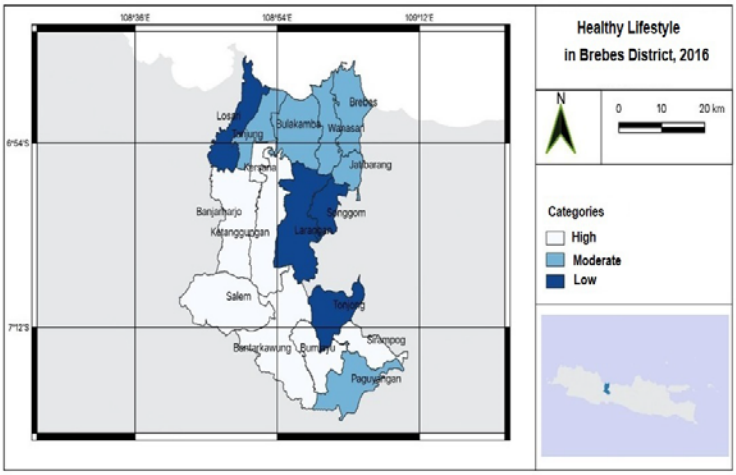

Figure 2. Healthy Lifestyle in Brebes District by the year 2016

Description:
High : 77.13 - 99.09 %; Moderate: 55.89 - 77.13 %; Low: 35.89 - 55.89 %

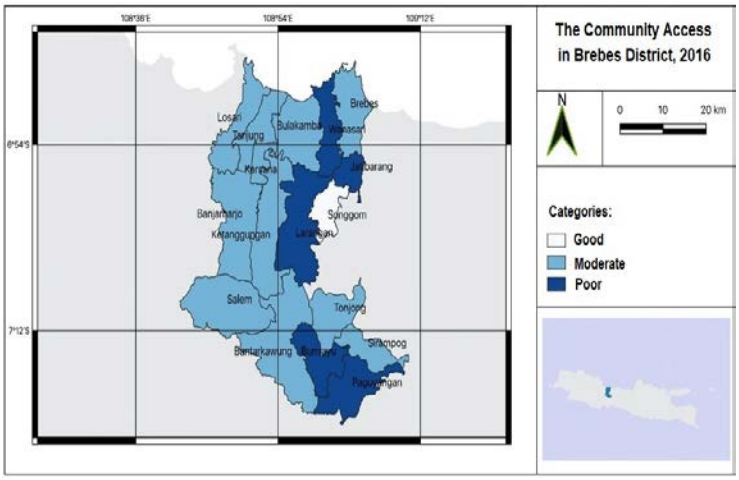

Figure 3. The community access in Brebes District by the year 2016

Descriptions:
Good : CW (%) > 79.82; HL (%) > 69.33; DWP (%) > 77.78
Moderate : 67.21> CW (%) <79.82; 69.33> HL (%) < 51.59; 77.78 > DWP (%) < 25
Poor : CW (%) < 67.21; HL (%) < 51.59; DWP (%) < 25

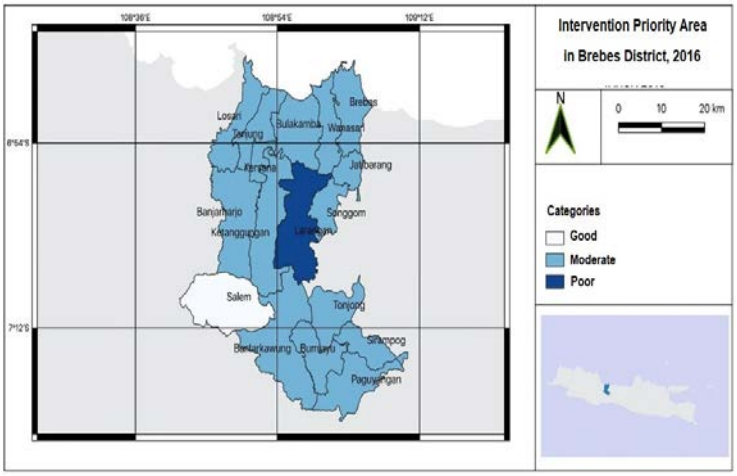

Figure 4. Intervention Priority in Brebes District by the year 2016

IV. DISCUSSION

Based on analysis, spatially the highest score of the intervention priority disclosed that Larangan Sub-District as the main priority for the intervention of diarrhoea prevalence. Larangan Sub-District has a very high density population (849 per Km^2) and included in 8 sub-Districts with high category of diarrhoea cases. Environmental sanitation and healthy lifestyle factors are categorized in moderate, and community access factors is the lowest between other 16 sub-Districts. The lowest aspect in community access factor is the percentage of drinking water providers (DWP) that meet health requirements <25% in Larangan Sub-District. Former study in Semarang stated that there was no significant relationship between bacteriological quality of clean water and the incidence of diarrhoea but its conclusion nearly similar with study in Manado that stated about increase in regional vulnerability to the incidence of diarrhoea caused by the quality of drinking water that does not meet the requirements, disposal facility and sewerage system.[3,4]

The lowest prevalence of Diarrhoea in Salem Sub-District as many as 978 cases (2%), influenced by environmental sanitation, healthy lifestyle, and community access which have good categories. Salem population density categorized in high density (393 Km^2), compared to another sub-District, it was the lowest. Salem Sub-District became the third priority area for intervention in Diarrhoea prevalence. It has supporting data by high coverage of healthy household (62.29%), high percentage of healthy hygiene habits (99.09%) and achieving the highest number of villages applied Community Led Total Sanitation (30.77%) compared to other 16 sub-Districts. Earlier study in district of Tegal, Tangerang, Yogyakarta and Kutai Kertanegara stated similar sound of significant association between community led total sanitation and healthy hygiene habits with the incidence of diarrhoea. It also had dominant aspect in reducing vulnerability to diarrhoea in the aspect of stopping open defecation free, promoting hand washing with soap, personal hygiene, and hygiene level.[2,3,21,22,23,24]

V. CONCLUSSION

Spatially the main priority area for intervention related diarrhoea was Larangan Sub-District. The most relevance aspect to suppress the incidence of Diarrhoea in Brebes District is intervention by promoting coverage of healthy household, conducting villages applied with Community Led Total Sanitation, coverage of family with Health Hygiene Habit and control over drinking water providers that meets health requirements.

VI. RECOMMENDATION

This study suggests that intervention in diarrhoea prevention should be location-specific, while considering spatial variation and the neighboring locations. Few areas identified in moderate category for interventions priority need to get further health guidelines and triggers to improve health over community and become a neighboring support to other sub-District.

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Extraction and Harnessing Natural Dye for Fabric Dyeing Techniques in Industries in South-East And West Nigeria

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Abstract- Dyeing is the process of application or coloring of desired fibers, yarns, or fabrics to obtain fastness. This involves special solution containing dyes and particular chemical material. The study is to develop extract and harness natural dye for fashion dyeing techniques in industries in south-east and west Nigeria. The extraction will x-rays the three types of dyes from Roselle, Beetroot and Cube root plants, therefore, the application of extracted dyes to fabrics using different techniques , test the fastness of the dyes on fabrics and assess the desired acceptability of the dyes on the fabrics using textile industrial workers and masters-craftsmen. In this study, the Research and Development (R&D) design was adopted to extract natural colorant for textile industry. 4 research questions guided the study. Basically, the study constituted the tasks needed for attaining the objectives in fabric resist dyeing techniques (tying, folding and tying, stitching, marbling and batik). These available plants are cheap source of natural colorants and good alternative to synthetic dyes. The reliability of the instrument was done by experts within the area of the study. The population (138 N) which comprised of workers in industries and master-craftsmen within the area of the study. There was prove that these extracted natural dyes were more affordable, accessible, can be used effectively for fabric dyeing and getting nice colour strength and shades are assured.

Keywords- Dyeing techniques, Natural dyes, Fabrics, Dye extraction, Industries.

I. Introduction

Most plants has become the prominent and abundant sources of colourant which one can utilize for application of dye on textile products since ancients. One of the objectives for instituting industries in Nigeria is for skill acquisition, job creation, poverty reduction and opportunities for individuals to develop manipulative skills that will enable them function effectively in the society. Textile industry is an arm of other areas where practical works in textile should be inculcated to interested individuals. The extraction of the textile colouring agents was done by making a detailed study of natural plant leaves and its cell walls to enhance the dyeing quality, dyeing extraction and fastness coloring patterns on fabrics. A dye must be soluble in water or dispersible in a solvent and transferable to the substrate (Fabric to be dyed) by the process of absorption and exhaustion (removal of the dye from the solution). (Ochili, .2014) noted that a good dye must also be colour fast, otherwise it looses its quality and acceptability level the consumers. Different dye assistants and mordants have been identified to improve dye fastens on fabrics during washing and exposure to light. Atkin, (2006) stated that dye is one of the most crucial raw materials and processing chemicals required not only in the word, food, paper, photography, textiles, wearing apparel, leather and leather product industries, but also in all textile industries and even in educational institutions at all levels.

Fabrics is very essential in peoples' lives whether it is for attaire, furnishing, designing, decoration. They are manufactured assembly of interlacing fibres, filaments and yarns having substantial surface area in relation to its' thickness, adequate mechanical strength to give a cohesive structure. Olabisi, (2004) maintained, that fabric materials made from fibre dyed with natural dyes are preferred by most individuals because of its colour fastness which retains and does not loose the dye colour easily.

Dyes are obtained from different sources such as natural sources and manmade or synthetic sources. Natural dyes are extracted from animals, plants and minerals whereas synthetic dyes are prepared from aromatic or chemical reagents in laboratory by man (Churchman, 1990). Observations has been made that dyes are scarce and synthetic dyes imported into the country are very expensive (Graw, 2011). Presently, in Nigeria, funding for textile industries is a great challenge and the inability of the industries to purchase materials and consumables such as synthetic dyes pose a threat to practical work. Natural dyes are locally and readily

available in our various environments. They are cheaper and can give an array of requisite and interesting colours for dyeing fabrics. Abundant species of potential dye yielding plants abound in Nigeria. These however, have remained largely unexplored (Dorin, 1990). Obikpo, (2004), made a comprehensive list of forty-three unexplored species with potentials of yielding dye which could be found in tropical Africa including Nigeria. Some of the plants include among others, cuberoot, roselle, beetroot , oil bean, oil palm.

Made in Nigeria fabrics are being currently popularized both within and outside Nigeria. Besides, the recent emphasis on acquisition of entrepreneurial skills to make products in our industries, schools, more effective should not be over looked. Emphases on local sourcing of materials to substitute the imported and expensiveforeign goods are on the increase and our textile industries should not be left out. The study will involve the use of R & D model of Gal et al (2007) which has ten steps and which could be modified to suit this study.

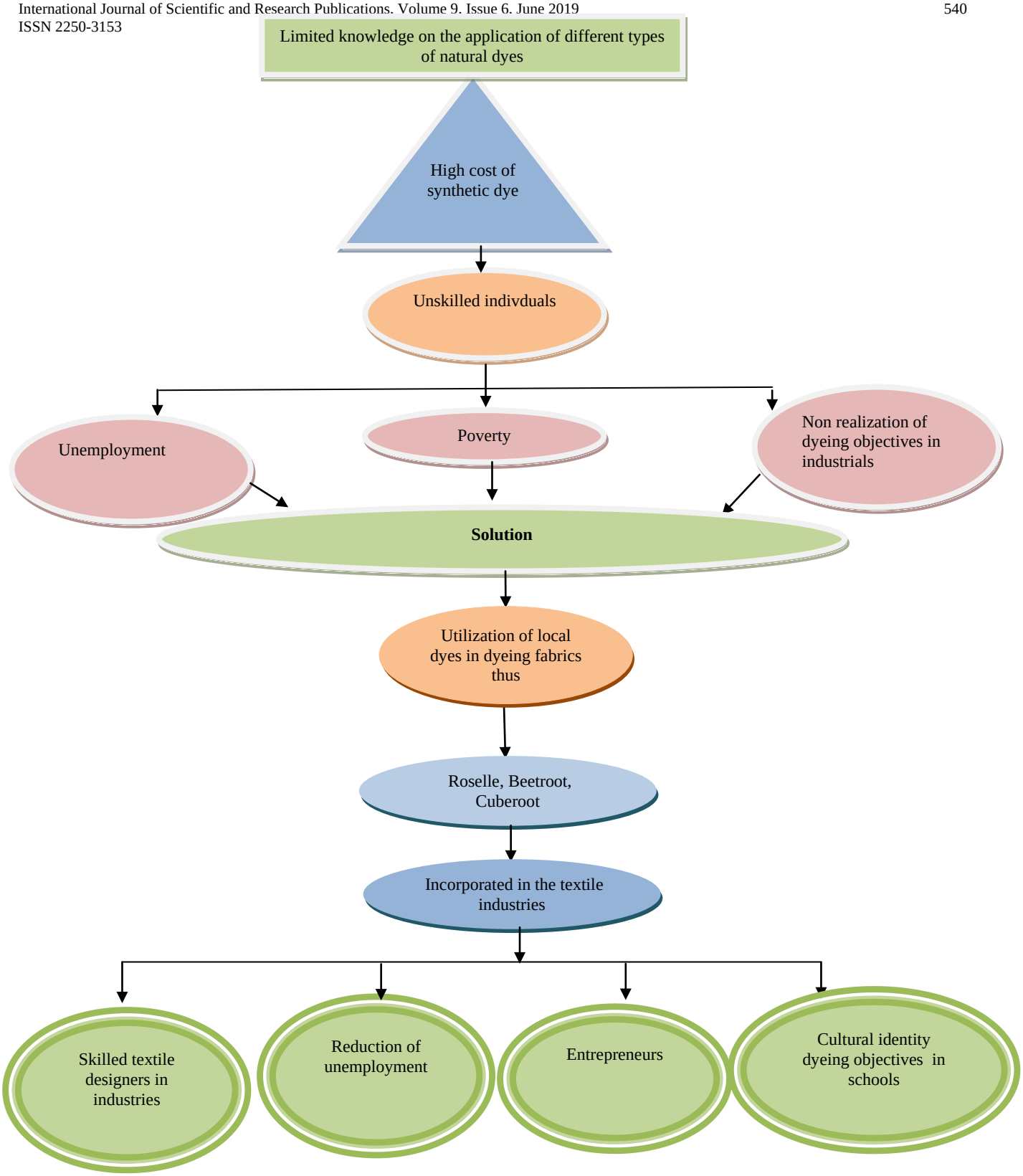
II. LITERATURE

In the word of Ezeoguine, (2018) a dye can be considered as a substance which can be fixed to a material by the selective absorption of certain wave length which will produce a sensation of colour. According to him, dyeing is craft practiced in many countries all over the world. Otubelu (2015) observed that the fabric which is mostly used in dyeing is light weight cotton fabric although silk, or any other fabric of light weight quality can be used. Before embarking on actual dyeing or resist operations, the fabric must be treated by washing to remove different fabric and any likely impurity in form of dirt or dust. This will ensure even dyeing. Okafor (2008) noted that fabric dyeing colouration could take any of the following method – tying, folding and tying, stitching, marbling, batik and printing techniques.

Dye can be obtained through man made natural agents. The natural dyes are so called because they are gotten from plants while man made dyes can as well be called synthetic dye some of the synthetic dyes are vat, basic direct and so. Natural dyes could be indigos dye from beetroot, Roselle or cuberoot. Mordant dyes do not dye fabric directly – it is an element that quickens the chemical reaction. The attachment of mordant to dyes is by means of a covalent and coordinate bond called chelation. (Dukpe 2015). Lemchi (2006) listed some of the textile industries like Arewa textile mills limited Kaduna, Sunflag Nigeria, Apapa Lagos. Bendel Textile will limited Asaba, General Cotton mill Onitsha, Kano textile Industries limited, aswani textile industry Osholi Lagos, International Textile Industries Lagos.

Latif, (2014) stated that dyed materials which were previously ignored have now been widely recognized by most Nigerians. Various fashion shows now promote new ideas and increasingly expose the public to the richness of our indigenous fabric dyeing and their potentialities for modern fashion. The economic situation in the country has helped to celebrate the total liberation of Nigeria fashion. This helped in making a complete turnway from the days of massive importation of fabric and ready made dresses, it can be said quite confidently, that fashion in Nigeria now reflects local climate, needs and materials (Anderson, 2014).

Agusiobu (2001) noted that the fastness properties of natural dyes must be ensured by going through some chemical analysis or testing directly on fabrics where the results are also ex-rayed. The dyeing techniques which could be applied in testing the fastness of the dye are – tying, folding and tying, marbling, stitching (both hand and machine) and batik techniques.



Designed Conceptualized Framework on The need of Natural dyes

Source: Researchers (2015).

III. IDENTIFICATION, RESEARCH AND COLLECTION OF IDEAS ON NATURAL DYES

The following procedures were adopted for the extraction of dyes from natural plants.

MATERIAL AND METHOD

Sample Preparation

Mature and healthy Roselle, Beetroot and Cube root plants was collected from the non-cultivated areas of the south-east and western part of Nigeria. Some of the collected materials were oven dried for 47 hours at 70°C and grinded into power. The application of Viscose fabic used for the dyeing was treated with NaOH solution (5%) for 15minutes, boiled with toilet soap (10g) for about 45minutes and dried.

Research on the three natural plants for practical extraction of dyes for fabric colouration

The researchers engaged in some methods to extract dyes. Thus – dissolving in liquid method, heating method and steeping method. The methods are uniquely suitable for extraction of dye from the plants. All these methods are closely related in application but with slight difference.

Dissolving in liquid method (Beetroot & Roselle): Any liquid that can dissolve another substance is called a solvent. This method was basically used for extraction of dye from Beetroot and Roselle using ethanol content. The researchers used one hundred (100g) of beetroot which was very fresh (not dry). Production started by washing, peeling and crushing while wet. Its paste was collected and dissolved in the 200% of ethanol as solvent to dissolve the crushed wet beetroot. The content was poured in a tight cover container and shaked properly to obtain a well mixed content which was left for a day (24 hours). On a tiny grain cloth, the content was passed through and the chaff was filtered off. This was kept for one week in an open room with enough air for evaporation to take place. Within the one week, the ethanol evaporated and the paste was the dye which was used to dye fabrics.

Heating method:

i). Cuberoot and Roselle dye extracted by heating method: The researchers scouted for and obtained reasonable quantity of cuberoot and Roselle plants leaves. Six kilograms (6kg) of both cuberoot leaves and Roselle was subjected to room temperature drying. The Roselle was dried already while the cuberoot was fresh. The fresh cuberoot is dried between 70-75 hours and the roselle (dried already) were further dried little just to keep them warm for 35 minutes. The two contents were crushed together and a fine flour content was achieved which was kept and was used for extraction of dye by the application of heating method. The two contents were heated differently, at the temperature range between 75% and 95^{0}C for 15 or 25 minutes. The two contents were allow to cool and they were sieved to remove the chaff while the content (dye liquor) were used for fabric dying.

ii). Beetroot Dye: This was the use of very hot water to heat up something by boiling. Dye from beetroot using heating method. To maintain cleanliness, 100g of beetroot plant were well washed and peeled. The researchers blended the wet beetroot. The paste was heated up with 200ml of water, approximately in the ratio of 1:2, in a temperature range of 75^{0}C – 95^{0}C and was allowed to heat for 25 – 35 minutes. The content realized was allowed to cool. This was then sieved with tiny mesh. The result was collected, labeled as dye liquor from beetroot which was used for fabric dyeing.

Steeping Method (Beetroot & Roselle): dyes can be extracted from beetroot plant using the above method. The researchers searched and got reasonable quantity of Beetroot and Roselle plants leaves which were well washed and kept to dry a little for easy handling. This was followed by peeling after which they were sprinkled with water, crushed/grinded. The quantity was soaked in water for twelve (12) hours in the ratio of 2:4 (of Beetroot flour/Roselle and water) upon completion of soaking in water for 12 hours. Tap water was used. The researchers sieved them with 0.3 or 0.5 size mesh just to remove the dirts/impurities. The liquid content is the dye liquor from Beetroot which the researcher used to dye fabrics. No heating was applied.

The fabrics were dyed using natural dye obtained from Beetroot, Roselle and Cuberoot. Two mordants alum and ash were used other items applied include:

- 15 – 20 grams of seasalt
- 0.15 litres of mixed caustic soda
- 50 grams of sodium hydrosulplite
- 100 grams of any of the already produced natural dyes
- 5 litres of water
- 20 yards of cotton/silk of fabrics.

Method of the Practical work

Traditionally, dyeing is done depending on the desired shades. The quantity of dye to be used therefore depends on the depth of colour required. The mordant was poured over the dye until it is enough. Both are then mixed together and other materials added too. The content was left to stand for two days before it is considered ready for use. It is stired at interval during this period. The fabrics were then pre-treated by washing and followed by immersion in the dye solution. Fabrics are held in the dye bath for three – five minutes, and were lifted into the draining board for 3 minutes before they were dipped again into the dye solution for three minutes. Fabrics were brought out washed in a cassava starch to ensure fastness of the dye to the fabrics and spread on a hang line to dry.

Researchers observed that the dye solution was good for five days after which it begins to produce unpleasant smell. As soon as the dyed fabric dries, collect them and fold them carefully and get them ready for beating process. This is achieved by the use of

log of wood (3 feet) and use the mallet (like pestle) to beat the fabrics. Fold the fabrics further as the beating goes on while the researchers pulls the beated side towards them. The fabrics were finally packaged and kept for end user.

TEST FOR EFFECTIVENESS OF THE EXTRACTED DYE FROM THE NATURAL PLANT LEAVES ON THE FABRICS USING FOUR DIEING TECHNIQUES

The industrial workers and textile craftsmen were subjected to some tasks to test the effectiveness of the extracted natural dyes. Four techniques were adopted thus:

Technique One: By Folding and Tying: This is based on fabric dyeing using folding and dying technique. Out of the 15 tasks listed, 14 were chosen as needed tasks to achieve the desired dying result. This is with mean scores ranging from 3.19 to 3.94 and standard deviation ranging between 0.31 and 0.40. This indicates that all the 14 tying tasks were needed for attaining the objectives in fabrics tying and folding dyeing technique. It then adds validity to the mean and its implications.

Technique Two: Stitching: This involves the use of running stitches to design fabrics before dying. 18 procedural tasks in the application of stitching dying technique were agreed upon as appropriate tasks which had between 0.00 and 0.28. This indicates that all the tasks were appropriate for stitching technique. This adds validity to the mean and its implications.

Technique Three: Marbling: This is another technique which involves colour application on fabrics that have rough surface as designed. Based on the 12 tasks listed, 10 were chosen as needed takes for attaining the desired collour in marbling technique with mean score ranging from 3.29 to 3.92 and standard deviation for the tasks ranging between 0.27 and 0.35 which indicated that the 12 items in the marbling tasks were needed for attaining the objectives in fabric marbling dyeing in the industry and for local craftsmen. As a result, they adds validity to the mean and its implications.

Technique Four: Batik: The process in this technique involves the application of hand stamping or wax-resist dyeing on whole cloth to create an interesting design. Finally, out of the 16 batik tasks listed 14 were needed for attaining the objectives in batik fabric resist dyeing techniques, with mean scores ranging from 3.38 to 3.95 which implied that the tasks were agreed upon as needed tasks in batik dyeing. The values of the standard deviation for the tasks ranged between 0.21 and 0.39. This indicates that all these 14 batik tasks were needed for attaining the objectives in fabric resist in industrials and among the craftsmen. Therefore, on the values of the standard deviation which are low (less than 0.5), this shows that the individual responses on each item are close to the mean calculated. Thus, they adds validity to the mean and its implications.

Test for effectiveness

Samples	**N**	**Tasks**	**Mean**	**Standard deviation**	**Achievements**
Natural Plant Dyes	38	Practical Work	49.5000	.84984	23.40
Synthetic Dyes	38	Practical Work	23.4000	3.89444	10.10

Author's Source

The results presented in the above table shows that the craftsmen and students taught using the conventional method on synthetic dye had mean test scores of 23.40 then the achievements for synthetic dye is 10.10 while in Natural plant dye which is 49.50 through the use of conventional method, then the achievements for natural dye is 25.90.

Finally, Synthetic dyes has a very harmful effects on the environment and human beings because they are made up from chemical compounds like mercury, lead, chromium, copper, sodium chloride, toluene, and benzene therefore exposure to these toxic substances can cause cancer like skin cancer etc. water pollution can also result from manufacturing synthetic dyes when untreated dye effluent is dumped directly on bodies of water. Natural plant dye is safe and is not harmful because they are effluent with organic bacteria in order to lessen fungi disease and reduction of cancers. Beetroot helps in inflammation and it has anti-cancer properties. Roselle contained and is packed with Antioxidants which helps to prevent some un-pleasant circumstances to individuals.

IV. DISCUSSION OF FINDINGS

The study found out various fabrics resist dyeing techniques – tying, folding and tying, stitching, marbling, batik among others. It is therefore expected that the implementation of experiences from the study will adequately motivate and encourage textile industrial workers and individuals who wish to go unto entrepreneurship in fabric dyeing and other such related ventures. This invariably will help to reduce unemployment and consequently poverty among individuals.

Moreover, the finding of the study reveal that skill in fabric dying using natural dying will equip the industrial workers and entrepreneurs with good knowledge in fabric dying, there will be job opportunities. These will promote our local fabric dying adequately. This then implies that natural dye are consider adequate for fabric dying (Okpara, 2012).

V. CONCLUSION

This study has filled the gap of non-availability and high costing of synthetic dyes. This is because the natural dyes can also be used to achieve good result in all the dying techniques in textile industries within the study area in Nigeria. Dyeing covers a wide area and a good number of people are engaged in the textile dyeing in industries throughout Nigeria today. Central to human resource training and development is the role of most textile industries and entrepreneurs. These industries are expected to use not only the synthetic dyes which is not easily affordable but also natural dyes and appropriate techniques for equipping individuals especially the textile industrial workers and entrepreneurs with skills to cope with situation of serious challenges in fabric dying, unemployment facing individuals, families and the countries at large are grossly reduced. Industries are thereby charged with the responsibility of equipping individuals with variety of skills in dyeing and accessibility of natural dyes from the local plants – instead of relying solely on the purchase of foreign dyes.

In gatherings where dyed fabrics are worn by a lot of people, they came in a wide range of colours. Natural dyes also offers this and it is easily affordable from the bushes in our environment. Nigeria have now accepted the locally produced dyed fabrics which are in different colours. Nigerian dyes fabrics are already competing favourable with other textile in the world market. Most people and groups can now open up small cottage industries to be run within the scale they can afford. This will enhance the production of dyed fabrics in large quantities. by this approach, improvements can be made in production and the advantage taken of both in internal and external markets.

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Impact of Seed Powder of *Dacryodes Edulis* on the Levels of Some Polycyclic Aromatic Hydrocarbons and Heavy Metals in Crude Oil Polluted *Telfairia Occidentalis* Model.

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Abstract- This study was designed to investigate the phytoremediation effects of *Dacryodes edulis* seeds on the levels of polycyclic aromatic hydrocarbons and heavy metals in germinating leaves of *Telfairia occidentalis* grown in crude oil polluted environment. Differential amounts of the powdered seed of *Dacryodes edulis* was introduced into four cotton wool vessels which were contaminated with crude oil prior to the planting of *T. occidentalis*. The study lasted for eight weeks. The determination of the concentrations of polycyclic aromatic hydrocarbons in *T.occidentalis* leaves and phytochemical composition of the seed of *D. edulis* was carried out using gas chromatographic method. Heavy metals level in leaves of plant model was determined using atomic absorption spectrophotometer. Results obtained from the phytochemical screening showed that the seeds of *Dacryodes edulis* contained varying amounts of alkaloids, saponins, flavonoid, steroid, tannin, phenol, phytosterol, terpenes, cardiac glycoside, anthocyanins, oxalates, phytate and coumarin. Furthermore, introduction of *Dacryodes edulis* seed powder caused a significant reduction in the level of naphthalene and pyrene in the vessel containing 30g *Dacryodes edulis* seed powder. The level of chrysene was significantly reduced in the vessel containing 100g *Dacryodes edulis* seed powder. The levels of acenaphthylene, phenanthrene and anthracene were significantly reduced in all the groups containing *Dacryodes edulis* seed powder relative to the control group. Also, the level of Nickel was significantly reduced in the 100g *Dacryodes edulis* group. These results therefore provide convincing evidence to validate the phytoremediation potentials of *Dacryodes edulis* seed powder.

Index Terms- Dacryodes edulis, gas chromatography, heavy metals, Telfairia occidentalis , polycyclic aromatic hydrocarbons,

I. Introduction

Crude oil is a complex mixture made of thousands of compounds including alkanes, aromatic hydrocarbons, resins, asphaltenes and heavy metals. The aromatics especially the polycyclic aromatic hydrocarbons (PAHs) are of serious health concern owing to their toxicity to aquatic life and bioaccumulation in living cells. The simplest forms of polycyclic aromatic hydrocarbons are naphthalene, anthracene and phenanthrene (Fetzer, 2000). They are considered hazardous because of their mutagenic and carcinogenic activities (Kalf *et al.*, 1997). Heavy metals have a relatively high density compared to water (Fergusson, 1990). Some of them including arsenic, lead and cadmium induce toxicity at low level of exposure (Duffus, 2002). In recent years, there has been an increasing ecological and global public health concern associated with environmental contamination by these metals (Bradl, 2002). Reported sources of heavy metals in the environment include, geogenic, industrial, agricultural, pharmaceutical, domestic effluents and atmospheric sources. These compounds bioaccumulate in the soil and are transferred to humans through plants cultivated in such contaminated environments.

Oil spillage has been reported in areas with oil exploration activity and it often introduce these chemicals into the environment, particularly contaminating the soil. The presence of these compounds in the soil affect the yield and quality of agricultural products hence negatively impacting agricultural activities. There has been tremendous effort in remediating the environment to bring about its safety after oil spillage. Microorganisms and plants have complementary roles in bioremediation of the polluted soil. Phytoremediation refers to the use of plants to clean contaminated soil (Joner *et al*., 2004). Trees and plants are often planted to take up these chemicals and consumption of such plant product may transfer the accumulated chemicals or heavy metals to man. The African pear tree (*Dacryodes edulis*) is one of such plant that has been studied for its phytoremediation potential.

Dacryodes edulis is an evergreen tree of an African origin (Arisa *et al.*, 2008). The pear fruit is widely consumed for its nutritional potential and has been reported to possess a broad range of medicinal, pharmacological and biological properties that are highly beneficial to human health. It is reported to be anti-microbial, anti-inflammatory, anti-hypertensive, diuretic, and antispasmodics in traditional medicine (Ajayi *et al*., 2002). The seed of plant such as *Moringa oleifera* has been evaluated for its ability to remediate the soil after crude oil contamination and the result is promising (Agboun *et al*., 2016). There is dearth

of information on the utilization of the seed of *Dacryodes edulis* in bioremediation of crude oil contaminated oil, hence the present study designed to evaluate the concentrations of polycyclic aromatic hydrocarbons and heavy metals in germinating leaves of *Telferia occidentalis* grown on crude oil contaminated environment.

Telfairia occidentalis is a tropical vine grown in West Africa as a leafy vegetable and for its edible seeds and leaves. It is a member of the Cucurbitaceae family and is indigenous to southern Nigeria. The leaves are used primarily in soups and herbal medicines. The plant is a drought-tolerant, dioecious perennial that is usually grown through seed (Nwanna *et al*., 2008). Furthermore, the shoots and leaves can be consumed as vegetables. When *T. occidentalis* is prepared for herbal medicine, it is used to treat sudden attack of convulsion, malaria, and anaemia; it also plays a vital and protective role in cardiovascular diseases (Giami, *et at*., 2003). There are several reports on the nutritional and medicinal potential of this very popular and widely cultivated and consumed plant. The popularity of this plant informed its utilization in the present study.

II. MATERIALS AND METHOD

Dacryodes edulis Seed

The fruits of *Dacryodes edulis* were harvested from *Dacryodes edulis* tree in Port Harcourt, River State, Nigeria. They were washed with clean water, cut open and the seeds removed. The seeds were allowed to dry under room temperature. The dried seeds were ground to powder using manual grinder. The powdered seed was used for the study.

Telfairia Occidentalis Seed

The seeds of *Telfairia Occidentalis* were procured from one of the university farmland in Madonna University, Elele, Rivers State. They were dried and made ready for planting.

Crude oil

Bonny light crude oil was obtained from the Nigerian National Petroleum Corporation (NNPC), Port Harcourt, River State, Nigeria.

Experimental Design

Soil sample for planting was prepared into a nursery with sterile cotton wool serving as the soil. The cotton wool was divided into four planting vessels; Vessels 1 – 4. Crude oil was applied on the cotton wool in the vessels to contaminate it. Varying amount of the powdered seed of *Dacryodes edulis* was applied on the crude oil contaminated cotton wool prior to the planting of *Telfairia occidentalis* seed on the crude oil contaminated soil. The experimental design was as stated below:

Vessel 1 - *Telfairia occidentalis* seed + 400 ml of crude oil + water

Vessel 2 - *Telfairia occidentalis* seed + 400 ml of crude oil + 30 g of powdered *Dacryodes edulis* seed + water.

Vessel 3 - *Telfairia occidentalis* seed + 400ml of crude oil + 70 g of powdered *Dacryodes edulis* seeds + water

Vessel 4 - *Telfairia occidentalis* seed + 400ml of crude oil + 100 g of powdered *Dacryodes edulis* seed + water

The seeds of *Telfairia occidentalis* were planted and monitored for eight weeks. The seeds germinated and the leaves of the germinating plant were harvested, air-dried under room temperature, pulverized and processed for determination of the concentrations of polycyclic aromatic hydrocarbon and heavy metals using gas chromatography and atomic absorption spectrophotometer. The phytochemical composition of the seed of *Dacryodes edulis* was also evaluated using gas chromatography.

Preparation of *Telfairia occidentalis* Leaf and Determination of Polycyclic Aromatic Hydrocarbon

The leaf of *Telfairia occidentalis* was extracted for the analysis of polycyclic aromatic hydrocarbon profiles based on the modified methods of ASTM D3328 and ASTM 3415. Hexane and dichloromethane in the ratio of 3 to 1 were used as solvent for the extraction of the plant material. The pulverized leaf was macerated in the solvent for 2 hours. The organic layer of the filtrate was obtained and dried by passing through a funnel containing anhydrous sodium sulphate and then concentrated with a stream of nitrogen gas. Naphthalene, acenaphthylene, phenanthrene, anthracene, pyrene and chrysene were some of the polycyclic aromatic hydrocarbon assayed in the leaf of *Telfairia occidentalis* using gas chromatography.

Preparation of *Telfairia occidentalis* Leaf and Assay of Heavy Metal Composition

The concentrations of heavy metals including nickle, chromium, arsenic and lead in the germinating leaf of *Telfairia occidentalis* were assayed using atomic absorption spectrophotometer.

Phytochemical Screening of *Dacryodes edulis* Seed

The phytochemical composition of the seed of *Dacryodes edulis* was evaluated using gas chromatography.

III. RESULT

Phytochemical composition of *Dacryodes edulis* seed

The phytochemical composition of the seed of *Dacryodes edulis* is presented in Figure 1.0. Phytochemicals including alkaloids, saponins, flavonoids, steroid, tannin, phenol, phytosterol, terpenes, cardiac glycoside, anthocyanins, oxalates, phytate and coumarin were detected in the seed of *Dacryodes edulis*.

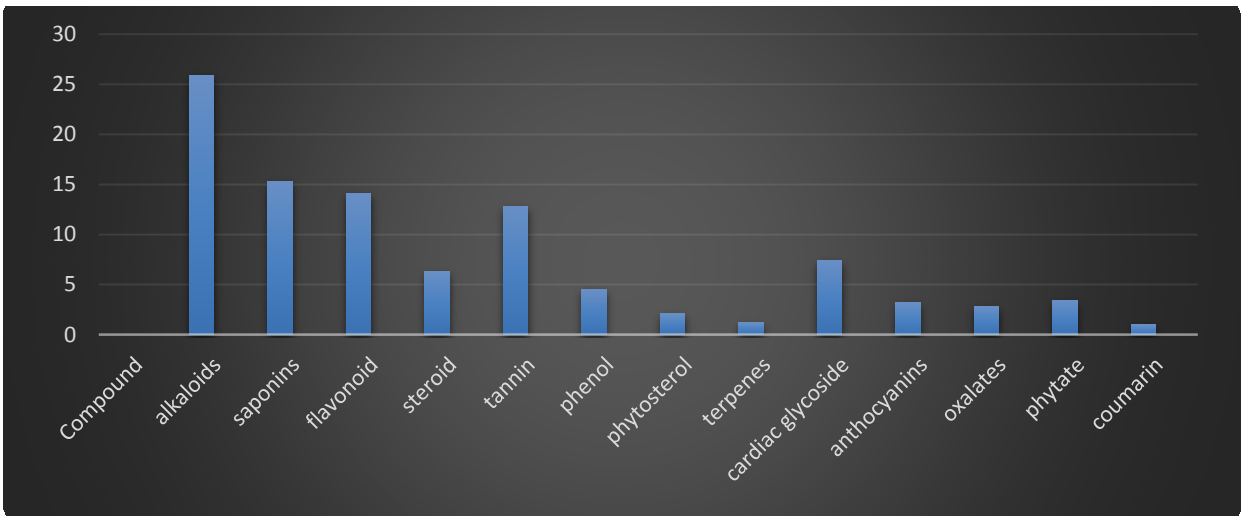
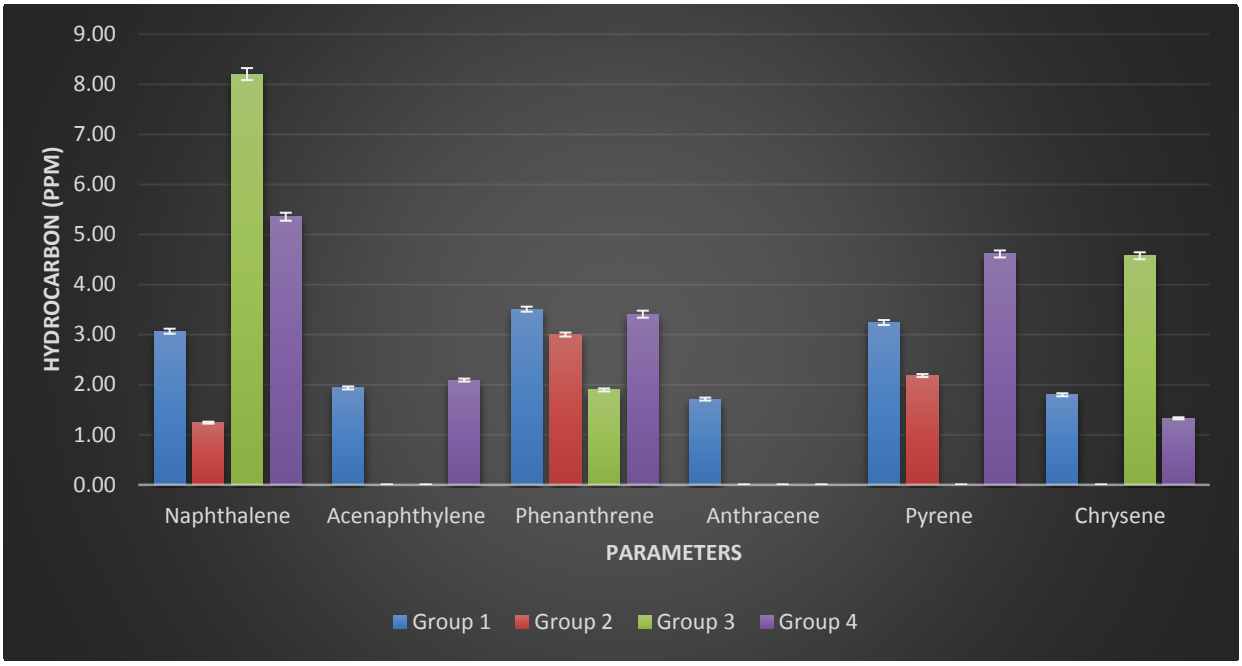


Figure 1.0: Phytochemical composition of seed of *Dacryodes edulis*

Effect of *D. edulis* seed on some polycyclic aromatic hydrocarbon levels in the leaf of *Telfairia occidentalis* grown in crude oil polluted vessel.

The effect of *Dacryodes edulis* seed powder on some polycyclic aromatic hydrocarbon levels in the leaf of *Telfairia occidentalis* grown in crude oil polluted vessels are presented in Figure 2.0. The polycyclic aromatic hydrocarbons under investigation include; naphthalene, acenaphthylene, phenanthrene, anthracene, pyrene and chrysene.

Figure 2.0. Polycyclic aromatic hydrocarbon levels in leaf of *Telfairia occidentalis* grown on crude oil polluted vessel exposed to *D. edulis* seed powder.



Effect of *D. edulis* seed on some heavy metal levels in the leaf of *Telfairia occidentalis* grown in crude oil polluted vessel

Nickle, chromium, arsenic and lead are the heavy metals investigated in the present study. The effect of *Dacryodes edulis* seed powder on the concentrations of these heavy metals in the germinating leaf of *Telfairia occidentalis* is presented in Figure 3.0. Groups 1 – 4 represent vessels 1 – 4 in the experimental design.

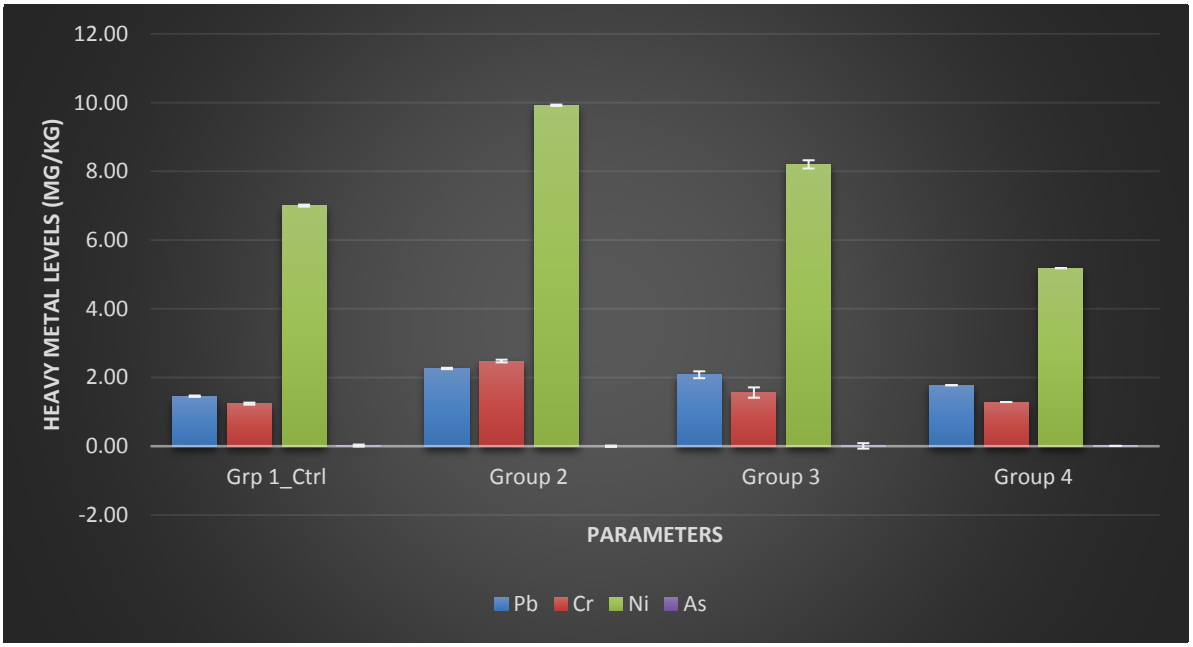


Figure 3.0. Heavy metal concentration in germinating leaf of *Telfairia occidentalis* grown crude oil polluted vessels exposed to *D. edulis* seed powder.

IV. DISCUSSION

Plants are known to absorb nutrients, minerals and other chemical substances from the soil. Substances such as heavy metals and polycyclic aromatic hydrocarbons which may be toxic to other living organisms can be tolerated hence bio-accumulated in plants (Flathmann, 1994). Plants contribute to bioremediation by their ability to fix hydrocarbons and metals due to the presence of some phytochemicals in the plants. This ability can be harnessed to extract hydrocarbons from polluted areas (Chavan, 2008). Phytoremediation can be applied to moderately contaminated soil or after the application of other remediation measures as a polishing step (Frick *et al*., 1999). The present study evaluated the effect of *Dacryodes edulis* seed powder on the concentration of some polycyclic aromatic hydrocarbon and heavy metals in germinating *Telfairia occidentalis* leaf grown in a crude oil contaminated environment. The essence of the study was to evaluate the phytoremediating potential of *Dacryodes edulis* seed powder and its usefulness in preventing bioaccumulation of some polycyclic aromatic hydrocarbon and heavy metals in germinating leaf of *Telfairia occidentalis* grown in crude oil contaminated environment.

The concentrations of polycyclic aromatic hydrocarbons such as naphthalene, acenaphthylene, phenanthrene, anthracene, pyrene and chrysene were evaluated in the germinating leaf of *Telfairia occidentalis* grown in a crude oil contaminated environment. The levels of heavy metals including nickel, lead, arsenic and chromium were assayed using the leaf of germinating *Telfaria occidentalis*. The naphthalene level in the leaf of *Telfairia occidentalis* in the present study as presented in Figure 2.0 was significantly lower ($p<0.05$) in the vessel with 30g *D. edulis* seed powder and significantly higher ($p<0.05$) in the vessel with 70g and 100g *D. edulis* seed powder compared to the control group. The result also showed that there was a significant decrease ($p<0.05$) in the levels of acenaphthylene, phenanthrene and anthracene in plant grown on vessel with 30g, 70g and 100g *D.edulis*.

This result demonstrated a phytoremediative effect of *D. edulis* seed powder by preventing the bio-accumulation of the polycyclic aromatic hydrocarbon in the leaf of *Telfairia occidentalis*. This can be attributed to the phytochemical content of the *Dacryodes edulis* seed particularly the flavonoids. Flavonoids are a class of bioactive components in plant. The concentration of flavonoid in the *Dacryodes edulis* seed in the present study was 14.1%. This metabolite in plant have been reported to be anti-inflammatory and possess antioxidant properties (Robert and Gryglewski, 1988) thereby endowing the plant material with the capacity to chelate the polycyclic aromatic hydrocarbon content in the crude oil polluted soil. Research has been conducted on the principle that free radicals can be blocked and / or scavenged (Adaramony *et al*.,2015), which may serve as a mechanism by which *D.edulis* remediate PAHs.

Pyrene levels were significantly reduced ($p<0.05$) in plants grown on vessels with 30g *D. edulis* and 70g *D. edulis* and were significantly increased in plant leaf grown on vessel with 100g *D. edulis* seed powder compared to the crude oil only vessel. The reason for the decrease in pyrene level in the vessel with 30g *D. edulis* could be due to some of the phytochemical content present in the plant. However, certain factors like nutrients and temperature changes may however be responsible for the significant levels in some of the PAHs. Temperature increase leads to increase in diffusion rate of the organic compounds by decreasing their viscosity which leads to increase in bioavailability by increasing solubility, diffusion and reaction rate (Mohan *et al*., 2006; Northcott and Lones, 2001).

Lead, chromium and nickel levels were higher in plants grown on vessels with 30g 70, and 100g of *D. edulis* compared to the crude oil only vessel though reduced concentration of nickel

was observed in the vessel with 100g of *Dacryodes edulis* seed powder when compared to the control. The concentration of arsenic was lower in the vessels with *Dacryodes edulis* when compared with the control. The results demonstrate that application of higher quantity of *Dacryodes edulis* seed powder significantly reduced the uptake of arsenic from the crude oil contaminated vessel.

The phytochemical composition of *Dacryodes edulis* seed powder consist of alkaloids, tannins, flavonoids, saponins, glycosides, steroids, phytates and oxalates. These phytochemicals, singly or in synergy have been known to be responsible for the various medicinal or toxicological activities of the plant material. Alkaloids, flavonoids, saponins and tannins were observed to be of high concentration in the seed powder of *Dacryodes edulis*. These phytochemicals may be responsible for the phyto-remediating potential of the seed. Conclusively, the seed powder of Dacryodes edulis has the capacity to reduce the uptake of some polycyclic aromatic hydrocarbon and heavy metals by leaf of *Telfaria ocidentalis* planted in crude oil contaminated vessels.

V. CONCLUSION

These work therefore suggest possible implication of *Dacryodes edulis* seed powder in phytoremediation of certain polycyclic aromatic hydrocarbons and heavy metal like nickel though according to the result is concentration dependent.

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Pancasila Village as the Identity and Character Formation of Elementary School Students

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Abstract- The purpose of this study was to describe the village of Pancasila as the identity and character formation of elementary school students. This type of research is descriptive qualitative. The research location is in SDN Balun Lamongan.Sources of data in research explored through other research subjects, ie principals, teachers, and students.Methods of data collection using interviews, observation and documentation. Data were analyzed through, data reduction, data presentation and conclusion.Research resultshow (1) social environment of the village of Pancasila as the source of learning and character formation in SDN Balun 1 Lamongan, (2) cooperation with the entire school community, parents to the character formation of students (3) integrating character education into the activities that have been programmed. (4) Evaluation and monitoring of character education, and (5) Internalization values of Pancasila village at SDN Balun 1 Lamongan. As well as the exemplary role of teachers in shaping the character between, including the first, modeling (exemplified good behavior) as a step in the character formation of students, second-class managing a safe, fun and habituation characterized in SDN Balun 1.

Index Terms- Character Building, Pancasila Village

I. Introduction

Character education as education to values, character education, moral education, character education, which aims to develop the ability of learners to provide good-bad decision, maintaining what is good, and realize that kindness in everyday life with a vengeance. Education as the business community and the nation in preparing the younger generation for the sustainability of the nation's public life and a better future. Continuity was marked by cultural inheritance and character that has been owned by the community and the nation. The process of the nation's culture and character education, actively learners develop her potential, the process of internalization, and appreciation of the values into their personality in the mix in society, developing a more prosperous community life, as well as develop a dignified life of the nation. In line with the pace of development of society, education becomes very dynamic and adapted to the changes. Educational curriculum not become the benchmark standard and static, but dynamic and must adapt to the situation and conditions. In this framework, education reform became urgent that education remains conducive. Education reform must be programmed and systemic (Kemdiknas, 2011, p. 6). Programmatic Reform the curriculum or program refers to an ducational institution, for example. Programming is done by introducing new ideas, new methods, and new infrastructure to enable the changes in the light with a certain purpose and intent (Zainuddin, 2008, p. 33).

Character education by Pala (2011, p. 3) "Character education is a national movement creating schools that foster ethical, responsible and caring young people by modeling and teaching good character through emphasis on universal values that we all share". Given these conditions as well as in the development of the era like today every child can easily freely imitate, accessing, searching for information, but they were empty all of the values of the local culture itself, alienated and melunturnya of the terms and practices as manners , manners, tolerance, mutual aid to the noble values derived from the Indonesian people themselves. According Lickona (2012, p. 14) without virtue to form a good character, then there is no individual who can live happy and will never be a society to function effectively. because without a good character of every human being will not make progress toward a world that can respect the dignity and worth of each individual.

Character education must be a national movement that makes schools (educational institutions) to build the character of students through learning and modeling. Character education through the school should bring learners have a noble character values such as respect and care for others, responsibility, honesty, integrity, and discipline. On the other hand the characters able to distance education learners of attitude and behavior was disgraceful and forbidden. Education process in children are not only taught what is right and wrong to the child, but more than that character education inculcate the habit (habituation) of the well so that learners understand, able to feel, and want to do good. Therefore, character education carries the same mission with moral education or moral education. Furthermore Frye (2002, p. 3) confirms that character education is a deliberate attempt to help people understand, maintain, and behave in accordance with the values of noble character.

In connection with the above character education in at least one among the attractive based on field observations that the characteristic values of Pancasila village community which is reflected and implied by all citizens in SDN 1 Balun Lamongan thus forming the quality of education and moral quality in these schools is very high. SDN balun 1 is located in the village Balun Turi district of Lamongan, with a background in schools located in the multicultural society makes SDN 1 Balun managed in the cool atmosphere of mutual respect for each other, a high tolerance, harmony with the mission which was to develop an

attitude bertoleran, democracy and form the character that suits the personality of the nation.

Basic education to become an institution after the family who take responsibility for managing education in both the cognitive, psychomotor and aspects of character formation. Lessons are conducted at SDN 1 balun can reflect the character of the student's character, wisdom and culture of the local community Pancasila village itself. Planting character learner visible on learning activities, worship, activities extracurricular, and with the example of the behavior of the teachers at SDN 1 balun to instill character, religious, mutual cooperation, discipline, tolerance and nationalists as well as a sense of responsible behave with peers as well as in everyday life in accordance with the local culture and values of the value derived from Pancasila village.

II. METHODS

In this study, the type of research is. The source of the data obtained from the primary and secondary data sources, Data collection techniques by using the method of observation, interviews, and documentation.For the analysis of data using Milez analysis and Huberman (2005). Among themData collected in the form of words were analyzed by means of reduction, data presentation, and conclusion., Overall results are then summarized by taking the essence and write it in a standard sentence.

III. RESULT

A. Students Character Building Values-Based Doctrine Pancasila village at SDN 1 Balun Lamongan.

SDN 1 Balun has a feel that is so friend, where a school environment that is sufficiently positioned in the middle of the village center Balun, the schools are surrounded by places peribdahan where the north of the mosque and tomb of community leaders that champion plaza, then east front of the school there is a church and south No temple. Elementary School 1 Balun Lamongan. This school includes a unique school, where learners embrace three different religions, such as Islam, Christianity and Hinduism, which they carry out their daily learning at school with adjoining albeit in a different religion. Based on the findings in SDN Balun 1 Lamongan through observation, interviews and documentation obtained such research findings in the following.

1. Pancasila Village Social Environment as a Source of Learning and Character Building At SDN Balun 1 Lamongan ,

Learning not only within the formal school classrooms with walls around it. However, this learning process can be done in a setting outside the classroom. One of the learning that comes from the environment is about the character formation of students themselves. Environment as a source of learning is the teacher and the learner can learn sebenanya circumstances beyond the classroom to expose learners to the actual environment to learn, like the characters were based on culture and local wisdom can provide the space for learners so that the learning process more meaningful.

2. Cooperation with whole Citizen Schools, Parents Against Students Character Building

The involvement of parents in planning their own character education is to support and carry out the commitments made, the parents and teachers in shaping the character of students In accordance with the results of interviews with the principal investigators SDN Balun 1 Lamongan exlpained that implementation of character education through association of parents, through the committee and so every class there should be a community if there is anything we can communicate and worktogether with parents. The cooperation of teachers and parents is the key to success in shaping the character of student discipline. Teachers and parents are educators who are expected to cooperate in building the character of discipline in students. Without the cooperation undertaken by parents and teachers, of the characters can be formed on the child if only done by teachers alone.

3. Integrating Into Character Education activities that have been programmed or planned.

The formation of the characters also take a concerted strategy one of which is to integrate the program that has been direncankan. As interviews conducted with Khoirul Ummah Islamic religious teachers as SDN Balun 1 Lamongan which states that: "Krakter like honor, respect, mutual assistance or in religious activities without distinction of religion which had previously been included in the school program or activity".

4. Character Education Evaluation and Oversight

Monitoring and evaluation at SDN Balun 1 as a series of activities to acquire, analyze and interpret the process and results of implementation of the values of character education is carried out systematically and continuously so that it can be information that can give meaning in the policy for determining the success of character education programs in school. Supervision of character education in SDN Balun 1 Lamongan as results, interviews researchers with Master Hinduism namely Adi wiyono who told his opinion as follows: "Control of cultivation of character of students in the school conducted by all teachers if you have any child who violates the rules need to be guided or reprimanded supervision also need to involve the parents because children spend more time social environment, family than in school".

5. Internalization Value Village Pancasila in SDN Balun 1 Lamongan

Some writings appeal wall mounted either outside the classroom as well as in the classroom such as vision, mission, discipline, the appeal aims to turn the environment that supports the planting and habituation of character values expected in SDN Balun one of those things that can dilihata or read by the entire school community of both teachers and learners are expected to grow into a school with a strong cultural character value. Such as tolerance, discipline, religious, protecting the environment, and mutual cooperation.

B. Exemplary Role of Teachers In character formation of Students at SDN 1 Balun Lamongan Through Values Doctrine Pancasila village.

Based on the findings peneleitian exemplary role of teachers in shaping the character of the learner in Lamongan sdn 1 balun through the values of Pancasila village applied in SDN Balun 1 is integrated in the teaching plan or program.following result of exposure data

1. Modeling (Exemplifying Good Behavior) as a step in the formation of character Educate participants.

Character values instilled in SDN Balun 1 Lamongan, we Iya is an example that Islam speaks good greetings, manners continue to respect their peers, tolerance, discipline, care for the environment as well as mutual cooperation. From the above, it can be concluded that the value of sincerity caregivers, teachers, coaches and learners. Shape the values of character education is through an exemplary process. As the actualization of the values imparted to all the students at SDN Balun 1. Planting exemplifies the value of good behavior (modeling) was very memorable for anyone either for learners and teachers all make this behavior as the core values of behaving and acting, both within the school and outside of school or at home.

2. Classroom Management Safe And Fun

The education process at SDN balun 1 is able to create an atmosphere of active learning, creative, innovative and fun so that the educational goals can be achieved well., To achieve these objectives the development of competence of learners must be adapted to the basic potential, development, needs and interests of learners and guidance environment is always dynamic, safe and fun.

3. Habituation Character In SDN Balun 1

Implementation of character education in SDN Balun 1 can not be executed as language or science education because education others these characters need to have a certain distinctiveness, since the essence of character education as an education of personality which in practice would require as much as possible with the habituation and peneladanan.as in SDN balun 1 applied habituation of social concern that emphasis on learners in terms of mutual help and mutual cooperation, tolerance, religious discipline in everyday life at school.

IV. DISCUSSION

A. Students Character Building Values-Based Doctrine Pancasila village at SDN 1 Balun Lamongan.

Based on the findings of research on the education of multicultural based on local wisdom in SDN Balun 1 Lamongan further discussed and elaborated as has been confirmed in qualitative analysis techniques descriptive (exposure) of data have been obtained either through observation, interviews and documentation, the results of the discussion related to the research are as following:

1. Pancasila Village Social Environment as a Source of Learning and Character Building At SDN Balun 1 Lamongan ,

Carriage and environment are considered important in the educational process, because both are factors that influence the success or failure in education. Environmental influences on development is not overly pushy, but still has a considerable influence on the individual development. So that environmental influences may be opportunities for individuals, depending also on the individual decision of whether to be accept, reject, or neutral with respect to the opportunities.

Further based on the theory Throndike (1997) characteristic of learning theory behaviorism is prioritizing the elements and small parts are mechanistic emphasizes the role of the environment concerned with the formation of a reaction or response. Thus the process of development and character formation processes that take place in SDN Balun 1 Lamongan is an interaction between heredity, environment and self-determination of the individual concerned. Man is a creature homo educundus, namely being able to be educated, then he deserves to get educated on the surroundings in the family, school and community environments

2. Cooperation with whole Citizen Schools, Parents Against Students Character Building

Motivation lifestyle characterized not only by the schools, but also from parents, because after I got home, students will be supervised directly by the parents of each of behaving. Among the most important factors in the family environment in character building of children is understanding the child's psychological parent will need essential, among other things compassion, a sense of security, self-esteem, a sense of freedom, and a sense of success. Aligned according to the CEP's (Character Education Partnership) by Lickona et al (2002) which is one among the principles of effective character is to involve families and communities as partners in development of character Schools that involve families and communities in an effort to jointly character building will make it easier to increase opportunity to achieve a success in the implementation of character education. Some ways to do as a form of cooperation such as meetings between teachers and parents build a strong trust between home and school.

3. Integrating Into Character Education activities that have been programmed,

The integration of character education into all learning material is done in order to develop interventions. The substance of real value explicitly or implicitly already present in the formulation of competency in Content Standards, as well as their respective competences device learning programs in the education unit. Character education is already planned and programmed, synergized into programs that have been established in SDN Balun 1. As is Rachmah (2016: 8) pelaksananaan character education required serious commitment that involves a process and good support curricula, models, strategies, assessments and support all elements of the school.

4. Character Education Evaluation and Oversight

As the opinion and Sahinkayasi Kelleci (2013, p. 119) states "*Teachers are directly responsible for "the effective values education. for this reason, teachers should be very competent on teaching strategies, methods and techniques of values*

education". Evaluation on character formation that took place in SDN Balun 1 Lamongan include all ability and personality of the learner is seen from the perception, understanding, appreciation, actions and attitudes of learners to appreciate diversity and differences. Perceptions of students peerta character occurring in SDN Balun 1 Lamongan had been awakened properly and correctly to complement each other in school institutions ranging from school principals, teachers to learners. Monitoring carried out by monitoring the activities of learners eg run school rules, discipline when going to school, how plainclothes, talk, hang out and about worship of parents / guardians of students are also involved in supervision because their parents / guardians of students must know.

5. Internalization Value Village Pancasila in SDN Balun 1 Lamongan

Dharma (2013) defines character as manners, morals, moral, affective, moral, character, and character have the same meaning. The values karaker village of Pancasila, which also diajarakan in these schools to shape the character of the learners such as ya like tolerance, discipline, religious, protecting the environment, and mutual cooperation Characters formed from the internalization of values that are consistent, meaning that there is harmony between the elements of value. For example, the character of an honest, formed in a unified whole between knowing the meaning of honest (what and why to be honest), willing to be honest and to behave honestly. Since each value is within the spectrum or group values, the psychological and sociocultural a value must be coherent with other values in the group to form the character of the piece.

B. Exemplary Role of Teachers In character formation of Students at SDN 1 Balun Lamongan Through Values Doctrine Pancasila village.

Teachers are professional educators with the primary task of educating, teaching, guiding, directing, train, assess and evaluate students on early childhood education, formal education, primary education and secondary education as Role Modeling Teachers In character formation of Students at SDN 1 Balun.

1. Modeling (Exemplifying Good Behavior) as a step in the formation of character Educate participants.

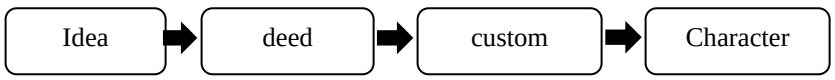
Teachers as educators should be competent with the main task of teaching, educating, directing, evaluating, guiding, training and evaluation in early childhood education, formal education, primary education and secondary education. Competent teachers do not come directly but requires preparation and lengthy process. As an effort in shaping the character of the SDN Balun 1 Lamongan is through Modeling (exemplary) of teachers who always makes exemplary as the most effective way in shaping the character of the learners. as According to Thorndike (1997) study is a process of interaction between stimulus and response. Stimulus is what stimulates the learning activities such as thoughts, feelings, or other things that can be captured through the sensory organs. While the response is a reaction that raised learners when learning, which can also be thought, feeling, or movement / action. So a change in behavior as a result of learning activities can be either concrete, which can be observed, or concrete that is unobservable.

2. Classroom Management Safe And Fun

Teacher at SDN Balun 1 persistent and motivated to shape the character of the child will believe in his ability to shape the character and be able to overcome the negative influences from outside the class. Character education at the level of educational institutions led to the creation of the school culture, the values that underlie behavior, traditions, everyday habits, and symbols as practiced by the citizens without exception and public schools around the school. Residents of schools that were targeted in the character education includes students, teachers, employees, staff, and school leaders. by CEP's (Character Education Partnership) by Lickona et al (2002) Creating a school community that has a caring attitude means that schools should have a strong commitment to character education means that the school needs to have a business and a strong motivation for being a replica of the simple components of society who is honest, caring, polite and fair elections. schools are able to realize a caring community in forming bonds with others.

3. Habituation Character In SDN Balun 1

Concept of Character Formation Perspective Stephen R. Covey (2002) That Started with the ultimate goal (begin with the end in mind) habits both begin with the end goal is a habit that has the vision, mission and goals. The values of character education contained in the habit of starting at the ultimate goal is self-sufficient, have a dream, a purpose in life (visionary), creativity, initiative, have a high commitment, hard work, and never meyerah. As according Hendriana & Jacobus (2016,p. 4) in Building character through habituation means that what is done repeatedly and continuously so that it becomes a habit. Implemnetasi held at SDN Balun 1 Lamongan arises from a habit that is done repeatedly. As a person's character is formed as illustrated in the table below:



Character formation which took place at SDN Balun 1 Lamongan stems from an idea will then be actualized in the form of actions or deeds, and if they were committed perpetually repeated it will shape the character of the person.

V. CONCLUSION

True characters cannot be formed instantly, but need to be seriously trained, proportionally, and continuously in order to achieve an ideal character form and as a form of learning experience that can be obtained for as long as human life whenever and wherever he is. Based on the process of character

building based on the values of the teachings of the village of Pancasila in elementary school students. Various things that can be done by schools include: (1) the social environment of the village of Pancasila as a source of learning and character building in Balun 1 Lamongan Elementary School, (2) cooperation with all school members, guardians of students' character formation (3) integrating education character into the programmed activity. (4) evaluation and supervision of character education, and (5) internalization of the values of the Pancasila village in Balun 1 Lamongan Elementary School. As for the role of teacher exemplary in the formation of character of students in SDN 1 Balun Lamongan through the values of the Pancasila village teachings, among others, modeling (modeling good behavior) as a step in forming character of students, both safe and pleasant classroom management and characterization SDN Balun 1. Because of this, Pancasila village values-based character education is applied early to students. Educational institutions must have a strong commitment and high awareness as a step to support the implementation of character education. The teacher must be willing to carry out self-transformation in educating and teaching, so that the objectives of character education can be implemented as well as possible. The limitations of this study are that researchers cannot examine attitudes, teacher activities more deeply due to time constraints in this study. teachers have different characters so that the attitude or way of teaching to students is also different and cannot be examined more deeply. Therefore the researchers expect further research to examine the attitudes and activities of teachers about the village of Pancasila as identity and character formation in elementary school students.

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Prediction Model For Goiter Verbal Screening On Children Using Logistic Regression As Machine Learning Technique (Study in Brebes)

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Abstract- Goiter is a swelling of the neck due to enlargement of the thyroid gland. Beside as a body image disorders, thyroid gland disorder can result including cardiovascular disease, hypertension, stunting and impaired fertility in women. Another impact of goiter was students which has goiter experiences has lower average grade than normal students. Bulakamba, Brebes District was a region with a severe goiter categories. This study aim to make prediction model with Logistic Regression as a Machine Learning Technique that can be used to do verbal screening for Goiter in children influenced pesticide using evaluation parameters, namely Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value. Data was obtained from Dr. dr. Rasipin M.Kes research on 2011 that was located in the Bulakamba, Brebes District. Data that will be used is 53 positive and 48 negative Goiter on children. From these data, the Logistic Regression Algorithm is used by using the WEKA version 3.8.2, performance will be evaluated using the evaluation parameters. The resulting Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value respectively was 0.774, 0.708, 0.745 and 0.739. From the evaluation parameters it was found that the model can be used to do verbal screening. This model can recognize patients who are positive and negative goiter above 70%.

Index Terms- Goiter, Logistic Regression, Machine Learning, Weka

I. Introduction

Goiter (Goitre) is a swelling of the neck due to enlargement of the thyroid gland. The gland enlarges as compensation for increasing or decreasing the output of thyroid hormone. This swelling of the thyroid gland can be associated[1] with thyroid gland abnormalities called Hypothyroidism (if there is a decrease in thyroid hormone levels) or Hyperthyroidism (if there is an increase in thyroid hormone levels).

Goiter can no longer be considered a cosmetic disease, surgery is often done to remove goitre because it interferes with body image. Patient perception of it's body image is important, ashame, self-awareness and social discomfort often accompanies this perception[2]. Some avoidance behaviors are often used to suppress negative emotions and thoughts, such as avoiding visual contact, ignoring self-care needs. In the end this negative reaction can contribute to increasing social isolation. Another impact of goiter was children with goiters have an average lower value in his study than normal student, this was mentioned by Apoina Kartini in Budiyono et al. 2015[3].

Diseases due to Iodine deficiency suffer from 541 million people in the Association of South East Asian Nations (ASEAN)[4]. RISKEDAS 2013, the prevalence of hyperthiroid at the age above 15 (fifteen) years based on a doctor's diagnosis for Central Java had a prevalence of 0.5% this is above the national prevalence which is 0.4%. Goitre on Kluwut Health Center, Brebes still above 5% and there has been an increase in the discovery of goiters in 2012, 2013 and 2014, respectively 32.17%, 48.97% and 50.46%.

Brebes still using Universal Salt Iodization to prevent Goiter occurrence. But research conducted by Rasipin in Bulakamba Sub-district shows that almost certainly Goiter not because lack of iodine on child body[5]. The major risk can came from the pesticides that majorly used in Brebes. We can use this to take precautionary measures on children. So because the use of Universal Salt Iodization, for universal ways to prevent goiter and the use of palpation for IDD surveys in children in Brebes, which this method has been introduced since 1974 and still in use today opened a new space for the development of a screening method for predicting the incidence of goitre in children with a case study on the District Health Center Bulakamba Kluwut Brebes. This study aim to make good prediction model with Logistic Regression as a Machine Learning Technique that later be used to do verbal screening for Goiter in children.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

This study uses secondary data. Data is obtained from Rasipin[5] research that was conducted on same location. In this study the population is children that influenced by pesticide. The amount of data that will be used is 53 positive goiter children and 48 goiter negative children.

Variable that will be used in this study, namely the age of the child, gender, exposure to pesticides (is a composite from playing in the agricultural area, playing / coming at the agricultural drug store, engaging in agricultural activities, storing crops in the house , storing pesticides at home, spraying pesticides into crops, working parents as farm laborers or farmers, exposure to cigarette smoke), exposure to insect repellent, Body Mass Index (BMI), habit of using plastic as a food container, habit of consuming vegetables / vegetables without washing, habit of not washing hands after playing / playing from the agricultural area. In this study, we tried to compare prediction result with full variable and the reduced variable(from Chi Square). Calculation of the relationship between each variable was carried out with the dependent using Chi Square. A significant factor will be used as a variable that will be used. variable which has a p-value <0.005 will be considered as variables that will determine the outcome prediction.

This study uses the Waikato Environment for Knowledge Analysis (WEKA) version 3.2.8 for machine learning technique. Named after a flightless New Zealand bird, WEKA is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a dataset or called from your own Java code. WEKA contains tools for data pre-processing, classification, regression, clustering, association rules, and visualization. WEKA GUI Chooser is appears on he first screen on the WEKA tool. The GUI Chooser window encompasses Simple CLI, Explorer, Experimenter, Knowledge Flow methods.

In a study conducted by Revathi[6], the study compared several Machine Learning algorithms for the heart disease data set. The study assessed the level of accuracy produced by the three algorithms by using WEKA as a research base. In another study, for predicting a disease[7], WEKA was used to see the performance of the algorithms used in Machine Learning.

The Variables selected will be included in the WEKA Application to do the training and testing process using the Logic Regression algorithm. 10-Fold Cross Validation is done on this data. Which means that the data will be separated into 10 parts and from every 10 parts taken 1 part will be used for the testing process.

Performance parameters used for measurements are Sensitivity (Se), Specificity (Sp), Positive Predictive Value (PPV) and Negative Predictive Value (NPV). This study uses only one System namely Fedora Spin XFCE with Core i5-4310 specifications and 8 GB RAM.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

The characteristics of each variable are shown in Table 1. In the existing data, the study was conducted on elementary school children in grade IV to VI. So that the age range obtained is not too varied. Mean for age is 10.93 years with a minimum value of 8 years and a maximum value of 13 years. In this study it was considered that the age was in the same year range so it was not taken into account in the model made.

For the variable smoking habits found that 100% of children, was non-active smokers but 79% of children are passive smokers, namely children who have active smokers in their families. This is reasonable because the research subjects are in elementary school age. Even if it is seen that in the rocket there is thiocyanate which can affect the performance of the Thyroid gland. But because the study aims for elementary school age children, the smoking habit (active smoker) is not included as a factor that has a relationship with the occurrence of Goiter.

Results obtained using Chi Square in each Variable can be seen in table 2. Nutritional status (BMI> 18.5 and BMI <= 25) was not significant to goiter occurrence, but we dicide to include this variable to predicting goiter occurance. While children playing in the agricultural area, and children having the habit of washing hands after playing in the area agriculture has no significant relationship with the occurrence of goiter. The variable is not continued to be included in the model. From this method we obtain a reduced variable(9 variable), namely

1. Parents as Farmers / Laborers of Farmers: If the wrong father / mother has a job as a farmer or farmer worker
2. Children were involved in agricultural activities: for example helping parents to produce onions, also spraying pesticides
3. Children usually visit agricultural drug stores: children are often told by their parents to buy medicine at a farm shop
4. Habit of storing crops in the house: onions that have been harvested are stored in the house, near the kitchen or place to eat
5. Habit of spraying pesticides on crops: The crops inside the house will be sprayed with pesticides to make them more durable
6. Nutritional Status (BMI <18.5 / thin): children classified as thin with a ratio of BB / TB <18.5
7. Passive smoking: There are family members who are active smokers
8. Use mosquito repellent / spray: routinely use mosquito coils / spray
9. Plastics or newspapers to wrap food: children often wrap food with plastic bags or used newspapersGoiter.

Table 1 . Data Characteristics

Variable	Frequency (n = 101)	%
Parents as Farmers / Farm Labor	31	30.7
Children play in farming area	17	16.8
Children are involved in agricultural activities	15	14.9
Children usually visit agricultural drug stores	11	10.9
Children have the habit of eating vegetables without washing	10	9.9
Children habbit not washing hands after following agricultural activities	7	6.9
The habit of storing crops in the house	23	22.8
The habit of spraying pesticide on harvest	14	13.9
Nutritional Status (BMI <18.5 / Thin)	92	91.1
Female Gender	58	57.4
Passive smokers	79	78.2
Use mosquito repellent / spray	62	61.4
Plastics or newspapers to wrap food	95	94.1

Table 2 . Variable Selection Using Chi Square

Variable		Positif (n=53)	Negatif (n=48)	p-value	OR (95%CI)
Parents as Farmers / Farm Labor	Yes	23	8	0.009	3.7
	No	30	40		(1.5 – 9.5)
Children are involved in agricultural activities	Yes	14	1	0.001	17.3
	No	39	47		(2.2 – 137.7)
Children usually visit agricultural drug stores	Yes	11	0	0.002	Not Available[a]
	No	42	48		
The habit of storing crops in the house	Yes	21	2	0.001	15.1
	No	32	46		(3.3 – 68.9)
The habit of spraying pesticide on harvest	Yes	14	0	0.001	Not Available[b]
	No	39	48		
Nutritional Status (BMI <18.5 / Thin)	Yes	48	44	1.000*	1.1
	No	5	4		(0.3 – 4.6)
Passive smokers	Yes	47	32	0.015	4.0
	No	6	16		(1.4 – 11.1)
Use mosquito repellent / spray	Yes	42	20	0.001	5.4
	No	11	28		(2.2 – 12.9)
Plastics or newspapers to wrap food	Yes	53	42	0.010*	Not Available[c]
	No	0	6		
Children have the habit of eating vegetables without washing	Yes	8	2	0.096*	4.1
	No	45	46		(0.8 – 20.3)
Children habbit not washing hands after following agricultural activities	Yes	6	1	0.115*	6.0
	No	47	47		(0.7 – 51.8)
Female Gender	Yes	32	26	0.668	1.3
	No	21	22		(0.6 – 2.8)
Children play in farming area	Yes	12	5	0.170	2.5
	No	41	43		(0.8 – 7.8)

* Fisher Exact

[a,b,c] Risk were not available because the data came from Case-Control Study and have no children within it's variable(zero value).

From our reduced variable(9 variable) we processed on WEKA, it's Se, Sp, PPV, NPV sequentially 0.774, 0.708, 0.745 and 0.739(tabel 3). This means that with Logistic Regression, it can only correctly predict goiter children with existing variable around 77%. PPV values describe the proportion of the children that realy have a disease with all the positif result by the model. So if you get a high Se and PPV number, the prediction for Disease Positif results will be good.

To complement this study we experimenting using full variable that exist on our data(13 Variable). With WEKA the result for Se, Sp, PPV, NPV was 0.698, 0.688, 0.712, and 0,673. Although that our reduced variable not significantly higher than full variable but we can see that reduced variable have more promising result on predicting goiter.

Table 3 . Result with Logistic Regression on WEKA

	Se	**Sp**	**PPV**	**NPV**
Full Variable(13 Variable)	0.698	0.688	0.712	0.673
Reduced Variable(9 Variable)	0.774	0.708	0.745	0.739

Discussion

Many research for prediction of a diseases using Machine Learning has been done. Machine Learning is a mechanism for pattern recognition and building intelligence into a machine(computer) that has the ability to learn, this means that a Machine Learning will be able to do something better in the future based on data or experience (training)[8]. The main purpose of the implementation of Machine Learning for disease prediction means that developing an algorithm that has the purpose of predicting the disease so that the results are as accurate as possible.

A research that using machine learning technique to predict liver cancer form Diabetic Mellitus Type2 Patient[9], and their result was very promising. They are using multiple Machine Learning, which is Logistic Regression, Decission Tree, Support Vector Machine (SVM) and Artificial Neural Network (ANN) Back propagation. The highest results was obtained are using ANN model, with sensitivity, specificity, Negative (NPV) and positive Predictive Value (PPV) respectively 75.7%, 75.5%, 79%, and 73%.

Another research was conducted for detecting Ischemic Stroke based in EEG[10], they are using more sophisticated method on Machine Learning called 1D Convolutional Neural Network and resulting good performance. It's sensitivity average was 86.1%. They are also using Logistic Regression on their studi but it's result was not as good as the first method.

In another study on predictions of hypothyroidism[11] a more complex (Artificial Neural Network) algorithm was used to resolve the case. A chance to increase accuracy is an aim for this area of research. The use of other algorithms to classify this disease can be used as material for further research.

With our reduced variable method, our experiment shows that with Chi Square method we can slightly increase it's accuracy. This reduced Variable method was also used in other disease prediction study[12]. Although there are many method to reduce variable for machine learning technique, our chi square method was suite for our research because of our categorical data.
With variable that have been investigated by Rasipin, in this study yielded a fairly high Se and Sp value which is above 70%, then this variable can be used as a verbal screening which is quite accurate. Data that only can be obtained from Laboratory such as Iodine Urine Excretion (EIU)[13] as in the previous study are indeed very important to do and can still be used as gold standard, but this will require time and money.

Like in some district in India[14], Brebes still using Universal Salt Iodization to prevent Goiter occurrence. But research conducted by Rasipin in Bulakamba Sub-district shows that almost certainly Goiter not because lack of iodine that on a child body. The major risk can came from the pesticides that majorly used in Brebes. We can use this to take precautionary measures on children. On recent study conducted in bulakamba[15], it's resulting that pesticide is still affecting the farmer on that sub district. Although that research were not focusing on children but we can see that pesticide is an issue on that sub district.

Technology that used to predict a disease can be used as a screening tool. Screening was not a diagnostic procedure. But more intends to dispose of a large portion of the intended population of interventions by minimizing the false positive results of a population[16]. If a screening tool can identify someone who has the potential for an illness, this patient can be immediately followed up with a specific diagnosis of an illness according to the screening tool used[17].With this verbal screening model that constructed, we can predict the diseases that can affect some individual, based on that we can constructed some focused preliminary interventions to that individual. Because the purpose of screening is to discover asymptomatic, affected individuals so that they can receive appropriate treatment[18]. Other research a prediction model was implemented to a computer program[19]. This study we do not implement this model on a computer program, but for further research, this model can be implement with computer program and combined with variable suggestions that can ultimately be more focused on changing the behavior of the individual.

IV. CONCLUSION

Results of this study with reduced Variable are sequentially Se, Sp, PPV, NPV at 0.774, 0.708, 0.745 and 0.739. Based on evaluation

parameters it can be seen that this study can be used for Verbal Screening. This means that this method can identify the patient and the Positive and Negative above 70%.

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Impact of Firm size on Profitability
(Special reference to listed manufacturing companies in Sri Lanka)

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Abstract-This study investigates the impact of firm size on profitability of listed manufacturing companies in Sri Lanka. In this study, 20 manufacturing companies which have been listed in Colombo Stock Exchange (CSE) have been selected as the sample using random sampling method and data have been collected from the annual reports of year 2014 to 2017. Return on Assets and Net Profit have been used as the indicators of firms' profitability. As indicators of firms size Total Assets and Total Sales have been used. Correlation analysis and regression analysis methods have been used as statistical tools and the results showed that firm size has no considerable impact on profitability of the listed manufacturing firms in Sri Lanka.
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Index Terms- Firm Size, Profitability, Return on Assets, Total Assets, Total Sales, Net Profits

I.INTRODUCTION

Size of a firm refers to the quantity and array of production capability and potential a firm possesses or the quantity and diversity of services a firm can make available concurrently to its clients and due to the phenomenon of economies of scale (Shaheen et al.,2012). The size of a firm is very essential in today's world because large firms can manufacture items on much lower costs in contrast to smaller firms. So, firm size has been become as a popular variable in explaining organizational profitability and a number of studies have investigated the effect of firm size on profitability (Niresh et al.,2014; Wu, 2006; Athanasoglou et al., 2008; Punnose, 2008). But In case of prior studies, some scholars reported positive relationship, others reported negative relationship. It means results of these prior studies have been inconsistent and controversial. So, further updated investigation in this area is vital. Therefore, the main objective of this study is to discover the impact of firm size on profitability of the listed manufacturing firms in Sri Lanka.

II.LITERATURE REVIEW

Most of the studies measuring the influence of firm size on profitability have found results with positive direction between firm size and profitability (Vijayakumar et al.,2010; Serrasqueiro et al.,2008). At the same time some of the studies have concluded that direction between firm size and profitability as a negative one. (Becker et al.,2010).

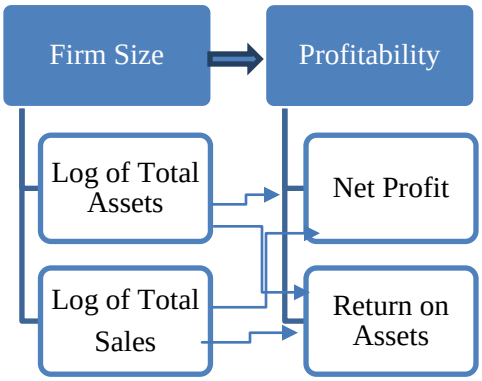
Niresh et al (2014) have studied the effects of firm size on profitability in listed manufacturing companies in Sri Lanka using the data of years 2008 to 2012 and results of the study showed that there is no indicative relationship between firm size and profitability. Velnampy et al (2010) have investigated the relationship between firm size and profitability of all the branches of Bank of Ceylon and Commercial Bank in Sri Lanka over the period of 10 years from 1997 to 2006.They have observed that there was a positive relationship between firm size and profitability in Commercial Bank, but there was no relationship between firm size and profitability in Bank of Ceylon.

According to these literatures, it is clear that the studies on the impact of firm size on profitability have brought out different results and there is no common agreement on how the firm size is related to firm profitability. The results are not having consistency and therefore more empirical work is required. So, this study has been instigated to the impact of firm size on profitability of the listed manufacturing firms in Sri Lanka.

III.METHODOLOGY

The population of the study comprises the manufacturing companies that are listed in the Colombo Stock Exchange, Sri Lanka. The period of the study covered the years between 2014 and 2017 for the manufacturing firms listed in the Stock Exchange. The sample comprised of 20 randomly selected companies per year, yielding a total of eighty (80) observations for the period under consideration. Secondary data were obtained from the audited annual reports of the relevant years.

Main independent variables of the study are firm size indicators and main dependent variables are profitability indicators. As Niresh et al. (2014) have done, total assets and total sales have been used as firm size indicators whereas net profit ratio and return on assets have been utilized as the measures of firm profitability in this study.
Based on the variables used in the study the conceptual framework can be developed in the following manner.



Furthermore, the following research hypotheses have been formulated in an attempt to provide empirical evidence on the existence of relationship between the variables of the study.

H1	There is a significant relationship between firm size and profitability (Niresh et al., 2014)
H1a	There is a significant relationship between Log of Total Assets and Net profit
H1b	There is a significant relationship between Log of Total Assets and Return on assets
H1c	There is a significant relationship between Log of Total Sales and Net profit
H1d	There is a significant relationship between Log of Total Sales and Net profit

The quantitative research approach was applied to investigate the findings of the research study. Multiple regression and correlation methods have been used in the empirical analysis. The following regression models which have been developed based on the variables used in the study have been tested.

$ROA = \beta 0 + \beta X1 + \beta X2 + \varepsilon$ ---------→ Model I
$NP = \beta 0 + \beta X1 + \beta X2 + \varepsilon$ ---------→ Model II

Where:

X1= Asset Turnover.
X2= Logarithm of Total Assets.
X3= Logarithm of Total Sales.
NP= Net Profit.
ROA = Return on Assets.
β0= Constant.
ε= Error term.

IV. Data Analysis

Pearson correlation analysis have been used by the researchers to determine association of determinants of firm size and determinants profitability.

		Total Assts	Total Sales
Net Profit	Pearson correlation	-0.29	0.304
	Sig. (2-tailed)	0.772	0.002**
	N	80	80
Return on Assets	Pearson correlation	-0.41	0.207
	Sig. (2-tailed)	0.689	0.40
	N	80	80

These results indicate that,

There is no statistically significant relationship between total assets and net profit because significance value (2 tailed) is higher than 0.05. Then H1a should be rejected. But according to Pearson correlation analysis there is a statistical insignificance weak negative relationship (-0.29) between total sales and net profit.
There is no statistically significant relationship between total assets and return on assets because in significance value (2 tailed) is higher than 0.05. Then H1b should be rejected. But according to Pearson correlation analysis there is a statistical insignificance weak negative relationship (-0.41) between total assets and return on assets.
There is a statistically significant relationship between total assets and return on assets because in significance value (2 tailed) is higher than 0.05. Then H1c should be accepted. But according to Pearson correlation analysis there is a statistical insignificance weak positive relationship (0.304) between total sales and net profit.
There is no statistically significant relationship between total assets and return on assets because in significance value (2 tailed) is higher than 0.05. Then H1d should be accepted. But according to Pearson correlation analysis there is a statistical insignificance weak positive relationship (0.207) between total sales and return on assets.
Below table presents the output of regression analysis which has been tested the affection of independent variables towards dependent variables in this study.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.210a	.044	.024	22.61731
2	.041a	.002	-.009	22.99465

According to the results summary of model 01, the R square value is 4.4%. That means affection of total sales and total sales towards ROA is 4.4%. & According to the results summary of model 02, the R square value is 2%. That means affection of total sales and total sales towards ROA is 2%.

V. Conclusion

This study examined the effects of firm size on the profitability of the listed manufacturing firms in Sri Lanka. In this study, data of 20 companies which were active in Colombo Stock Exchange (CSE) between the years 2014 to 2017 have been used. Multiple regression and correlation methods have been used in the analysis.
Correlation analysis presence of statistically insignificant association between the indicators of firm size and the measures of firm profitability. H1a, H1b & H1d have to be rejected & just H1c was accepted. Even though there is a significant relationship between total sales and profitability (H1c), the results disclose that no remarkable relationship is found between firm size and profitability of the listed manufacturing firms in Sri Lanka.
Furthermore, in multiple regression analysis R2 values suggest that just 4.4% & 2% of the observed variability in the model I & II were demonstrated by the variations in the independent variables used in the study. Remaining 95.6% & 98% of the variations in the models were related to other variables which were not considered in the models. According to the analyzed data reveals that regression analysis shows the total assets and total sales are not contributed to determine the net profit of the listed manufacturing firms. As well as the total assets and total sales are not contributed to determine the return on assets of the listed manufacturing firms. So, the size indicators are not the determining factors of profitability of listed manufacturing companies in Sri Lanka. So, there may be a number of variables which can have impact on the profitability that need to be studied in future studies.
This research has proved that the size indicators are not the determining factors of profitability of listed manufacturing firms in Sri Lanka. That is other factors are probably found to be better predictors of profitability. Hence, there is an enormous scope for further researches in this area.

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Total Quality Management applications of higher education in Libya

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Abstract- Address the extent to which higher education institutions standards of total quality management in accordance with the different axes, and represented the study procedures in the use of descriptive and analytical approach, also used the questionnaire to collect information tool which has been applied to a sample of 62 of the directors and heads of departments and units and members of the faculty and all of his role in the strategic planning of higher education institutions in Sabratha management. Statistical processing was used program (SPSS) to calculate percentages and averages, standard deviations, and test hypotheses to find a relationship between the variables of the study in accordance with the comprehensive quality management standards axes, the study found the number of results was the application of total quality management standards such institutions moderately according to different axes, One hypothesis testing results and there is a significant statistical relationship between the approval of the organizational structure of the Foundation Council and the procedures for the organization agrees with its mission and objectives, as there is a relationship between the approval of the organizational structure of the Foundation Council and the vision and mission. The presence of a statistically significant relationship between the clarity of vision and mission and how the organization measures agree with its mission and the existence of significant differences, for the variables of the study by type, and job level and age. The study recommended the need to adopt the concept of total quality management in the educational process and review the implementation mechanisms and the establishment of a specialized department for quality and accreditation of institutions where there is no quality management, dealing with the applications programs and to work on activating the idea of creating a unit of Total Quality and Performance Development in Higher Education Institutions in the light of international standards.

Keywords*:* Higher education, quality management, statistical processing, International standards.

I. INTRODUCTION

Consider higher education the most important pillars of comprehensive development, and through its contribution to the preparation of technical and academic and professional cadres of various institutions of society, in addition to the course in the development of knowledge, use and dissemination through scientific research, and the preparation of specialists in the fields and the development of society and the environment service methods.

So I enjoyed the process of the development of education with great interest in most countries of the world, and it was the most important tools developed by the application of quality standards that have become a feature of this era, making thinkers call this era of quality era as one of the basic pillars of the model of successful management that appeared to keep pace with international and local variables and try to adapt.

Accordingly, the basic pillars determine the quality ranks of great importance in the framework of its practicality in the various institutions involved, including the institutions involved in higher education, if these cornerstones that would indicate to the basic facts in the field of quality assurance [22]

The overall quality of the system occupied a leading position in the thinking of economists and educators to improve the quality of education at all levels, and in all its dimensions and its components, and the overall quality has become one of the issues of concern to the administrative leadership of any educational institution to raise the level of their performance.

And what was the administration's success is linked to the productive efficiency, so the overall quality strategy for integrated management emerged for the development of the productive and service enterprises, and including institutions of higher education [3].

Given the importance of the development of a gateway T. Higher Education, processes and outputs it has become a recognized acceptance of the principle of comprehensive evaluation of the components of the educational system and the way its programs to achieve its objectives on the one hand and an investigation into a good investment to spend on education on the other hand, has led to the emergence of a strong approach aims to strive hard to improve the efficiency of the educational system, by improving

the overall quality of the outputs of the education system, and adjust the quality standards and systems using different overall quality [3].

The study questions in the following main question:

Is University of total quality management standards are applied in accordance with the different axes? The fork to the following questions.

A. Are university standards of total quality management in accordance with the applicable standard administrative work through (Vision, Mission, and Goals)?

B. To what extent the application of the university to the standards of total quality management of the administrative organization?

C. To what extent the application of the university to the standards of total quality management of educational programs and curricula, and educational systems?

II. The hypotheses of the study

The study based on the following hypotheses:

* TQM requires work in one team (the senior management and members of the faculty and staff and senior policies of the state body) lead to the success of the application of total quality management.
* Quality of inputs (students, faculty and curricula, facilities and funding) leads to the quality of outputs.
* There are many obstacles that lead to deficiencies in the application of total quality in higher education institutions standards in Sabratah.
* No quality standards and the adoption of a real and if there is not implemented.
* The extent to which higher education institutions quality standards in Sabratah and accreditation recognized by the Ministry of Higher Education.

III. The objectives of the study

The aim of this study is the following:

1. Showing the basic concepts of Total Quality Management in Higher Education Institutions.
2. Definition of the concepts of Total Quality Management in Higher Education and the various intellectual visions that I've ever had.
3. Highlighting the most important criteria and steps that educational institutions should be followed in the field of establishing Assurance Authority generosity of academic accreditation.
4. Contribute to the enrichment of scientific libraries in Libya in this area.
5. Ensure the application of total quality concepts in Libyan universities.

Perhaps the most important challenges of our time the subject of the quality of higher education, which has become a challenge for institutions of higher education and what should be on governments and educational institutions work in this regard in terms of search quality for quality in everything under the tyranny of the quantum [2]

Hence the importance of this study are as follows:

1. Find highlights the importance of the application of total quality management as a way to improve the university educational system and its development.
2. Apparent lack of literature and research in the field of total quality management and its applications in higher education institutions of the Libya
3. The establishment of quality assurance and accreditation bodies in Libya.
4. The need for higher education institutions to take the Libyan modern methods in the development, management.

IV. The methodology used in the study

The study relies on:

1 - Descriptive approach: by describing the statement of facts and information

2 - Analytical approach: and it is data and information that is obtained from the questionnaire and personal interviews, analysis, and placed in tables and arrange them and then draw conclusions and recommendations.

3 - Historical method

V. The limits of the study

1 - Objective limits: the application of Total Quality in Higher Education Standards

2 - Spatial boundaries: The spatial boundaries in higher education institutions in Sabratah - Libya

3 - Time limits: The study was conducted on the data and information from the years 2011 to 2015

VI. THE STUDY COMMUNITY

The study population consisted of (managers and heads of departments and units, supervisors and some faculty and all the members involved in strategic management) workers in the fields of higher education institutions in Sabratah.

All targeted relevant faculty' members and may distribute the questionnaire on colleges and universities, and the ratio of that period which has been distributing the questionnaire has experienced annual leave for colleges, so the proportion of participants in the survey decreased. However, the share was convinced of the importance of study. The study included 62 College workers ranged between department heads, faculty, staff, engineers and other functions.

VII. STUDY METHODOLOGY

A tool Established to study it is identification is made up of four areas covering 80 questionnaires to measure Degree application criteria for management of quality overall in the area of Sabratha , Study looked at workers in higher institutes, where there was developing a questionnaire to gather information, and that according to the following steps:

1- View on literature education and studies ex on the topic of study.

2- Choose a model for antecedent Centre used nationally to ensure quality and accreditation institutions, education and training, and found they serve Search dramatically.

3- Choose areas and items appropriate to exclude some of the other to avoid stretching or repetition.

4- Distribution of the questionnaire as final.

5- Measure the extent of sincerity and steady lines resolution.

6- Distribution of questionnaire on category targeted and then collected.

7- Conduct analysis of statistical fitting, and coming up with results and comment on them.

8- Prepare recommendations are appropriate in light of these results.

VIII. STUDY VARIABLES

Included Study variables as following:

A - Independent Variables:

- Sex: It has two levels: male, female.
- Qualifier Scientific: it has three levels) diploma, Bachelor, higher than Bachelor).

Years Expertise: it has three levels: (less than 5 years, 5-10 years, and more than 10 years.

B -Dependent variable: In response on the question of study which is determined by the degree of application of standards of quality Overall In colleges and higher institutes in the city of Sabratha.

IX. STATISTICAL PROCEDURE

After Unloading answers members sample was encoded and enter data using a computer, then was Processing the data statistically using software statistical package for social sciences (SPSS),

Statistical procedures used are:

1. Frequencies, averages, percentages and Standard Deviation of screened
Responses to Members of the sample on the question the President first.
2. Test of Normality.
3. Test analysis of variance (ANOVA) to examine the significance of the differences in the responses of members of the sample in the degree of application of criteria Management of quality overall according to variables of the qualification and years of experience.
4. Correlation test to see if there is a relationship between study questions with significance.
5. Nonparametric Test (Sign test) is taken to test statistical hypothesis for individual study.

X. DESCRIPTIVE ANALYSIS:

Table 1: Statistics Survey applied to 62 participants.

		sex	age	Education level	Job position	Practical Experience
N	Valid	60	54	60	61	60
	Missing	2	8	2	1	2

Some values are missing for every question, because May perhaps participant is not interesting or refuse to answer.

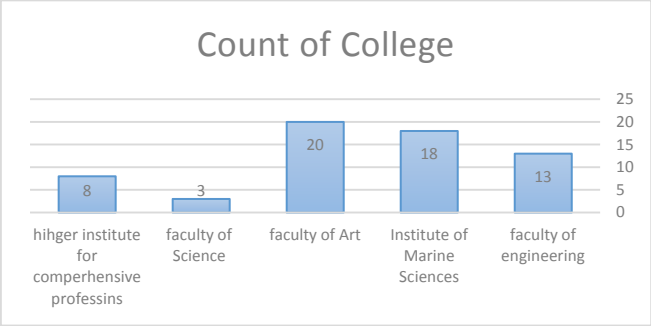

Figure 1: Frequency rate for college's participants

Table 2: participant's distribution as sex category.

		Frequency	Percent
Valid	male	42	67.7
	female	18	29.0
	Total	60	96.8
Missing	System	2	3.2
Total		62	100.0

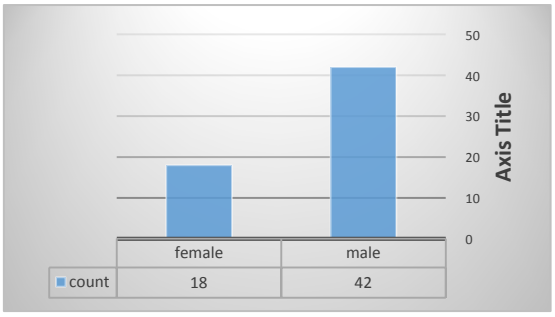

Figure 2: participant's distribution as sex category.

Table and figure above show that 42 male and 18 female who contribute to survey.

Table 3: participant's distribution as age category

		Frequency	Percent
Valid	less than 30 years	7	11.3
	30-40 years	10	16.1
	40-50 years	21	33.9
	more than 50 years	16	25.8
	Total	54	87.1
Missing	System	8	12.9
Total		62	100.0

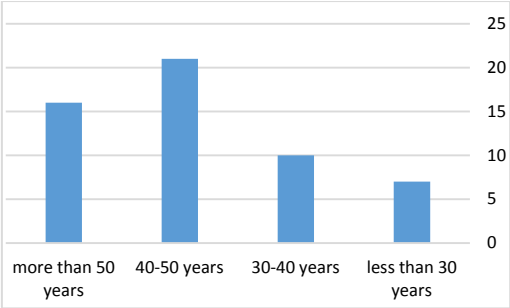

Figure 3: participant's distribution as age category

Table and figure above display seven participants age less than 30 years, 10 participants 30-40 years, 21 participants 40-50 years and 16 participants more than 50 years

Table 4: participant's distribution as education level category

		Frequency	Percent
Valid	PUBLIC HIGH SCHOOL	1	1.6
	Bachelor	18	29.0
	Master Degree	19	30.6
	PhD	9	14.5
	other	13	21.0
	Total	60	96.8
Missing	System	2	3.2
Total		62	100.0

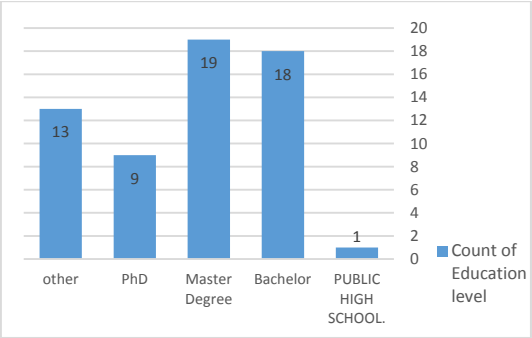

Figure 4: participant's distribution as education level category

Table and figure above display one participant has PUBLIC HIGH SCHOOL, 18 participants with Bachelor degree, 19 participants Master Degree, 9 participants has PhD degree and 19 participants are other.

Table 5: participant's distribution as job position category

		Frequency	Percent
Valid	Enterprise Manager	2	3.2
	Head division	26	41.9
	Faculty Member	13	21.0
	Engineer	2	3.2
	Employee	15	24.2
	other	3	4.8

	Total	61	98.4
Missing	System	1	1.6
Total		62	100.0

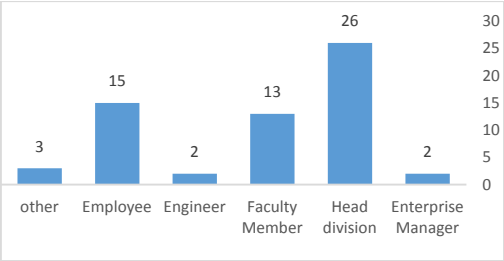

Figure 5: participant's distribution as job position category

Table and figure above show distribution of participants according to their jobs as two participants work as Enterprise Manager, 26 participants work as Head division, 13 participants work as Faculty Member, 2 participants work as Engineer, 15 participants work as employee and three participants said they work other.
Note: one answer is missing.

Table 6: participant's distribution as Practical Experience category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5 years	12	19.4	20.0	20.0
	5-10 years	18	29.0	30.0	50.0
	10-15 years	7	11.3	11.7	61.7
	15-20 years	8	12.9	13.3	75.0
	20 years and more	15	24.2	25.0	100.0
	Total	60	96.8	100.0	
Missing	System	2	3.2		
Total		62	100.0		

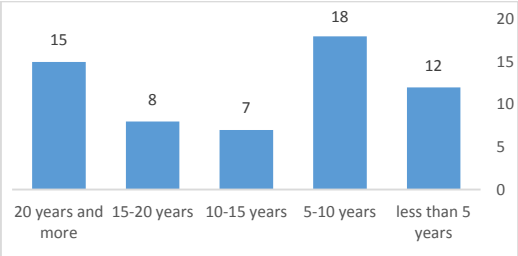

Figure 6: participant's distribution as Practical Experience category

Table and figure above show distribution of participants according to their Practical Experience 12 participants have less than 5 years' experience, 18 participants have 5-10 years' experience, seven participants have 10-15 years' experience, eight participants have 15-20 years' experience and 15 participants have more than 20 years' experience work.

XI. Reliability analysis (Alpha Cronbach Statistics)

Scale: ALL VARIABLES

Table 7: Case-Processing Summary

		N	%
Cases	Valid	58	93.5
	Excluded[a]	4	6.5
	Total	62	100.0

a. Listwise deletion based on all variables in the procedure.

Table 8: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.667	.669	3

Table (8): Reliability Statistics

Reliability analysis is taken as table above show for three questions and respondents to its. 0.667 Cronbach's Alpha statistics, means that researcher could consider questionnaires answers is good reliable. Truth statistics is the square roots for reliability measure equal to 0.81, consider good statistics and participants who contributes to survey have fact answers.

Table 9: Reliability Statistics

		Sum of Squares	df	Mean Square	F	Sig
Between People		136.626	57	2.397		
Within People	Between Items	.356	2	.178	.223	.800
	Residual	90.977	114	.798		
	Total	91.333	116	.787		
Total		227.960	173	1.318		

Table (8): Analysis of Variance (ANOVA)

Analysis of Variance is taken to test homogeneity of variables and if there are differences between its. Test in table above show that there is significance value (0.800) greater than 0.05 significance test, which means that hypothesis of homogeneity is true and there is no difference between variables' answers.

Likert Scale:

Likert scaling, like, uses a panel of expert judges to locate the items on the attitude scale. However, Likert scaling uses a polychromous response scale (e.g., strongly disagree =0; disagree = 1; neutral = 2; agree = 3; strongly agree = 4) rather than a dichotomous response scale (disagree = 0; agree = 1). Typically an odd number, usually five or seven, response categories are used, with a middle 'neutral' or undecided category'; however, the use of an even number of response categories is equally valid. The central assumption in Likert scaling is that the respondents located high on the attitude scale are more likely to use high response categories than are individuals located on the low end

XII. Hypothesis Testing

Table 10: Correlations between questions and its significance

		college	Enterprise has a clear vision and postings	The enterprise organizational structure were approved by its Board	Enterprise procedures compatible with its mission and objectives
college	Pearson Correlation	1	-.035	-.068	.082
	Sig. (2-tailed)		.789	.608	.540
	N	62	61	60	58
Enterprise has a clear vision and postings	Pearson Correlation	-.035	1	.339**	.541**
	Sig. (2-tailed)	.789		.008	.000
	N	61	61	60	58
The enterprise organizational structure were approved by its Board	Pearson Correlation	-.068	.339**	1	.486**
	Sig. (2-tailed)	.608	.008		.000
	N	60	60	60	58
Enterprise procedures compatible with its mission and objectives	Pearson Correlation	.082	.541**	.486**	1
	Sig. (2-tailed)	.540	.000	.000	
	N	58	58	58	58
**. Correlation is significant at the 0.01 level (2-tailed).					

- Table above shows there is no significance correlation between colleges; Enterprise' vision and postings, enterprise organizational structure approval by its Board and compatibility of Enterprise procedures with its mission and objectives.
- There is significance correlation (sig=0.000) between enterprise organizational structure approval by its Board and compatibility of Enterprise procedures with its mission and objectives.
- There is significance correlation (sig=0.008) between enterprise organizational structure approval by its Board and Enterprise' vision and postings.
- There is significance correlation (sig=0.000) between enterprise organizational structure and compatibility of Enterprise procedures with its mission and objectives.

XIII. Discussion

As Analysis of Variance is taken to test homogeneity of variables and if there are differences between its. Test in table above show that there is significance value (0.800) greater than 0.05 significance test, which means that hypothesis of homogeneity is true and there is no difference between variables' answers. Where there are relationships between Enterprise' vision and postings, enterprise organizational structure approval by its Board and compatibility of Enterprise procedures with its mission and objectives. To which means Enterprise' vision and postings affect enterprise organizational structure and compatibility of Enterprise procedures with its mission and objectives.

There are some notices based on researcher's observations:

I. A significant lack of communication and delivery of information.

II. Leaving the task and responsibility of quality to specialists in quality.

Quality Section work without any incentive.

III. Lack of work in the spirit of Integrated Task Force for improvement teams

responsible party do not to forget and leave the ways of the past and the curriculum.

IV. Incompatibility of the organizational structure with total quality management requirements.

V. Resistance to change resulting from the work of the Department of quality universities.

VI. Lack of harmony between organizational culture and the requirements of the success of the application of total quality management.

VII. Work is not a favorable environment so that employees feel that there is no value to them.

VIII. Lack of commitment by senior management of total quality management in universities.

IX. Lack of education and training in how to implement total quality management.

X. Interim interest and non-continuous improvement, when access to some of the results is discontinued.

XI. Not taking into account the enterprise environment and how to respond to them

To answer the research questions

I. Are university standards of total quality management in accordance with the applicable standard administrative work through (Vision, Mission, goals)?

From hypothesis testing, higher institutes and university colleges apply quality management in accordance with the applicable standard administrative work through (Vision, Mission, and goals) in average level, with no significance differences between educational institutes.

II. To what extent the application of the university to the standards of total quality management of the administrative organization?

From hypothesis testing, higher institutes and university colleges use quality management standards of the administrative organization in typical manner.

III. To what extent the application of the university to the standards of total quality management of educational programs and curricula, and educational systems?

From hypothesis testing, higher institutes and university colleges apply typically quality management standards of educational programs and curricula and educational systems.

XIV. Conclusion

The research centered on the extent to which educational institutions to the standards of total quality management in accordance with the different axes: the vision-message-organizational goals and work and educational programs. The study found the presence of total quality concept and vision, but his application below the desired level, the proportion of the circumstances experienced by the country within the temporal limits within which the message was conducted. There is an effort by the quality of educational institutions and departments attempt to consolidate the overall quality practices, which is recommended by the National Centre for TQM and training. National Centre for TQM training is considered the national to oversee the quality of education in universities Jamahiriya. Observed study the link between the organizational structure of the institution and clarity of vision and mission, as noted not to forget the ways of the past and the curriculum, especially from party officials, and the incompatibility of the organizational structure with total quality management requirements. There is also resistance to change resulting from the work of the Department of quality universities, and non-continuous attention improvement, when access to some of the results is discontinued. Finally, not taking into account the enterprise environment and how to respond to them. It recommended the message of attention to the quality and the quality of services offered by institutions of higher education to the individual and society in accordance with the standards of overall quality, and to ensure that scientific activities and programs of study accredited meet the quality and accreditation requirements and are consistent with international standards in the field of higher education and the requirements of specialization in various fields of education, as well as the needs of the university and students The state and society. The message also calls for work on activating the idea of creating a unit of Total Quality and Performance Development in Higher Education Institutions in the light of international standards.

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High Sensitive O_2 Transducer by Gallium Oxide Thin Film

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Abstract- This thesis is mainly to study the oxygen sensing characteristics of gallium metal oxide film at high temperature, and to analyze the oxygen sensing at temperatures above 600°C. First, the gallium oxide thin film is grown on the silicon substrate by sputtering, and the film quality and the boundary particle size are determined by different sputtering conditions, and the film structure is analyzed by atomic force microscopy. Finally, using this intrinsic and variable resistance characteristic of a gallium oxide film under oxygen, a simple Wheatstone bridge circuit was designed to successfully complete an oxygen voltage sensing transducer.

Index Terms- transducer, gallium oxide, oxygen sensor, Wheatstone bridge

I. Introduction

The development of the automobile industry has brought people a more convenient lifestyle, but relatively embarrassing is the problem of energy shortage and environmental pollution. The most critical component in controlling this big problem in automotive components is the O_2 sensor. In terms of energy conservation, the main purpose of the oxygen sensor is to prevent the mixed gas from being too rich or too lean, causing some unburned gasoline to accumulate in the catalytic converter, causing the temperature to be too high and burning the catalyst. When the mixture is too rich, the oxygen sensor transmits the excessive signal to the engine control module (ECM) to reduce the fuel injection time of the injector and reduce the injection amount of the gasoline, so as to achieve fuel saving. Up to date, Gallium oxide (Ga_2O_3) is one of the most recent potential oxides and can be used as a material in metal-oxide gas sensors. It has a high temperature sensing property, which is caused by oxygen sensing due to defects in the crystal lattice in the crystal lattice. In order to obtain an oxygen sensor with high performance, the characteristics of easy to manufacture with gallium oxide (Ga_2O_3), stable characteristics, fast reaction speed and low price have been used. During film growth, the target is sputtered and oxidized by sputtering. Gallium material and then a new high-temperature oxygen sensor of platinum-gallium-platinum sandwich structure (Pt-Ga_2O_3-Pt sandwich), which is expected to be applied to high-temperature industrial applications such as steam, in order to achieve the purpose of fuel economy and environmental safety and environmental protection. Typically, the oxygen induction mechanism can be explained as follows: the oxygen molecules adsorbed by the metal oxide at a high temperature and converted into ionized molecules or ionized atoms, that is, or caused to extract electrons from the conduction band. [1] Then, the surface state is modified by reducing the vicinity of the carrier and the formed semiconductor interface of the depletion region. While the oxidizing gas occupies the sensor surface, more oxygen will adsorb on the surface and then attract more electrons from the conduction band. The result of this surface conductivity reduction of this reaction can be written as given by the following equation:

$$O_2(gas) \Leftrightarrow O_2(ads) \quad (1)$$

$$e^- + O_2(ads) \Leftrightarrow O_2^-(ads) \quad (2)$$

$$e^- + \frac{1}{2}O_2 \Leftrightarrow O_2^-(ads) \quad (3)$$

Therefore, the amorphous gallium oxide film can be used as a good gas sensor with insufficient oxygen. [2-3] Improved conductivity, which can be thought of as the presence of many unoccupied bonds and is caused by oxygen vacancies.

II. EXPERIMENTAL

Based on the physical understanding of the principle of oxygen sensors, etching the gallium oxide sandwich structure, suggesting that there may be more unoccupied bonds and high oxygen sensitivity is expected in this study. In Fig. 1, the AFM image shows the grain surface of the gallium oxide film in the area range of 1.2um x 1.2um under the sputtering pressure of different powder targets, that is, the pressure is 5Pa, 4Pa, 3Pa, 2Pa film surface condition. It has been found experimentally that the crystal faces of films deposited at low sputtering pressures have a larger grain size than when subjected to high sputtering pressures. Therefore, the average grain size observed for the deposited film was gradually increased from Figs. 1(a) to (d). At the same time, from the experiment, the film deposited after the thermal annealing, while increasing the temperature of the substrate also increases the grain surface size.

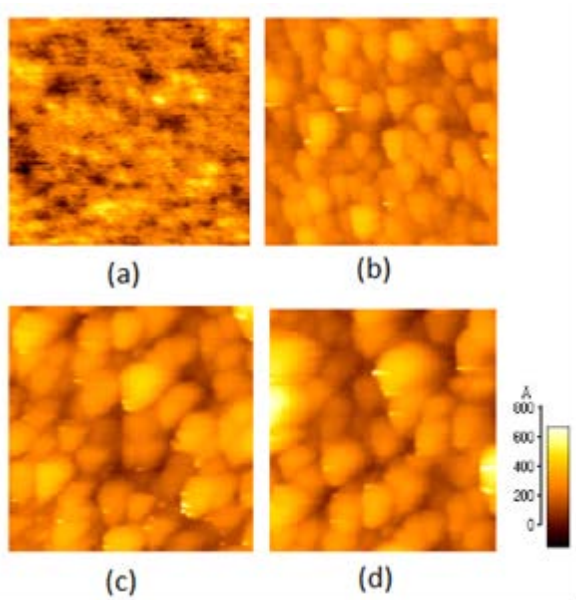

Figure 1: AFM gallium oxide film deposition pattern at pressures of (a) 5 (b) 4 (c) 3 and (d)2Pa, respectively

Figure 2,3 shows the corresponding current-voltage (I-V) characteristics. The electrical properties of the platinum-gallium oxide-platinum structure is measured at room temperature and 20% O_2 at a temperature of 700^0C. The structure of the element is a metal-oxide layer. Metal-oxide-metal (MSM), the current-voltage curve is a graph similar to the diode. The current-voltage curve is symmetrical under positive and negative polarity, and there is a corresponding turn-on voltage under forward bias (turn-on voltage) are 1V and 1.3V respectively. The relatively high turn-on voltage is mainly attributed to introduction of oxygen. The most important reason for the high turn-on voltage when containing condition at 20% oxygen is due to oxygen vacancy caused by the induced resistance to rise, so the behavior is different from those at 30% and 40% O_2 concentration. The current-voltage graphs are shown in Figures 4, 5. The corresponding turn-on voltages are 1.45V and 1.75V, respectively. The four diode idealization factors under forward bias are 1.3, 1.8. 1.85, 2.15, respectively. [2-3]

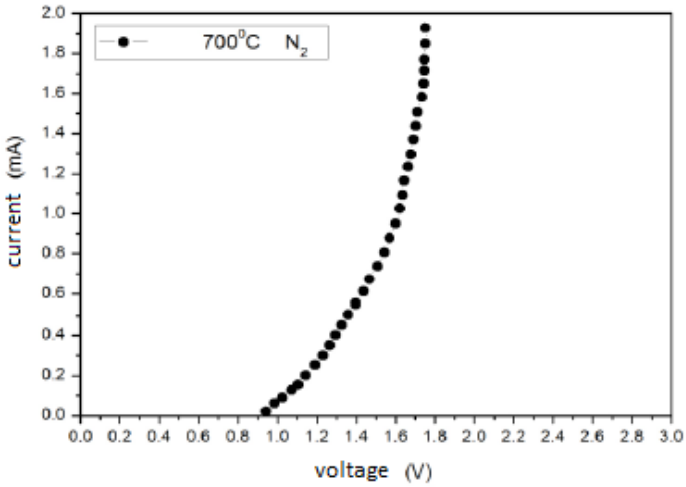

Figure 2: Current-voltage graph of platinum-gallium oxide-platinum under N_2 at temperature = 700^0C

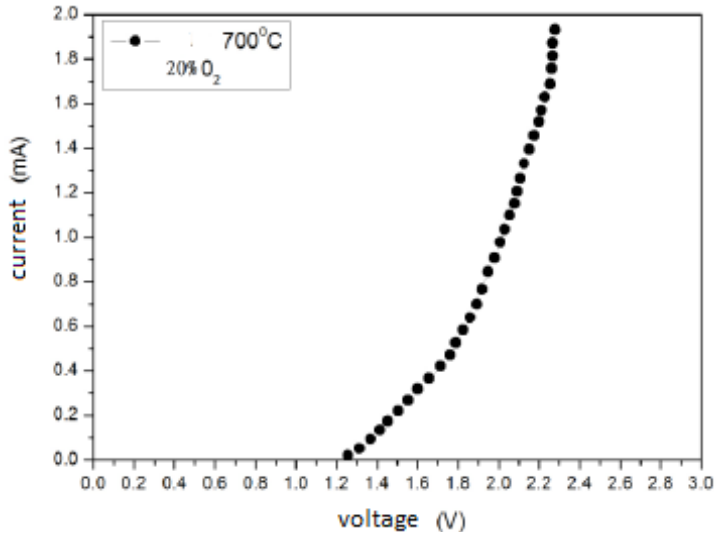

Figure 3: Current-voltage graph of platinum-gallium oxide-platinum at 20% O_2 at temperature = 700^0C

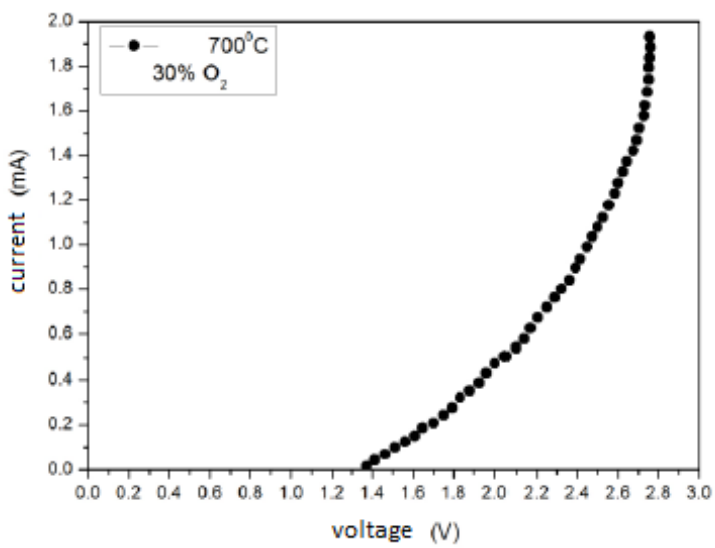

Figure 4: Current-voltage graph of platinum-gallium oxide-platinum at 30% O_2, temperature = 700^0C

For a diode characteristic, its behavior is shown as eq. (4), where V_D is the diode voltage, V_T the thermal voltage, I_S the saturation current, and n is the ideal factor. The closer n is to the nearest one, the closer it is to the ideal diode.
where

$$V_D \approx n \cdot V_T \cdot \ln 10 \cdot \log_{10}\left(\frac{I}{I_S}\right) \qquad (4)$$

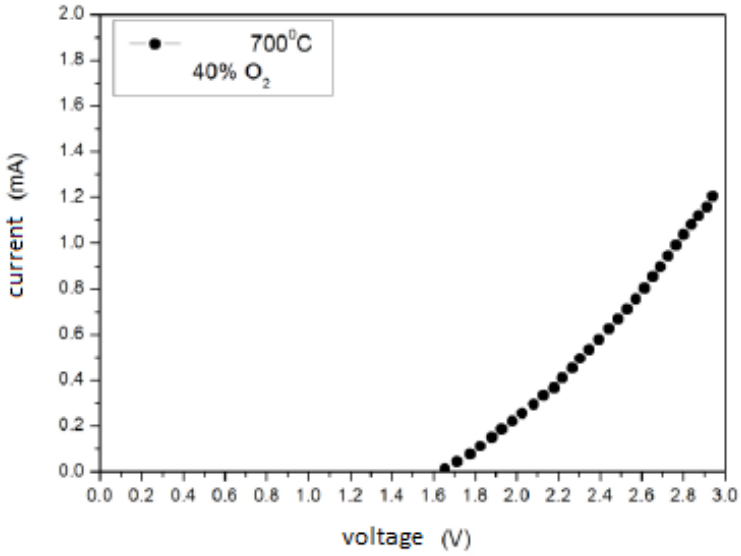

Figure 5: Current-voltage graph of platinum-gallium oxide-platinum at 40% O_2 at temperature = 700^0C

III. RESULTS AND DISCUSSION

This surface-etched oxygen sensor has a typical dynamic response curve as shown in Fig. 6 under an O_2 gas mixture of 0% and 35%. At the same time, increasing the concentration will increase the sensing resistance, because the electrons are in the phenomenon of electrical conduction. Contrary to this, when the concentration is lowered, a decrease in the sense resistance occurs, which means that the electrical conduction is caused by the formation of oxygen vacancies and the release of electrons. The difference between the maximum and minimum sense resistor values can be as high as 74KΩ at a temperature of 830^0C. In addition, the calculated average response time (τ), which is defined as the time required for the sense resistor response to go from zero to 90% of its saturation value, yields a response of approximately 24.7 sec for the proposed oxygen sensor time. This short response time can be explained by a large area of interface oxygen vacancies and a large electron release rate. It has also been found experimentally that the sensing temperature is comparable to the previous published paper (Ogita et al., 2003), [4] the temperature of the deviation can be attributed to the results obtained from different measurement systems, or because the component has a large sensing structure.

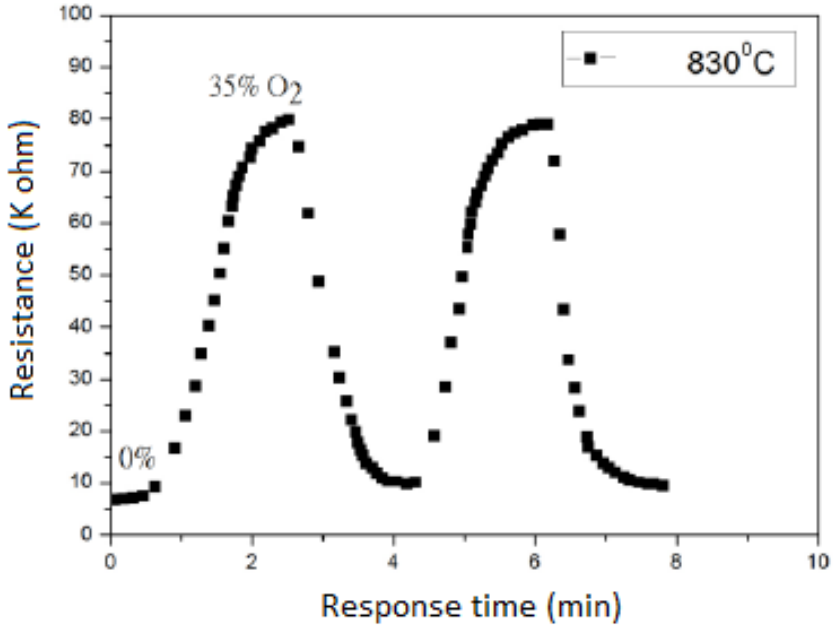

Figure 6: Dynamic change diagram of resistance under different oxygen concentration changes

In addition, the mathematical definition of oxygen sensitivity can be written as follows:

$$S(\%) = \frac{R_g - R_a}{R_a} \times 100\% \quad (5)$$

Where R_g and R_a are the sense resistor values in the atmosphere and oxygen, respectively. The effect of oxygen sensitivity on temperature change at a fixed 30% O_2 concentration is shown in Figure 7. From the experiment, it was found that the highest sensitivity is as high as 70% at a temperature of about 810°C. This phenomenon can be attributed to the surface etching type. The detector has a structure that senses a large surface area.

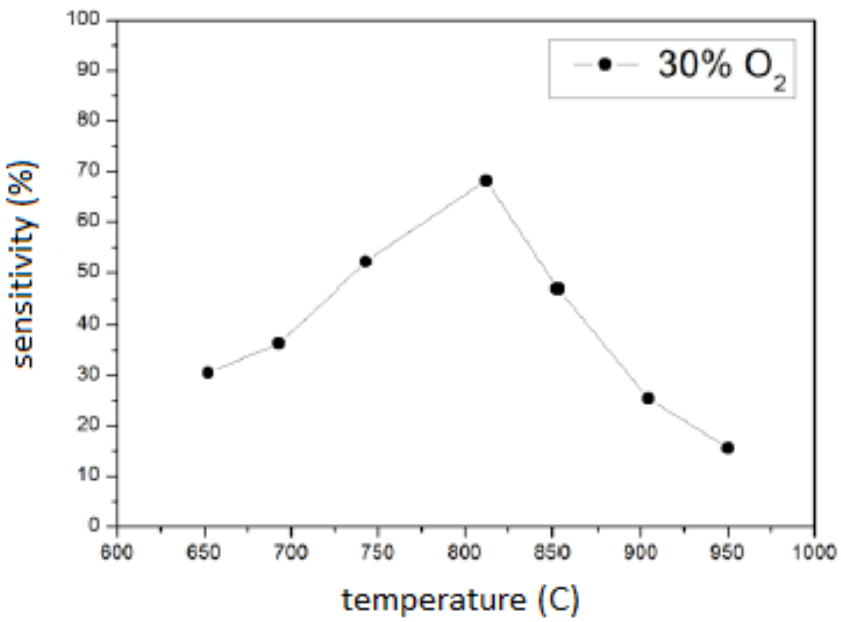

Figure 7: The relationship between temperature and sensitivity when the oxygen concentration is fixed at 30%

In addition, the experiment also tried to observe the change of the induction resistance with the continuously changing oxygen concentration, that is, when the temperature was 900°C at different times, the oxygen concentration of 15%, 25%, 40% was introduced to observe its dynamic response. The experimental results produced different and measurable fluctuating resistance values at different oxygen concentrations, and the response of the sensor was good and reproducible. From 15% oxygen concentration to 35%, the increased sensor resistance and resistance change is mainly due to the influence of electrons on electrical conduction. The experimental results show that at 40% concentration, the difference between the maximum and minimum sensed resistance values can be as high as 90KΩ. The formula can be written as a function of different temperatures.

$$R(T_2) + R(T_1) + \Delta R = R(T_1)\left[1 + \gamma(T_1) \cdot \Delta T\right] \quad (6)$$

After finishing the above formula, referring to the simple voltage dividing circuit shown in Fig. 8, the relationship between the output voltage V_o and the temperature can be obtained as follows:

$$V_o(T_1) = \frac{V_{CC}}{1 + \frac{R_2}{R_L}} \quad (7)$$

$$V_o(T_2) = \frac{V_{CC}}{1 + \frac{R_2}{R_L}\left[1 + \gamma(T_1) \cdot \Delta T\right]} \quad (8)$$

In this simple voltage divider circuit, the condition is 15% O_2, and when the DC voltages V_{CC}=5V and R_L=50KΩ are used, the output voltage is correlated with temperature, and the measurement temperature is changed from 600 to 1000°C. As shown in Fig.8, the measured V_o value is equal to 3.2V at 600°C, and the calculated corresponding value is the oxygen sensor resistance with 28kΩ. The calculation method is as follows:

$$3.2=5 \text{ x } [50/(R2+50)] \qquad (9)$$

Calculated by the above formula, R_2 = 28 (kΩ). Further, it is understood from Fig. 8 that the output voltage tends to be saturated at a temperature close to 1000°C, and V_o = 2V is measured at this temperature, which corresponds to an oxygen sensor resistance of 75 kΩ. Testing the voltage output from a simple voltage divider circuit can also reconfirm that an increase in temperature will result in an increase in the resistance of the oxygen sensor of the gallium oxide.

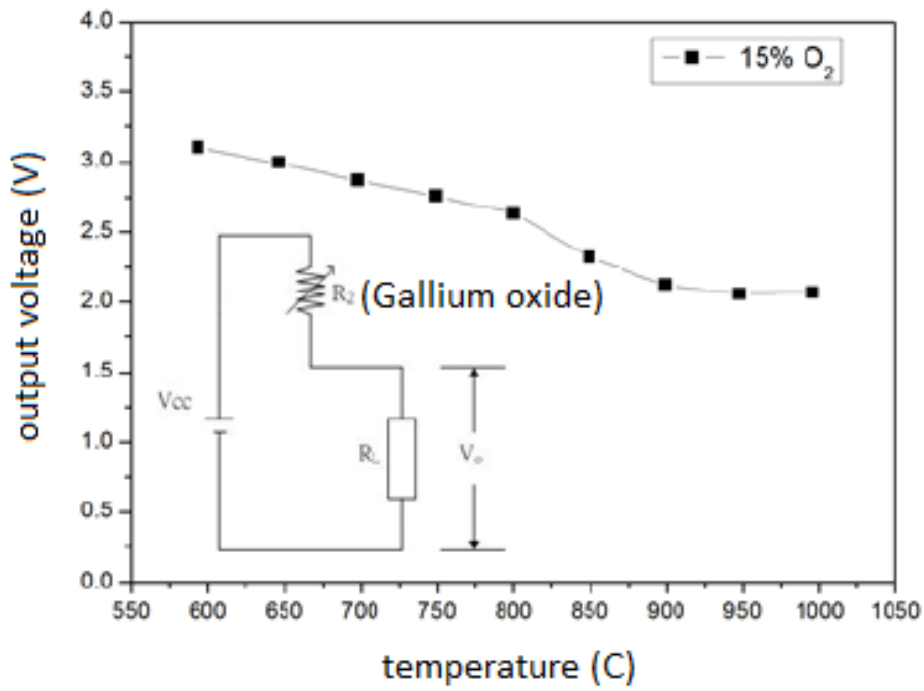

Figure 8: The relationship between output voltage and temperature under voltage divider circuit test; illustration is oxygen sensor divider circuit test

The oxygen sensing characteristics of gallium oxide can be tested by a simple voltage dividing circuit as shown in the inset of Fig. 8. For an oxide semiconductor, the coefficient of thermal expansion can be expressed by the following formula:

$$\gamma(T) = \frac{1}{R}\frac{dR}{dT} \qquad (10)$$

Where γ is the air excess ratio. Under temperature changes, the equation for resistance change can be rewritten as follows:

$$\Delta R = \gamma(T) \cdot R \cdot \Delta T \qquad (11)$$

Since the oxygen sensor resistance varies with temperature and oxygen concentration, the most popular and accurate method of detecting resistance changes is by using a Wheatstone bridge, as shown in the inset of Figure 9. If V_{cc}, R_1, R_3, and R_4 are set to 5V, 100KΩ, 50KΩ, and 100KΩ, respectively. The internal voltage difference, Vo is derived using the circuit formula will be equal to:

$$V_o = V_+ - V_- = V_{CC} \cdot \left(\frac{R_4}{R_1 + R_4} - \frac{R_3}{R_3 + R_2} \right) \qquad (12)$$

At a temperature of 880°C and 15% O_2, the output voltage V_o is approximately equal to zero. The exposed gallium oxide oxygen sensor is equal to 50KΩ by the bridge balance and is measured by the Wheatstone bridge circuit. The output voltage is the same as the oxygen concentration. The dependency is shown in Figure 9. When the oxygen concentration is 10%, the measured output voltage

V_o=-0.3V, the corresponding value can be calculated by formula (12) with 39KΩ; similarly, at the oxygen concentration of 35% O_2, the measured output voltage V_o=0.8V has a corresponding value of 97KΩ. Therefore, it can be seen that an increase in concentration will also result in the same result as discussed in the theoretical analysis, which would also increase the sense resistance.

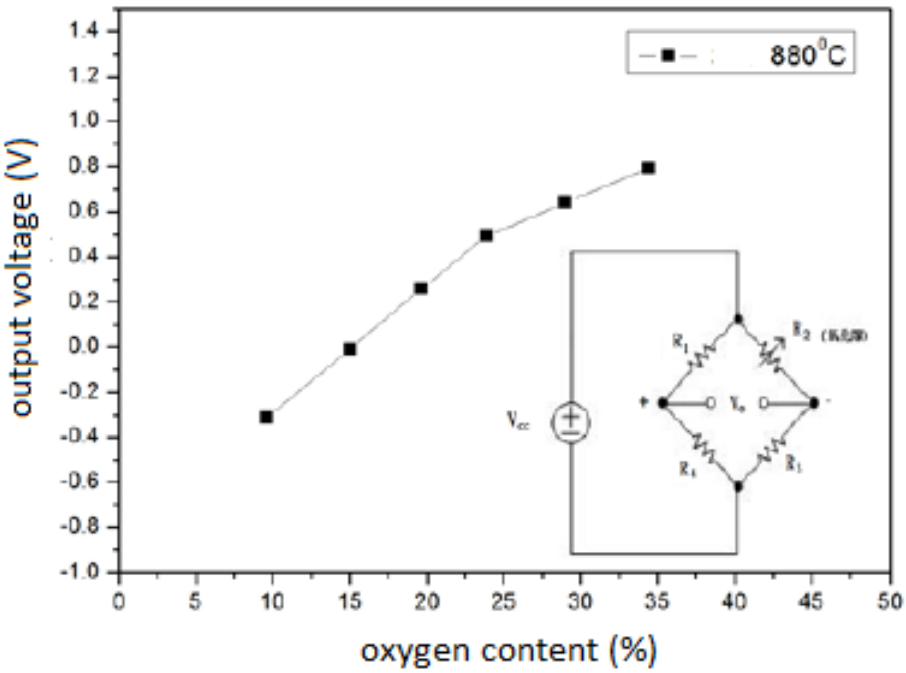

Figure 9: The relationship between the oxygen content and the output voltage at a temperature of 880°C; the illustration is the Wheatstone bridge test circuit.

VI. CONCLUSION

This thesis has successfully studied the high-temperature sensing characteristics of gallium oxide thin films. Oxygen sensors with V-groove gallium oxide surface structure with large surface area have been successfully manufactured, and a series of tests and research have been carried out at the same time. Under the use of a good quality gallium oxide film layer, the DC turn-on voltage and oxygen detection sensitivity are significantly adjustable, and its electrical characteristics are a function of oxygen concentration and temperature. A short rise time response of 24.7 sec was observed experimentally when the oxygen content changed from 0% to 35%. It can also be found from the experiment that the proposed structure has good electrical properties and high oxygen sensitivity over a wide temperature range. This new oxygen sensor also has low oxygen concentration detection sensitivity. This gallium oxide film is highly sensitive to oxygen from low to high concentrations of oxygen. In addition, using the oxygen sensing thin film resistor in the circuit design, the relative output voltage at different oxygen contents can be obtained, that is, the voltage of the conversion circuit can derive the ambient oxygen content. Therefore, this new research structure shows high sensitivity and fast response, so this component should have high potential in sensor circuit applications.

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Design of Vertical Wall-to-Light Solar Photovoltaic Circuit by Holtek Microprocessor

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Abstract- In this study, the solar detector is used as a light source sensor by means of a photodetector is proposed. After using the HT66F50 single-chip processing microprocessor, the signal is output to the stepping motor. In this way, the motor can be adjusted in an automatic manner to adjust the solar panel to the characteristics of the required angle. The researched results can be used as a reference for relevant researchers.

Index Terms- photo-voltage modules, stepping motor, shading device, Holtek, HT66F50 microprocessor, application examples

I. Introduction

In the 21st century, human beings are facing climate change, the lack of energy and resources, and the increasingly serious environmental pollution. The research and development and application of green energy, especially solar energy, have become the focus of exhibitions in the global industry and academia. The introduction is widely seen in various flat electronic media and will not be described again. [1-5] In the solar power supply system, the "city parallel type" is used when the sunshine is sufficient, and the solar battery supplies power to the load of the home. If there is excess power, it is stored separately. When the volume is insufficient, the required power is provided by the company. Because the power is not enough, it can be provided by the power company. Unlike the self-sufficient "independent power storage system", it has to increase the cost in order to prepare a large capacity, and it does not consider the distribution problem when the "feedback power system" is to be sold to the company. Compared with the "independent power storage system" and the "feedback power system", the "city parallel type" may be suitable for general use and home use. However, when we consider the use of "electric parallel solar system" in the city, because there is limited space available, it seems that there is no place to install solar panels except for the roof of each building, and the solar panels that are erected are limited; When there are other uses for the roof, there is nowhere to be used.

For high-rise buildings in the city, in fact, the wall area of buildings is often larger than that of the roof. Therefore, it is necessary to erect solar panels on the walls of the building's sunny side, which should effectively increase the area of solar panels. However, if the solar panel is directly embedded in the wall, the efficiency of the illumination angle problem can be poor. A solar panel that is tilted vertically on the vertical side may be covered by the upper shadow to cover the lower solar panel. Therefore, we plan to erect a light-directed system that can adjust the solar panel with the sun angle on the wall of the building, that is, a “wall-to-light electric system” because the angle of the solar panel is adjustable to obtain better efficiency.

"Vertical wall type solar photovoltaic system" installs the solar cell on the wall of the building according to the structure of the blinds, uses the photodetector to detect the angle of the sun, and sends the sunshine angle data to the micro control; after the micro control determines the message, it is decided The solar panel angle control motor will be adjusted to the desired angle. The microcontroller used in our system is the Holtek HT66F system microcontroller.

II. WORKING PRINCIPLE

Since the power generation efficiency of a solar cell is related to the angle of incident sunlight, maximum efficiency can be obtained when sunlight is incident perpendicularly to the solar panel. Therefore, in general design, the solar panel is fixed at an angle, and the angle is based on the annual average noon sunshine angle. In Taiwan, it is often facing the south, tilting about 23.5 degrees, taking the Tropic of Cancer as 23.5 degrees, which is the angle of noon at the vernal equinox and the autumn equinox. With a fixed tilt angle, the efficiency of the solar cells in the morning and afternoon is significantly reduced by the oblique. If the solar photovoltaic module is placed on the vertical façade of the building, if the solar panel is directly mounted on the wall, the efficiency may be poor due to the

illumination angle problem. If the solar panel is designed to be tilted vertically, it may be covered by the upper layer to cover the lower solar panel. Therefore, it is generally evaluated that the design of the solar photovoltaic module on the vertical façade of the building is considered suitable for high latitudes and not for Taiwan.

However, urban space is limited, and solar panels are placed on the walls of the building's sunny side. In the case of the decline in the cost of solar panels, more and more considerations are being made. Therefore, we design a solar panel that is tilted vertically on the vertical surface and a light-reflecting device, so that the tilt angle of the solar panel can be adjusted with the angle of sunlight, and the solar panel can obtain better efficiency. The time when the lower solar panels are covered by the upper shadows is actually limited to the noon in summer, and the solar panels can be effectively operated in other seasons and during the day.

This "vertical wall-to-light solar photovoltaic system" installs solar cells on the walls of buildings in a structure similar to blinds, but not as close as blinds, because it is necessary to consider the problem that the lower solar panels will be covered by the upper shadows. Therefore, the solar panels are far apart from each other. As shown in Figure 1, when the solar panels are installed on the wall, it is considered to completely avoid the shadows and the position of the solar panels.

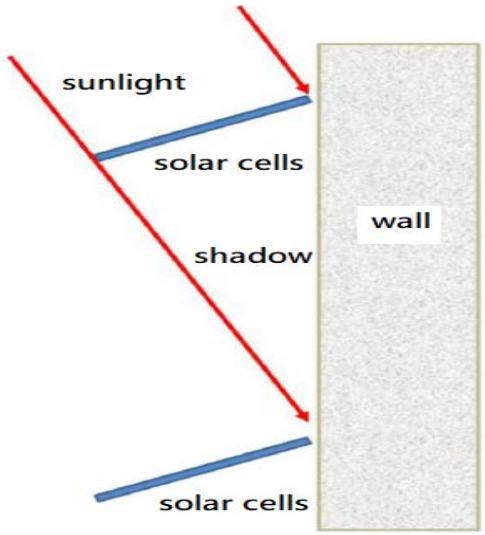

Figure 1: Solar panels on the wall to consider the effect of shadow

This "vertical wall-to-light solar photovoltaic system" also adds a light-directing controller, so that the tilt angle of the solar panel is adjusted with the sun angle, as shown in Fig. 2, at different times. Because the solar radiation angle is different, the solar energy is applied to the optical device. The angle of the board is adjusted to the solar vertical incidence solar panel, so that the solar cell can obtain better power generation efficiency. [6-7]

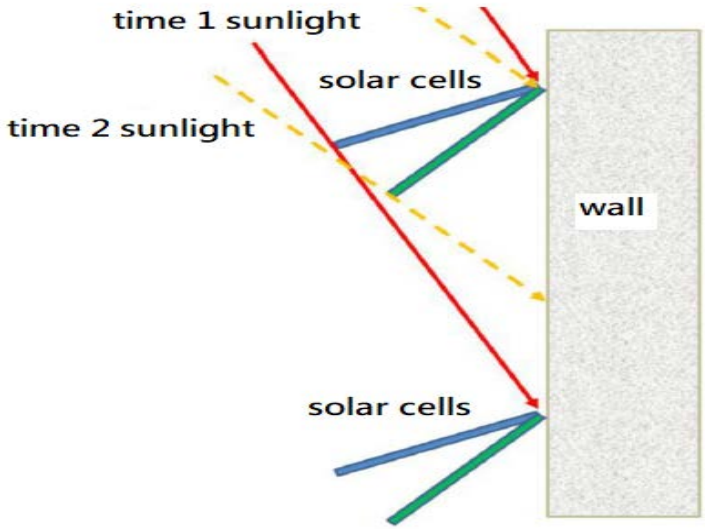

Figure 2: Solar panel tilt angle adjusted with sun angle

III. CIRCUIT DESIGN AND RESULTS

The "vertical wall-to-light solar photovoltaic system" designed and prepared by ours can be used on the sunny side of the building. In the urban buildings with high-rise buildings, the households with lack of area and horizontal space can be set up in parallel. Solar power systems such as systems, which make the use of solar energy more popular. For countries in high latitudes, this “wall-to-light solar power system” is more suitable, especially for several developed national metropolitan areas with doubts about nuclear energy, which should have considerable potential. "Vertical wall-to-light solar power system" is a solar power supply system that is more efficient in arranging earth and gold. The cost of setting up the cost and saving the space under the space must be calculated before it can be determined in those areas to set up the "wall-to-light solar power system".

The proposed "Vertical wall-to-light solar photovoltaic system" is to install solar panels on the walls of buildings, use the sunshine angle detection circuit to detect the sunshine angle, and send the sunshine angle data to the microcontroller circuit, after the microcontroller judges the message. The solar panel angle is determined, and the solar panel angle is detected by the solar panel angle detecting circuit, and then the solar panel angle control circuit is controlled, and the solar panel is detected by the motor to adjust the solar panel to the desired angle. The hardware structure diagram is shown in Figure 3.

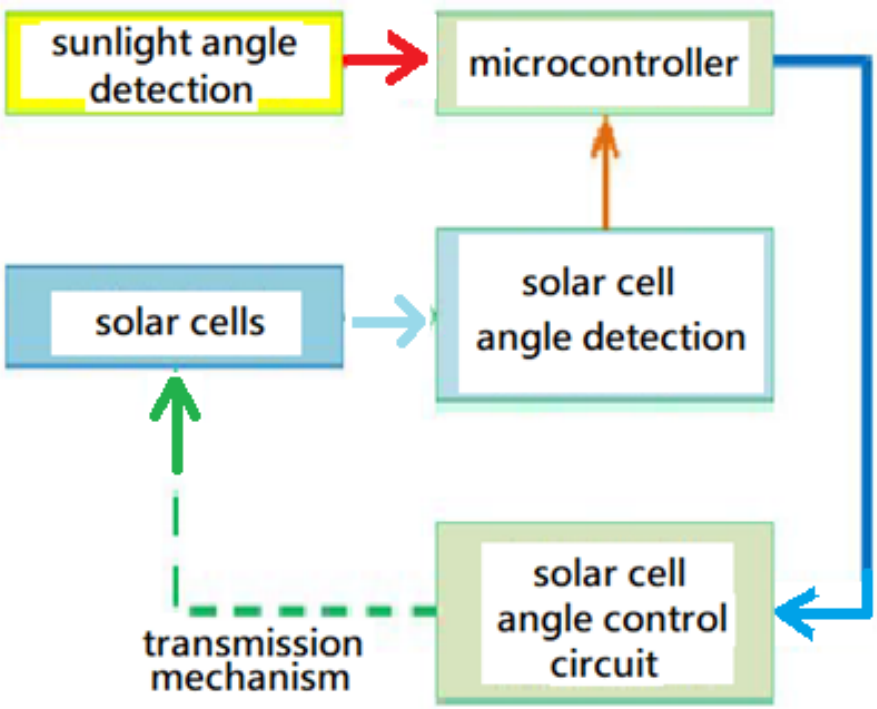

Figure 3: Vertical wall type solar photovoltaic system hardware structure diagram

The functions of each component are explained as follows:

1. Solar panels: The function of solar cells with an additional mechanism that can control the angle, and wire them to the load system to be powered.
2. Sunlight angle detection circuit: It consists of a plurality of photodetectors at different positions. Different light detectors detect the difference in light intensity and determine the angle of sunlight. Because the sunshine intensity is different times, it is the difference between the light intensity ratio at different positions, not the difference between the light intensity and the weak value.
3. Solar panel angle detection circuit: Because the solar panel is installed outdoors, the angle of the board will be affected by some external factors, so the angle of the solar panel must be monitored, so an angle detection circuit is added to the solar panel.
4. Solar panel angle control circuit: A mechanism that controls the angle of control on the solar panel by a motor to turn the solar panel to the desired angle.
5. Microcontroller circuit: The main control circuit for monitoring the angle of the sun, monitoring the angle of the solar panel, and controlling the angle of the solar panel. The microcontroller we chose is the Holtek HT66F50 system microcontroller.

The flow chart of the control program of our vertical wall-to-light solar photovoltaic system is shown in Figure 4.

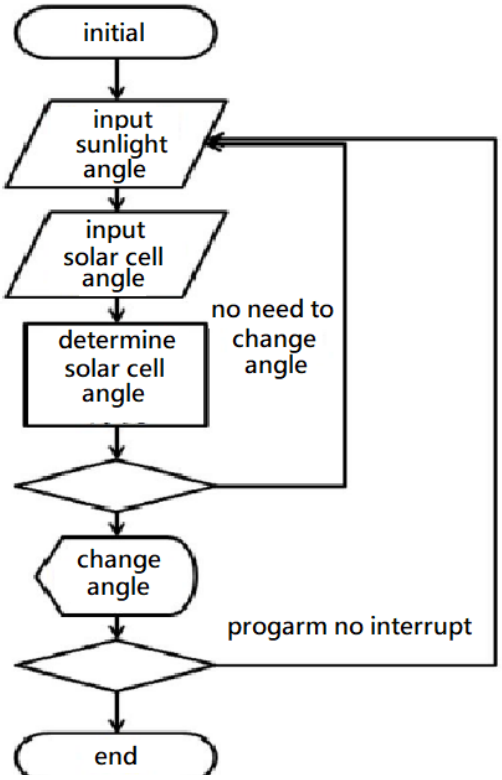

Figure 4: Vertical wall-to-light solar photovoltaic system control program flow chart

First, the sunshine angle detection circuit and the solar panel angle detection circuit input the sunshine angle and the solar panel angle data, and the microcontroller determines whether the solar panel angle needs to be adjusted and adjusted, and outputs a control signal to the solar panel angle control circuit to control the solar panel to change the angle. If there is no special break command, repeat the above process. The complete program content is shown in the appendix.

The hardware consists of HT66F50 single-chip control circuit, photosensitive detection circuit board, transparent acrylic plate, stepper motor solar panel, reset circuit, ULN2803 current amplification drive circuit and so on. The overall block diagram is shown in Figure 5.

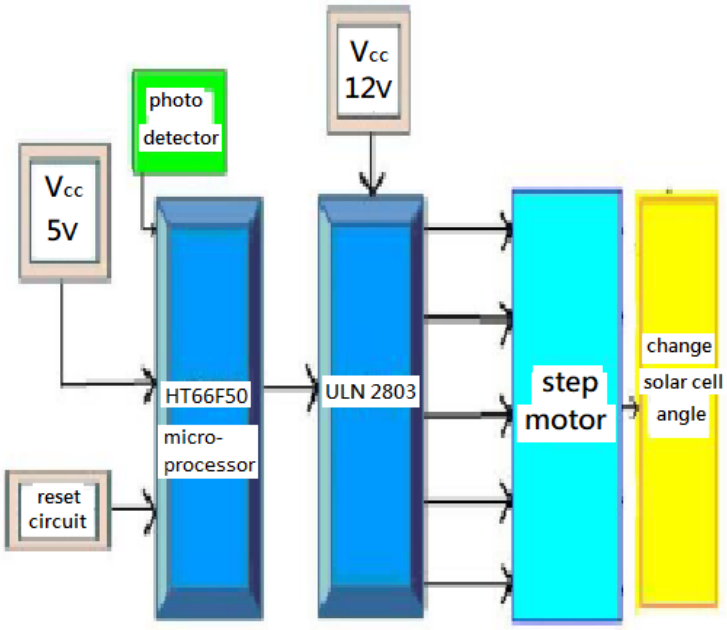

Figure 5: Overall composition block diagram

In Figure 6, V_{SS} is the 14th pin of the HT66F50, which is the grounding pin of the circuit. V_{DD} is the HT66F50 pin 19, the power pin needs to be connected to 5V. The oscillating circuit uses an internal oscillating circuit, so there is no need to connect an external oscillating circuit. We use two 0.1uf capacitors (C_1, C_2) to make the HT66F50 The HXT oscillator circuit has a frequency of 1MHz. Figure 6 shows the reset circuit. V_{SS} is pin 14 of the HT66F50 and is the ground pin of the circuit. V_{DD} is the HT66F50 pin 19, the power pin needs to be connected to 5V. The oscillating circuit uses an internal oscillating circuit, so there is no need to connect an external oscillating circuit. We use two 0.1uf capacitors (C_1, C_2) to make the HT66F50 The HXT oscillator circuit has a frequency of 1MHz.

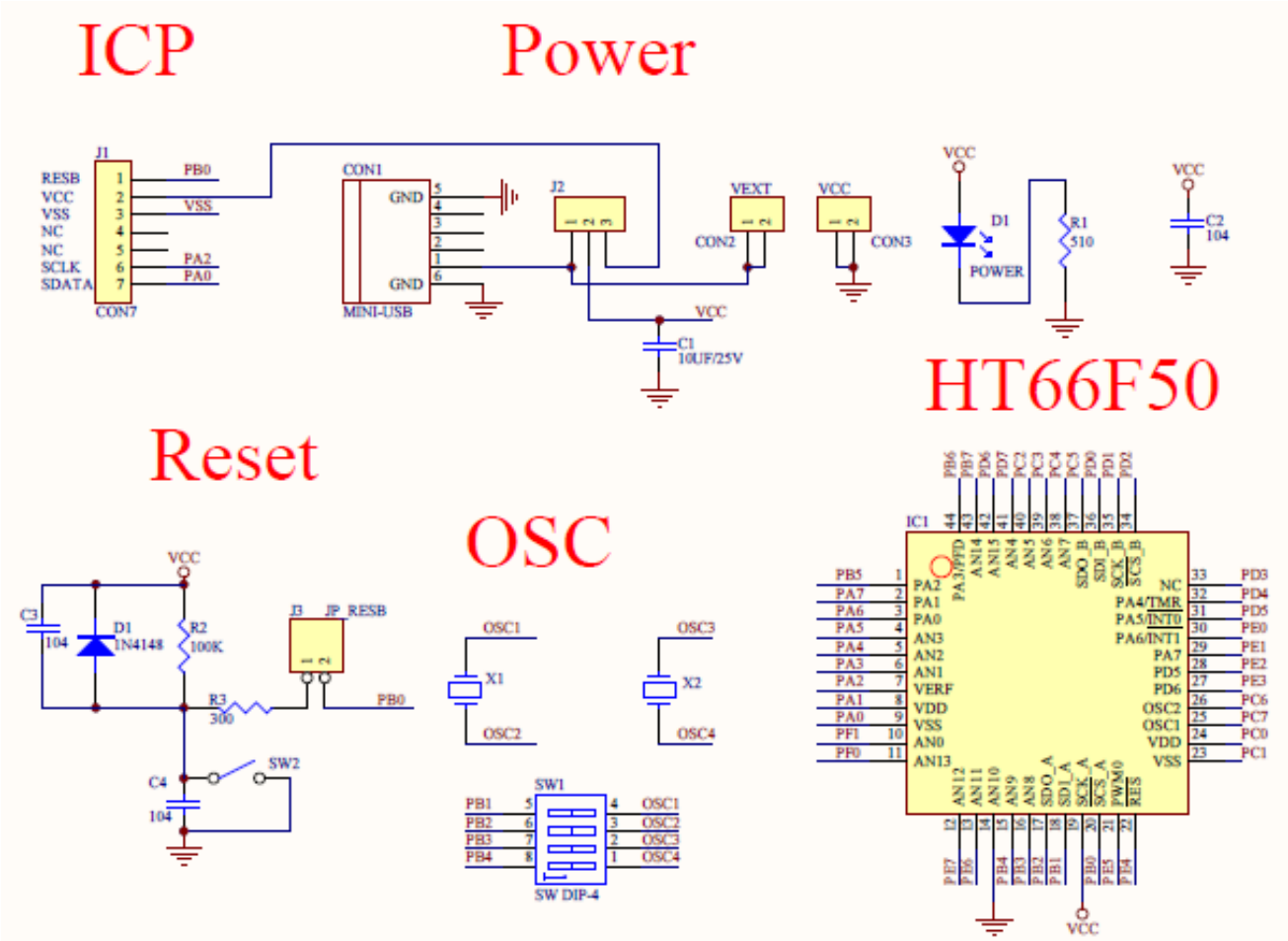

Figure 6: Reset circuit connection diagram of HT66F50

The 19th and 20th pins of the HT66F50 are reset circuits as shown in Figure 6. The reset circuit requires a 300-ohm resistor (R_2), 41K ohm resistor (R_1), IN4148, and two 0.1uf capacitors (C_1, C_2). The external adjustment button is added to the part. As shown in Figure 7, the 5th, 6th, 7th, and 8th pins of the HT66F50 are I/O positions. Since the voltage of the HT66F50 is too small, we add a ULN2803 circuit to increase the output voltage to the 12V. I/O pin is output from the ULN2803 Darlington circuit and then output from the 18th, 17th, 16th, and 15th pins of the ULN2803 via the 12V.

The ULN2803 requires a 12V voltage and is connected to the stepper motor. We packaged the solar panel, acrylic, photosensitive detection circuit and the stepping motor's shaft into a square package. When the photosensitive detection board detector as shown in Figure 8 absorbs the light energy, the analog signal is transmitted to the HT66F50. Signal and judgment, and then send a signal to the Darlington transistor ULN2803 to amplify the current. The stepping motor receives the signal action and engages in forward or reverse rotation to change the angle of the solar panel so that the sunlight is incident perpendicularly to the solar panel. [8-9] The photo of the tested circuit on board is shown in Fig. 9 and the finished product is also shown in Fig. 10.

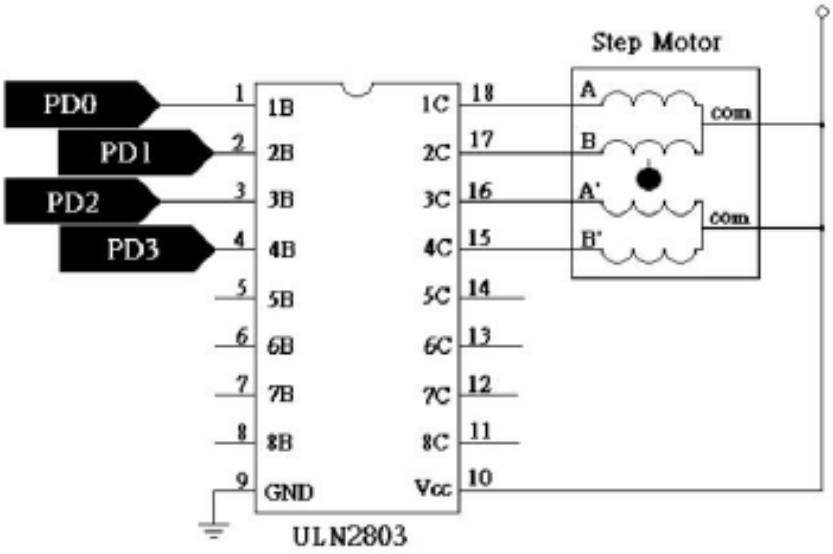

Figure 7: PD0 to PD4 pin connection of HT66F50 ULN2803 and stepper motor

Figure 8: Photosensitive detection board

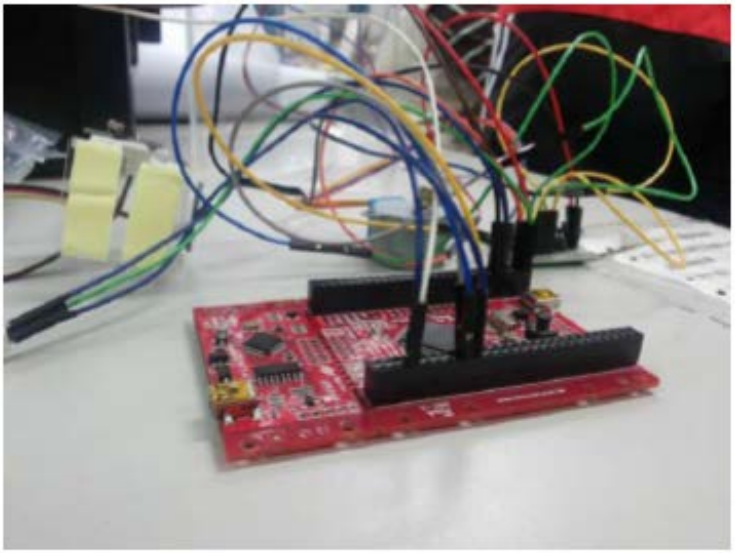

Figure 9: The photo of tested circuit on board

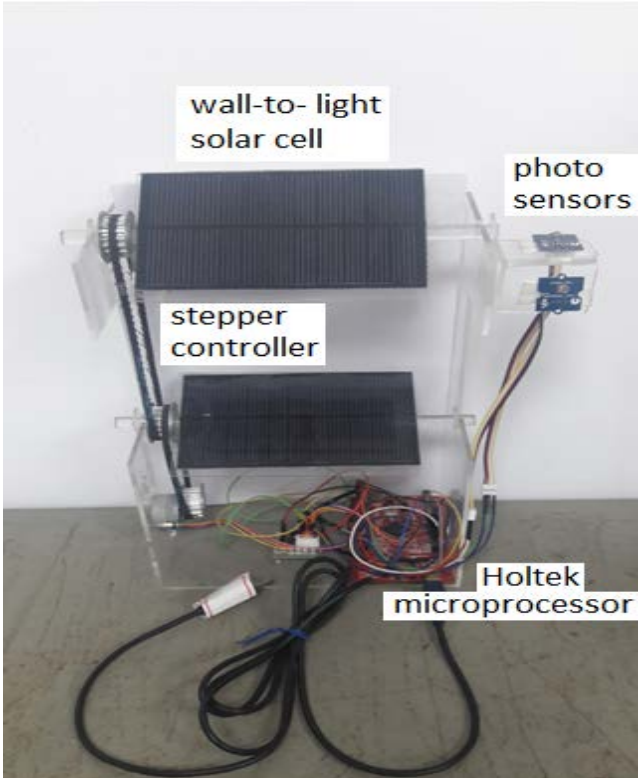

Figure 10: The finished wall-to-light circuit

IV. CONCLUSION

The solar photovoltaic energy is a renewable energy source and used more and more widely. This implementation of proposed circuit combines this modern trend, using a photodetector to detect the sunshine angle and send the sunshine angle data to the microcontroller. After judging the message, it is determined that the solar panel angle control motor will be adjusted to the desired angle. In order to meet the needs set by the user, the signal is output to the stepping motor, so that the characteristics of adjusting the motor to adjust the solar panel to the desired angle in an automatic manner can be achieved as a useful reference for another researchers.

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APPENDIX

[A] Program of solar angle driver

```
#include "arminno.h"
#define Motor1 PB0
#define Motor2 PB1
#define Motor3 PB2
#define Motor4 PB3


void stepmotorp12f(int i,int k);
void stepmotorp12b(int i,int k);
int main(void)
{
        u16 lm1,lm2,lm1m,lm2m,stepstate,steptg,step001;
        u8 cc;

        stepstate=90;
        steptg=90;
        SetAdc(6);//PA6
        SetAdc(7);//PA7


        cc=0;

  Output(Motor1); Output(Motor2); Output(Motor3); Output(Motor4);
        while(1)
  {
// Read light sensor value
                lm1=GetAdc(6);
            lm2=GetAdc(7);
                lm1m=lm1/64;
                lm2m=lm2/64;
                cc=1;
// Compare two photo sensor values to determine the angle
                if((lm1m>(10*lm2m)))
                 {steptg=100;
                 }
                else if((lm2m>(10*lm1m))){
                        steptg=200;}
                else
                        {
                                steptg=150;
                                if((lm1m>(6*lm2m))) steptg=110;
                                if((lm1m>(4*lm2m))) steptg=120;
                                if((lm1m>(3*lm2m))) steptg=130;
                                if((lm1m>(2*lm2m))) steptg=140;
                                if((lm2m>(2*lm1m))) steptg=160;
                                if((lm2m>(3*lm1m))) steptg=170;
                                if((lm2m>(4*lm1m))) steptg=180;
                                if((lm2m>(6*lm1m))) steptg=190;
                        };
                        if(stepstate>200) stepstate=200;
                        if(stepstate<100) stepstate=100;

// Move to the desired angle
                while((cc<5))
```

```
                                {
                                if ((steptg>stepstate))
                                {
                                 stepmotorp12b(20,13);
                                 Pause(2);
    stepstate=stepstate+10;
                                }
                        else if ((steptg<stepstate))
                {
    stepmotorp12f(20,13);
                                 Pause(2);
    stepstate=stepstate-10;
    }
                        else
                                {
                                        cc=10;
                                };

                                };

                        Pause(1000);
  }
}

// Stepper motor driver 1-2 phase

void stepmotorp12f(int i,int k)
{
        int j;
        for(j=0;j<i;j++){
 High(Motor1);Low(Motor2);Low(Motor3);Low(Motor4);Pause(k);
        High(Motor1);High(Motor2);Low(Motor3);Low(Motor4);Pause(k);
        Low(Motor1);High(Motor2);Low(Motor3);Low(Motor4);Pause(k);
        Low(Motor1);High(Motor2);High(Motor3);Low(Motor4);Pause(k);
        Low(Motor1);Low(Motor2);High(Motor3);Low(Motor4);Pause(k);
        Low(Motor1);Low(Motor2);High(Motor3);High(Motor4);Pause(k);
        Low(Motor1);Low(Motor2);Low(Motor3);High(Motor4);Pause(k);
        High(Motor1);Low(Motor2);Low(Motor3);High(Motor4);Pause(k);
        };
};
void stepmotorp12b(int i,int k)
{
        int j;
        for(j=0;j<i;j++){

        High(Motor1);Low(Motor2);Low(Motor3);High(Motor4);Pause(k);
                Low(Motor1);Low(Motor2);Low(Motor3);High(Motor4);Pause(k);
                Low(Motor1);Low(Motor2);High(Motor3);High(Motor4);Pause(k);
                Low(Motor1);Low(Motor2);High(Motor3);Low(Motor4);Pause(k);
                Low(Motor1);High(Motor2);High(Motor3);Low(Motor4);Pause(k);
                Low(Motor1);High(Motor2);Low(Motor3);Low(Motor4);Pause(k);
                High(Motor1);High(Motor2);Low(Motor3);Low(Motor4);Pause(k);
                High(Motor1);Low(Motor2);Low(Motor3);Low(Motor4);Pause(k);

        };
};
```

[B] Program of stepper motor driver

```
// PROGRAM      : 4-6.c
// FUNCTION     : STEP MOTOR HALF STEP CONTROL
#include "HT66F50.h"
#define Motor_Port   _pe
#define Motor_PortC  _pec
const unsigned short TAB_CW[] = {                                   //Excitation Table
                                 0b0001,0b0011,0b0010,0b0110,
                                 0b0100,0b1100,0b1000,0b1001};
void main()
{       short i,j;
        Motor_PortC=0x0;                                                                    //Config Port as O/P Mode
        while(1)
        {       for(i=0;i<50;i++)
                {       for(j=0;j<8;j++)
                                {       Motor_Port=TAB_CW[j];               //Read Table
                                        _delay(10000);                                      //Delay 10mS
                                }
                }
                for(i=0;i<50;i++)
                {       for(j=7;j>0;j--)
                                {       Motor_Port=TAB_CW[j];               //Read Table
                                        _delay(10000);                                      //Delay 10mS
                                }
                }
        }
}
```

Does Recurrent Expenditure Drive Growth In Nigeria?

A Cointegrated Var Approach.

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Abstract: *This study 'Does government recurrent expenditure drive growth in Nigeria'? found the absence of multicolinearity and heteroskesdasticity with no serial correlation. The data employed showed that the variables are differenced once to be statationary using Augmented Dickey Fuller unit root test. Johansen Cointegration Test found long run relationships existing between growth of the economy (Gross Domestic Product) and Recurrent Expenditure variables. The result of Ordinary Least Square found positive and significant relationship between the dependent and independent variables, except administration that has negative relationship. The speed of adjustment was found to be 40.18%. That means short term errors can be corrected in the long run with annual speed of adjustment of 40.18%.VAR Granger Causality/Block Exogeneity Wald Tests found unidirectional effect with the variables, except social and community services that has a bidirectional effect or feedback effect. Therefore, the researchers suggest adequate funding of economic services and social and community services due to their positive contributions to the expansion of the growth of Nigerian economy.*

Key words: *Economic growth, Government Recurrent Expenditure, VECM, Impulse Responses.*

1. Introduction

Nigerian recurrent expenditure stood at N4.85billion in 1981, increased to ₦36.22 billion in 1990, then ₦127.63 billion in 1995. It was ₦178.10 billion in 1998. Then on return to democracy in 1999, there was astronomical rise to ₦449.66 billion. In 2003, it stood at ₦984.3 billion to ₦1110.64 billion in 2004, and then almost doubled the figure in 2008 with ₦2117.36 billion. In 2012, it started with ₦4004.46 billion to ₦4892.36 billion in 2015, rose to ₦5762.7 billion in 2016, then up to ₦7138.7 billion in 2017 (CBN, 2017).

While, 1981 the Gross Domestic Produt growth rate was 57.15% in 1981 to -1.79% in 1982, then to -7.58% in 1983, then rose to 11.63% in 1990 and down to -0.55% in 1991 and increased to 2.5% in 1998. Then on return to democracy in 1999, it moved up by 0.52%, then up to 5.52% in 2000 to its peak of 14.6% in 2002. Then slightly came down to 10.44% in 2004, with average of 6.42% from 2005-2015 and recorded -1.58% in 2016, then rose 0.82% in 2017(NBS, 2018).

From the above, it can easily be adduced that both government expenditure and growth are not moving in the same frequency. That means government expenditure in Nigeria seems not to drive a commensurate growth. In the words of Okoro (2013), the rising government expenditure may not have translated to meaningful growth and development, as Nigeria ranks among the poorest countries in the world.

These situation cast doubt on whether government recurrent expenditure is in manner it can drive growth in Nigerian economy, hence subjected to empirical investigation in order to ascertain the concern of this study.

2. Literature Review

2.1 Conceptual Review

Njoku (2009), government expenditure refers to all expenditures which government incurs in the course of performing its functions. Thus, government expenditure has two components namely recurrent expenditure and capital expenditure. While recurrent expenditure encompasses expenditures recurring over the year such as personnel costs, transportation, utility services, telephone services, stationery, hospitality, maintenance of office furniture and equipment all other day to day, month to month or quarterly

running expenses funded by the government, capital expenditure involves expenditure on construction, land extension, building and plant and machinery acquisition.

In the words of Okpara (2002) Public expenditure represents the funds expended by the government for its own maintenance, the maintenance of the society and the running of the economy in general. Bhatia (2002) added that apart from maintenance of the economy and society, expenditure of the government extends to helping other countries. Government spending reflects the thrust of the regime in power. Once the government has decided the type and amount of goods and services to be purchased, government spending represents the cost of carrying out these policies.

Anyanwu (1977) contended that public expenditure simply means government spending out of public revenues derived from taxes and other sources. It involves all the expenses for its own maintenance, for the benefit of external bodies and other countries and for settling Nigeria's foreign and international obligations.

2.2 Theoretical Literature

The following theories are reviewed to enhance more understanding on relationship between government expenditure and economic growth.

Wagner's law of Increasing State Activity: Wagner (1911) was a German political economist who based his law on increasing state activities and historical facts, primarily in Germany. He studied the German economy overtime and observed a correlation growth between national output and the public expenditure in the economy. He expressed the view that there was an inherent tendency for the activities of different layers of government (such as central and state governments) to increase both intensively and extensively. That is, there is a functional relationship between the growth of an economy and the growth of government activities, so that the government sector grows faster than the economy.

Keynesian Hypothesis- Economic Growth Theory: Keynesian public expenditure- economic growth theory has attracted a vast array of empirical investigation by economists especially from academic setting over time. Keynesians‟ in other hand postulates a function with the orientation that runs from government increasing undertakings to economic improvements. These expenditures are considered as normal goods in society's stance with income elasticity of demand greater than one. Keynesian's stance evolved at the hill of the Great depression of late 1930s. This advocating for government involvement in the economic managements brought about, a tremendous evolution in the field of economic. The periods witness a considerable growth on sensitive economic indicators such as investments, employment creation, and general demands whereof government spending (Musgrave and Musgrave, 1989).

Peacock-Wiseman Hypothesis or displacement Effect*:* In their study of the U.K economy between 1890 and 1955, Peacock and Wiseman (1961) concluded that public expenditure do not increase in a smooth and continuous manner but in jerks or step-like fashion. Peacock and Wiseman's hypothesis is popularly referred to as displacement effect hypothesis. They believe that the pattern of growth of public expenditure in Britain is less regular and quite different from the corresponding pattern of growth in the size of the national output as proposed by Wagner.

2.3 Empirical Review

Appah and Ateboh-Briggs (2013) investigated the co integration patterns of public expenditure and growth in Nigeria for the period 1961-2010 employed VECM and other Diagnostic tests. The results from econometric analysis revealed that pattern of public expenditure of administration, social community series, economic services and transfers affects the economic growth of Nigeria.

Okanta (2009) in a study, the impact of public education expenditure on Economic growth in Nigeria (1990-2008), using simple, bivariate regressions shows that public education expenditures are statistically significant in affecting real GPD and real per capita in Nigeria. Also, that expenditure is not statistically significant in influencing economic growth using multivariate regression.

Okoro (2013) studied the impact of government spending on the Nigerian economic growth using Granger causality test, cointegration and VECM technique on time series data spanning 1980 -2011. The result from the estimation shows that there exists a long-run equilibrium relationship between public expenditure and economic growth in Nigeria, supporting the Keynesian hypothesis. The short-run dynamics adjusts to long-run equilibrium at the rate of 60% per annum. The policy implication of this finding is that both the short-run and long-run expenditure has a significant effect on economic growth of Nigeria.

Equally, Sevitenyi (2012) analyzed the relationship and the direction of causality between public spending and economic growth in Nigeria by adopting a Granger causality test using annual time series data from 1961 to 2009. Aggregate government expenditure is disaggregated into recurrent expenditure, capital expenditure, administration, social and community services, economic services and transfers. Finding revealed that there is a unidirectional causality running from aggregate public spending to economic growth, which supports the Keynesian hypothesis. Moreover, at the disaggregate level, results show that all the variables except recurrent expenditure cause economic growth, implying that government expenditure promotes growth in Nigeria. In general, this result does not empirically support the existence of Wagner's law both at the aggregate and disaggregate level.

Taiwo and Abayomi (2012) examined government expenditure and economic development: Empirical evidence from Nigeria over the last decades (1970-2008) using econometrics model with OLS techniques. They found that there is a positive relationship between real GDP as against the recurrent and capital expenditure.

Edame and Akpan (2013) examined empirically the structure of government expenditure and economic growth of government of Nigeria with time series data for the period of 1970 to 2009. The OLS regression technique was employed as the main method of data estimation. The result obtained revealed that factors such as fiscal deficit, GDP, Government revenue and debt servicing are some of the factors causing growth in the government expenditure in Nigeria for the reference period.

In addition, Egunjobi (2013) examined the pattern of public expenditure in Nigeria using error correction model and granger causality test from 1977 to 2008, the study supported that government spending and public consumption impact negatively on economic growth in Nigeria. Also, a unidirectional causality exists between economic growth and total expenditure, while there was no causal relationship between private investment and public investment.

Similarly, Aruwa (2012) examined the causal relationship between government expenditure and economic growth in Nigeria from 1979 to 2008 using a VAR- based error correction model. Result among other things shows that an increase in both real gross domestic product and public revenue causes growth in government expenditure, hence indicating the presence of Wagner's hypothesis in Nigeria during the review period.

Also, Ifarajimi and Ola (2017) examined the relationship between government expenditure and economic growth. The study made use of time series data on government expenditure on administration, economic services, social and community services, transfers, government total revenue, nominal exchange rate and real per capital GDP for the period of 1981 to 2015, using ECM computed through Dynamic OLS and found that long run government expenditure on administration and nominal exchange rate were significant and therefore impact significantly on economic growth in Nigeria.

Miftahu and Rosni (2017) investigated public sector spending and economic growth in Nigeria: In search of a stable relationship employed ARDL model. The model revealed the existence of positive and significant relationship between public spending and economic growth in Nigeria. From the findings, it is evidence that government expenditure are considered to be highly important in creating opportunities and widening the productive base at which developing countries can grow, Nigeria is inclusive.

Danladi, Akomolafe and Anyadiegwu (2015) examined government expenditure and its implication for economic growth: Evidence from Nigeria. The ARDL methodology was employed to examine the relationship between the variables. From the analysis and findings, government spending significantly and positively explained the economic growth of the country. In comparing the results of the total government expenditure in the capital and recurrent expenditure, the result shows that they are positively related to economic growth however the recurrent component of expenditure significantly explained more. This study attests to the keynesian model (1936) of government intervention in the economy.

Oziengbe (2013) investigated the relative impacts of federal capital and recurrent expenditures on Nigeria's economy (1980-2011). The study employed ECM model and revealed that total government expenditure had significant positive effect on Nigeria's economy in the period covered. It confirms postulation of keynesian theory and implies that Nigeria economy at its current stage of development owes much to government spending

Akanbi (2014) in his work, Government expenditure in Nigeria: Determinants and the trends employed a public choice framework and the model is estimated in the time series data from 1974 to 2012, using the Johansen estimation techniques. The results show that capital and recurrent expenditure are resilient to shocks in total government spending and, similarly, total government expenditure is found to be resilient to shocks in capital and recurrent spending. The increased per capita income was found to be in support of the Wagner's law in total and capital expenditure specifications, but this was refuted by the recurrent expenditure specification.

Ditimi, Nwosa, and Ajisafe (2011) investigated the relationship between the components of government expenditure (that is, education, agriculture, health and transport and telecommunication) on economic growth in Nigeria for the period spanning 1970 to

2010. The results of the long run and short run regression estimates confirmed that expenditure on agriculture was the most significant component of government expenditure which impacted on economic growth.

Chude and Chude (2013) investigated the effect of public expenditure in education on economic growth in Nigeria over a period from 1977 to 2012, with particular focus on disaggregated and sectoral expenditure analysis. The study used ECM and the results indicated that total expenditure on education is highly and statistically significant and have positive relationship on economic growth in Nigeria in the long run.

Yusuf, Babalola, Aninka and Solako (2015) used Autoregressive Distributed Lag Model (Bound Test Approach) on Analysis of impact of sectoral Government Expenditure on Economy in Nigeria. Bound test co-integration approach revealed that public expenditures have not performed well to the expectation in promoting the economic growth. Contrarily to expectation, government expenditures on the Education, Defense and Agriculture sectors have failed to promote the economic growth.

Tajudeen and Ismail (2013) used Auto-Regressive Distributed Lag (ARDL) approach to analyse the impact of public expenditure and economic growth from 1970-2010. Their findings indicated that the impact of public spending on growth was negative and recurrent expenditure was also found to have little significant positive impact on growth.

3 Materials and Methods

Data for government recurrent expenditure (Administration, Community and Social Service, Economic Services, Transfers) and economic growth proxied by Gross Domestic Product were collected from Central Bank of Nigeria (CBN) Statistical Bulletin of 2017.

We employed the following econometric tools; serial correlation LM, heteroscedasticity, normality, multicolinearity, inverse root of characteristic, unit root stationarity among others. Employment was made of VEC Granger Causality/Block Exogeneity Wald tests, Johansen Cointegration, Vector Error Correction Model (VECM), Cholesky Impulse Response and Variance Decomposition analysis to determine the full Causality implications of the variables in the model. The least squares were applied to test the contemporaneous and long run relationship.

3.1 Model Specification

The model will be specified as follows;

$$GDP = \alpha_{01}+\alpha_{11}GDP_{t-1} + \alpha_{21}Admin_{t-1}+\alpha_{31}Comserv_{t-1}+\alpha_{41}Ecoserv_{t-1}+\alpha_{51}Trans_{t-1}+ U_1 \quad (1)$$

$$Admin =\beta_{02}+\beta_{12}GDP_{t-1}+ \beta_{22}Admin_{t-1}+ \beta_{32}Comserv_{t-1}+\beta_{42}Ecoserv_{t-1}+ \beta_{52}Trans_{t-1}+U_2 \quad (2)$$

$$Comserv = \Upsilon_{03}+ \Upsilon_{13}GDP_{t-1} + \Upsilon_{23}Admin_{t-1}+\Upsilon_{33}Comserv_{t-1}+\Upsilon_{43}Ecoserv_{t-1}+\Upsilon_{53}Trans_{t-1}+ U_3 \quad (3)$$

$$Ecoserv = Z_{04}+ Z_{14}GDP_{t-1} + Z_{24}Admin_{t-1}+Z_{34}Comserv_{t-1}+Z_{44}Ecoserv_{t-1}+Z_{54}Trans_{t-1}+U_4 \quad (4)$$

$$Trans = X_{05}+ X_{15}GDP_{t-1} + X_{25}Admin_{t-1}+X_{35}Comserv_{t-1}+X_{45}Ecoserv_{t-1}+X_{55}Trans_{t-1}+ U_5 \quad (5)$$

Where;

GDP = Gross Domestic Product

Admin = Expenditure on government such as general administration, defense, internal security and national assembly.

Comserv = Expenditure on provision of social and community services such as education, health, and other social and community services

Ecoserv = Expenditure on provision of economic services such as agriculture, construction, transportation & communication and other economic services.

Trans =Expenditure on public debt servicing, pension and gratuities, contingencies/subventions.

3.2 Apriori Expectation

It is expected that GDP = f(Admin, Comserv, Ecoserv, Trans), $\mathbf{f_1, f_2, f_3, f_4 > 0}$. $\mathbf{f_1, f_2, f_3, f_4}$ are the coefficients of Comserv, Ecoserv and Trans respectively. It is expected that the more expenditure government makes sincerely and appropriately on them, the more the economy expands, hence growth in the economy.

4 Results and Analysis

Residual Correlation Matrix

	GDP	ADMIN	COMSERV	ECOSERV	TRANS
GDP	1.000000	0.892954	0.859321	0.717526	0.865282
ADMIN	0.892954	1.000000	0.955979	0.518923	0.76611
COMSERV	0.859321	0.955979	1.000000	0.334315	0.742592
ECOSERV	0.717526	0.518923	0.334315	1.000000	0.527469
TRANS	0.865282	0.76611	0.742592	0.527469	1.000000

Table above, presents the correlation matrix of variables. From the table, the correlation between ADMINand GDP is 0.892954 that between COMSERV and ADMIN is 0.955979, ECOSERV and COMSERV is 0.334315. TRANS and ECOSERV is 0.527469. In some, none of the pairs of correlations among the independent variables is linearly perfectly correlated i.e. there is no presence of multi-colinearity.

Augmented Dickey-Fuller Unit Root Test

Variables	lag	1st difference	1st diff. Probility	Order of Integration
LGDP	0	-5.423279	0.0001	1(1)
LADMIN	0	-7.440819	0.0000	1(1)
LCOMSERV	0	-7.066199	0.0000	1(1)
LECOSERV	0	-6.227349	0.0000	1(1)
LTRANS	0	-7.512799	0.0000	1(1)

The above table shows that all the series are more negative than their 1 percent critical value and far more than that of 5 and 10 percent at first difference. This implies that the series are differenced once for them to be stationary. They are therefore said to be integrated of order one. Therefore, we proceed to determine the if long run relationship exist between economic growth (GD) and recurrent expenditure variables (Admin, Comserv, Ecoserv and Trans).

Johansen Cointegration

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	1.000000	1313.744	69.81889	1.0000
At most 1 *	0.622085	66.40720	47.85613	0.0004
At most 2 *	0.528375	32.34917	29.79707	0.0249
At most 3	0.145784	6.044192	15.49471	0.6903
At most 4	0.015006	0.529191	3.841466	0.4669

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

From the table above, the result shows that 3 components of the trace statistics are greater than the critical values at 5% level and as such, indicates 3 co-integrating equation at the 5% level. This implies that there exist long run relationship between GDP and Recurrent Expenditure variables; Administration (Admin), Social and community services (Comserv), Economic services (Ecoserv) and Transfers (Trans). Having established a long run relationship between the GDP and Recurrent Expenditure; Administration

(Admin), Social and community services (Comserv), Economic services (Ecoserv) and Transfers (Trans), the researchers employed the Ordinary Least Square (OLS) Method to determine the predictions of recurrent expenditure variables on GDP. The results of the analysis are presented in table as follows:

Ordinary Least Square (OLS) Method

Dependent Variable: GDP
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	473.9944	1033.967	0.458423	0.6497
ADMIN	-44.47526	8.730600	-5.094182	0.0000
COMSERV	126.7693	12.79656	9.906513	0.0000
ECOSERV	43.99876	3.051696	14.41781	0.0000
TRANS	9.719258	1.500990	6.475230	0.0000

R-squared	0.983572	Mean dependent var	22679.98
Adjusted R-squared	0.981518	S.D. dependent var	34219.67
S.E. of regression	4652.094	Akaike info criterion	19.85311
Sum squared resid	6.93E+08	Schwarz criterion	20.07080
Log likelihood	-362.2826	Hannan-Quinn criter.	19.92986
F-statistic	478.9644	Durbin-Watson stat	1.514642
Prob(F-statistic)	0.000000		

The result of table above confirms that recurrent expenditure on Social and Community Services and Economic Services and Transfers exert positive and significant impact on the growth of the economy while recurrent expenditure on Administration impact negative and significant on the growth of the economy. The model is well fitted (R^2 = 98.3%) with no autocorrelation (Dw=1.514642). The result of OLS model reveals that the adjusted coefficient of determination is 0.98 implying that the government recurrent expenditure explains about 98 % of the variation in economic growth in Nigeria. The F-statistic 478.9644 with P-value og 0.000000 shows overal significance. The researchers therefore conclude that recurrent expenditure on Admin, Comserv, Ecoserv and Trans are good predictors of economic growth (GDP).

VAR Lag Order Selection Criteria

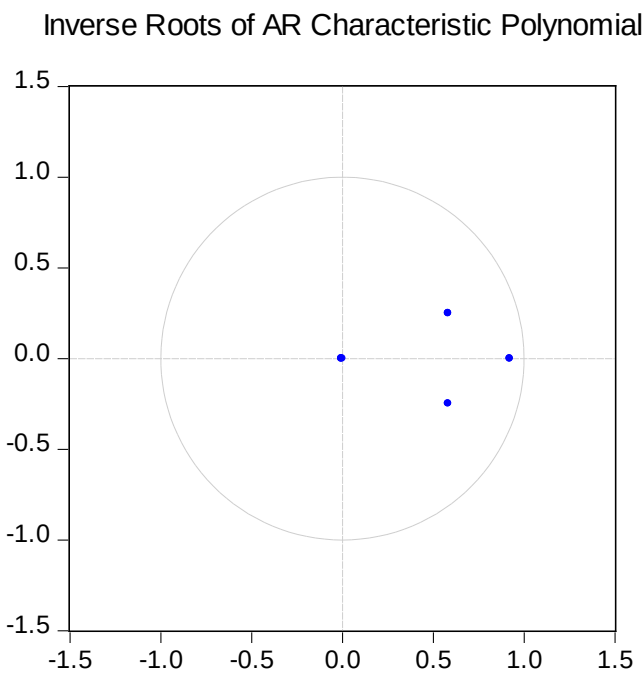
Endogenous variables: LGDP LADMIN LCOMSERV LECOSERV LTRANS
Exogenous variables: LGDP
Included observations: 34

Lag	LogL	LR	FPE	AIC	SC	HQ
0	992.2291	NA*	4.14e-32*	-58.07230*	-57.84784*	-57.99575*
1	909.5153	-136.2346	2.38e-29	-51.73619	-50.38941	-51.27690
2	907.2594	-3.052120	1.31e-28	-50.13290	-47.66379	-49.29087
3	912.1844	5.214759	5.66e-28	-48.95203	-45.36059	-47.72724

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The VAR lag order selection criteria on table above shows that lag length of 1 is selected at 5% level based on sequential modified LR test statistic, Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ).

Inverse Roots of AR Characteristic Polynomial



Also Figure above shows that all np roots of the characteristics polynomial are in circle or lie within the unit imaginery circle (modulus). Hence, all are stationary.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.915107	Prob. F(2,30)	0.0697
Obs*R-squared	6.020559	Prob. Chi-Square(2)	0.0493

Table above shows that F-statistis is 2.915107 wtih P-value of 0.0697, meaning rejection of the null hypothesis. Hence, no serial correlation.

VAR Residual Heteroskedasticity Tests (Levels and Squares)
Included observations: 35

Joint test:

Chi-sq	df	Prob.
316.6570	300	0.2436

In the same vein shows that Chi-sq is 316.6570 wtih P-value of 0.2436, meaning rejection of the null hypothesis. Hence, the model is homoskedastic.

Heteroskedasticity Test: ARCH

F-statistic	3.636319	Prob. F(1,34)	0.0650
Obs*R-squared	3.478222	Prob. Chi-Square(1)	0.0622

In the same vein Table above shows that F-statistis is 0.3.636319 with P-value of 0.0, meaning rejection of the null hypothesis. Hence, the model is homoskedastic.

In view of this, the researcher resorted to using Vector Error Correction Model (VECM) for more explanations since Vector Autoregressive (VAR) model is atheortical.

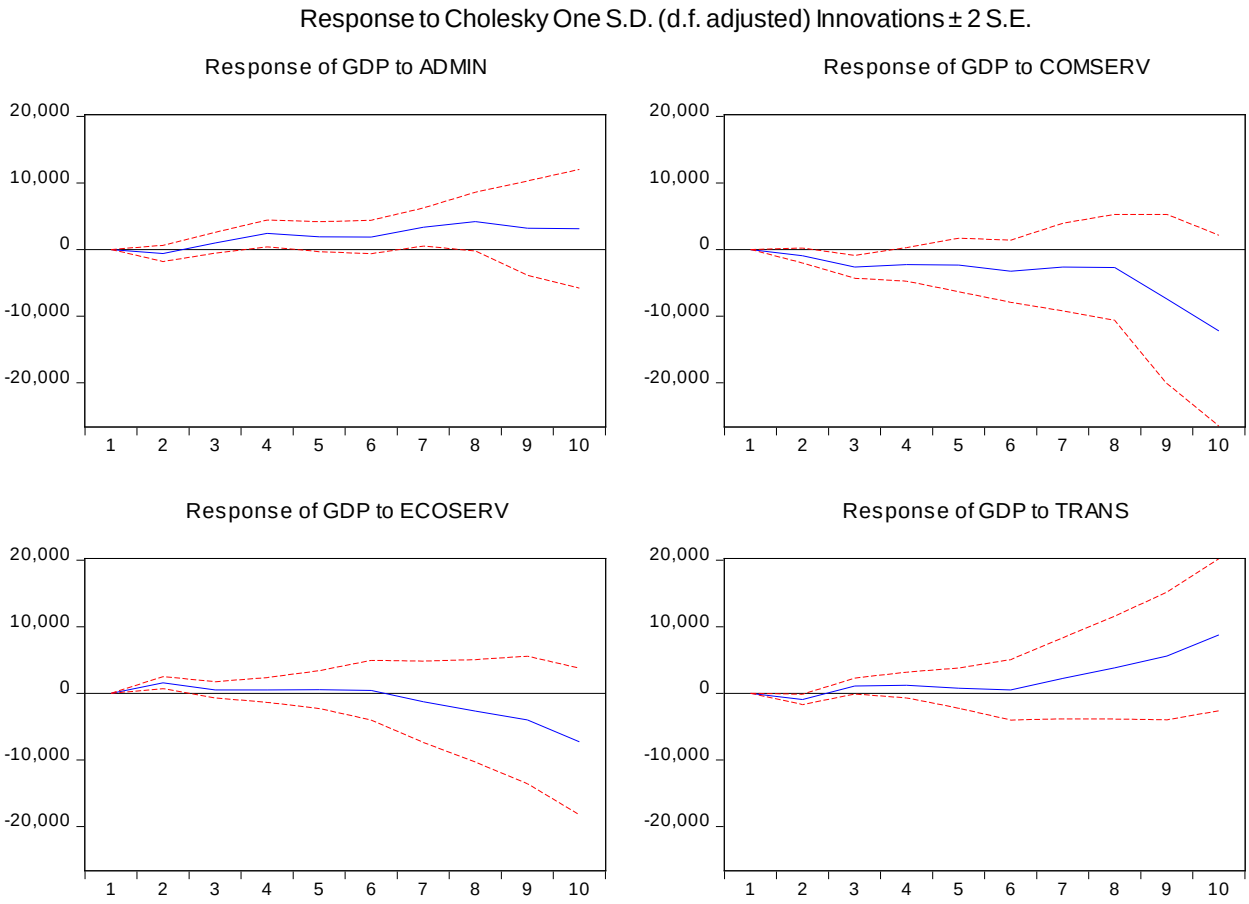
Vector Error Correction Estimates

Included observations: 33 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Error Correction:	D(GDP)	D(ADMIN)	D(COMSERV)	D(ECOSERV)	D(TRANS)
CointEq1	-0.401839	-0.006312	0.006313	-0.031583	0.003189
	(0.06759)	(0.00174)	(0.00050)	(0.00223)	(0.00392)
	[-5.94557]	[-3.63516]	[12.7380]	[-14.1777]	[0.81455]
R-squared	0.959572	0.946166	0.996939	0.990517	0.978363
Adj. R-squared	0.919145	0.892332	0.993878	0.981034	0.956726
F-statistic	23.73560	17.57561	325.6979	104.4521	45.21681

The analysis in table above shows that error correction equation (CointEq1) satisfied the condition, hence, significant. The speed of adjustment is 40.18%. That means short term errors can be corrected in the long run with annual speed of adjustment of 40.8%. Also long run casuality flows from independent to dependent

Cholesky Impulse Response



From above, Impulse responses of economic growth to all the variables of government recurrent expenditure were positive and scantly negative at various period authenticating the fact that the government recurrent expenditure are good predictors of economic growth in Nigeria.

Variance Decomposition

Period	S.E.	GDP	ADMIN	COMSERV	ECOSERV	TRANS
1	2351.852	100.0000	0.000000	0.000000	0.000000	0.000000
2	3550.937	63.53922	2.728608	6.715604	20.06486	6.951699
3	5677.478	56.98210	4.167350	23.79813	8.622315	6.430103
4	7463.869	52.34290	12.92842	22.86781	5.429821	6.431050
5	9121.785	56.15688	13.01874	21.80666	4.010593	5.007128
6	10859.93	56.61936	12.16675	24.45042	3.001989	3.761474
7	12495.04	51.18969	16.46536	22.95387	3.310520	6.080557
8	14616.69	42.48791	20.26237	20.16366	5.706304	11.37976
9	19343.82	37.01271	14.32740	26.24093	7.522693	14.89627
10	27633.74	31.26812	8.294840	32.41897	10.61801	17.40006

Cholesky Ordering: GDP ADMIN COMSERV ECOSERV TRANS

From the above, GDP explains 100 percent of its variations in the first period and diminishes 31.2 percent in the tenth period. In other words, "the own shock" started from 100 percent and decreased to 31.2 percent. Expenditure on administration started from zero percent of the variation in GDP in the first period and fluctuates between 2.7 to 20.2 percent over the period. Expenditure on social and community services started from 6.7 percent in the second period and increased to 32.4 percent in the tenth period, and then the expenditure on economic services fluctuates from 0.00 to 20.06 within the period, while expenditure on transfers fluctuates from 0.00 to 17.4 within the period.

VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: GDP

Excluded	Chi-sq	Df	Prob.
ADMIN	1.034680	2	0.5961
COMSERV	15.25806	2	0.0005
ECOSERV	1.021626	2	0.6000
TRANS	21.42951	2	0.0000
All	154.4104	8	0.0000

Dependent variable: ADMIN

Excluded	Chi-sq	Df	Prob.
GDP	53.05490	2	0.0000

Dependent variable: COMSERV

Excluded	Chi-sq	Df	Prob.
GDP	20.02034	2	0.0000

Dependent variable: ECOSERV

Excluded	Chi-sq	Df	Prob.
GDP	15.38275	2	0.0005

Dependent variable: TRANS

Excluded	Chi-sq	Df	Prob.
GDP	0.303689	2	0.8591

The table above, it is seen that economic growth (GDP) does not granger cause government expenditure on Administration, but government expenditure on Administration granger causes GDP (unidirectional effect). While GDP does granger cause government expenditure on social and community services, in the same way government expenditure on social and community services granger causes GDP (bidirectional or feedback effect). But GDP does not granger cause government expenditure on economic services, conversely government expenditure on economic services granger causes GDP, hence unidirectional effect. While GDP granger causes government expenditure on transfers, but government expenditure on transfers does not granger cause GDP, hence unidirectional. That means all components of government expenditure structure and GDP granger cause each other with unidirectional effect, except social and community services that has a bidirectional effect or feedback effect. In other words government expenditure on social and community services granger and economic growth drives each other.

4.1 Discussion of findings

The results of this study show that government recurrent expenditure namely expenditures on Social and community services, Economic services and Transfers exert positive significant impact on the growth of Nigerian economy. However this excludes expenditure on Administrationwhich was found to exert negative and significant impact on the growth of on Nigeria economy.

The findings that recurrent expenditure on social and community services, economic services and transfers exert positive and significant impact on the growth of the economy corroborate Wagner's Law Of Increasing State Activities which stipulates that the activities of government are increasing function of the changing structure of the economy. These findings also corroborate the findings of Miftahu and Rosni (2017); Taiwo and Abayomi (2012); Edame and Akpan (2013); Danladi, Akomolafe and Anyadiegwu (2015); Oziengbe (2013); Akanbi (2014); Ditimi, Nwosa, and Ajisafe (2011); Chude and Chude (2013) and Appah and Ateboh-Briggs (2013) and Sevitenyi (2012) which found that expenditures on social and community services, economic services and transfers exert positive and significant impact on the growth of Nigerian economy. However this excludes recurrent expenditure on administration which found to exert negative and significant impact on growth on Nigeria economy. This provides that these variants of government expenditure engender economic growth.

The finding however contradicts the findings of Okanta (2009);; Egunjobi (2013); Babalola, Aninka and Solako (2015); and Tajudeen and Ismail (2013) which see government expenditure as not contributing to the growth of the economy. The findings that recurrent expenditure on administration does exert negative and significant impact on the growth of the economy conforms to the assertion of the classical economist that expenditure on administration, defence, justice, law and order and maintenance of state are unproductive since they do not add to capital stock and/or tangible goods in the economy (Bhatia, 2002).

Again, with the exception of government expenditure on social and community services that has bidirectional effect on the growth of the economy; all components of government expenditure structure have unidirectional effect. In other words, government expenditure on social and community services and economic growth drive each other while economic services, administration and transfers drive economic growth with no feedback effect. The finding corroborates Appah and Ateboh-Briggs (2013) and Sevitenyi (2012), that there is a unidirectional causality running from aggregate public spending to economic growth. But Sevitenyi (2012), at the disaggregate level, results show that all the variables except recurrent expenditure cause economic growth, implying that government expenditure promotes growth in Nigeria.

Recommendations

Therefore, we suggest that adequate funding of economic services and social and community services due to their positive contributions to the expansion of the growth of Nigerian economy. Also, government recurrent expenditure on transfers should receive priority attention as this will contribute immensely to economic growth.

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Association of CYP1A1 Gene Polymophism (3801T/C), Smoking, Menstrual Status and Post Hormonal Contraceptive Use with Invasive Breast Carcinoma

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***Abstract*- Background:** CYP1A1 plays a role in the phase I metabolism of polycyclic aromatic hydrocarbon (PAHs) and estrogen metabolism. This gene polymorphism is suspected to be one of predisposition factors contributing to incidence of breast carcinoma. Literatures about CYP1A1 gene polymorphism in breast carcinoma showed contradictory results.
Aim: To analyze the association of CYP1A1 gene polymorphism (3801T/C), smoking, menstrual status and past hormonal contraceptive use with invasive breast carcinoma.
Material and method: Forty six patients of invasive breast carcinoma and 46 healthy women (control) were analyzed with PCR-RFLP method by using Msp1 restriction enzyme.
Results: Overall, there were no significant associations between CYP1A1 gene polymorphism and invasive breast carcinoma (p=0.877). Smoking women with heterozygote T/C genotype apparently had higher risk of suffering from invasive breast carcinoma (p=0.04, OR=2.551 [95%CI 1.304-4.989]), while other variables didn't.
Conclusion: This study showed that CYP1A1 gene polymorphism (3801T/C) is not a risk factor for invasive breast carcinoma. However, smoking women with heterozygote T/C genotype were 2.5 times at risk than wild type and homozygote genotype to suffer invasive breast carcinoma.

***Index Terms*-** polymorphism, CYP1A1 (3801T/C), CYP450 1A1, invasive breast carcinoma

I. Introduction

Breast carcinoma is the most common malignancy among women worldwide, with estimated 911,014 new cases and 137,514 cases in Southeast Asia. Based on GLOBOCAN 2018, this carcinoma is the second most frequently diagnosed carcinoma, with an estimated 2,088,849 cases (11.6%) and 626,279 carcinoma-related deaths.[1] In Indonesia, breast carcinoma is one of the carcinoma with highest prevalence in 2013.[2]

Epidemiologic studies showed that breast carcinoma is a multifactorial and polygenic disease. Combination of genetic and environmental factors play a role in the development of breast carcinoma.[3] About 5-9% of all invasive breast carcinoma is thought be hereditary breast carcinoma.[4] Combination of BRCA1 and BRCA2 gene mutation are found in 30% hereditary breast carcinoma and less than 2% of all breast carcinoma.[5] It is thought that maybe there are other low penetrating genes also increasing individual susceptibility to breast carcinoma.[6] For last few years, several genetic researches have been done to identify genetic variation associated with breast carcinoma.[7]

Cytochrome P450 (CYP450s) are enzymes catalyzing phase I metabolism reactions. Cytochrome P450 1A1 (CYP1A1) is one of the cytochrome P450 superfamily playing an important role in metabolism of xenobiotic and endogenous substance which mostly found in extrahepatic tissues, especially in the epithelial cells, including breast.[8] This CYP1A1 catalyzes the metabolism of polycyclic aromatic hydrocarbons (PAHs) and contributes in the formations of reactive metabolites that are capable to induce DNA damage. If this process is not intervened, it will initate or accelerate carcinogenesis.[9]

CYP1A1 also involves in breast carcinoma through estrogen-related mechanism. Estrogen can initiate and promote the process of breast carcinoma. Estradiol is metabolized through two pathways into inactive 2-hydroxyestrone or active 16α-hydroxyestrone. 2-hydroxyestrone has a weak binding capacity to estrogen receptor, meanwhile 16-hydroxyestrone is increased in breast carcinoma and usually associated with tumorigenesis.[10] CYP1A1 gene is located in 15q22-q24 and consists of 7 exon and 6 intron spanning 5810 base pair (bp).[25] CYP1A1 Gene polymorphism is divided into 3 groups, such as wild-type T/T, heterozygote T/C and homozygote C/C. If PCR shows only 1 fragmen, such as 340 bp, this will be defined as wild-type; 2 fragments (200bp and 140 bp) as homozygote; and 3 fragments (340bp, 200bp, and 140bp) as heterozygote.[8]

Studies about the association between gene polymorphisms and breast carcinoma is still controversial. Therefore, researchers would like to analyze about the association between cytochrome CYP1A1 gene polymorphisms in invasive breast carcinoma.

II. METHODS

Forty six breast carcinoma patients and 46 healthy women were analyzed in this study. Patients' groups were stored DNA from previous study, but control groups were obtained from community service activities. Control groups had been gathered

since March 2019 after obtaining approval from the Ethics Committee of Medical Faculty of University of Sumatera Utara. The blood was isolated using Promega Wizard Genomic DNA Purification Kit. The isolating procedures were done according to the kit protocol. The isolated samples were kept while waiting for the histopathology results.

The CYP1A1 (3801T/C) polimorphism gene were determined using a PCR-RFLP-based assay method[4]. PCR amplification of a 340-base DNA fragment using the primers 5'-CAGTGAAGAGGTGTAGCCGCT-3' (*Forward*) dan 5' TAGGAGTCTTGTCTCATGCCT-3' (*Reverse*). PCR process was prepare containing 12,5 µl mix solution (Gotaq PCR master mix by Promega), 2 µl DNA Template, 1,0 µl Forward primer 10 pmol, 1,0 µl, Reverse primer 10 pmol, 8,5 µl nuclease-free water, resulting in 25 µl solution in each PCR tube. These mixture was spindown and the PCR amplifications were performed as follows: initial denaturation at 94°C for 5 minutes, followed by 30 cycles of denaturation at 94°C for 1 minute, annealing at 60°C for 1 minute, extension at 72°C for 1 minutes and a final extension at 72°C for 10 minutes. 10 µl of PCR product was digested with 1,5 µl MspI (Bench Top 100bp DNA Ladder, Promega Corporation, Madison, USA), then incubated at 37°c for 16 hours. The restricted products were analyzed by electrophoresis in 2% agarose gel containing ethidium bromide and visualized under a UV illuminator. The PCR product was identified by the presence of bands on the gel. Three different genotypes were defined for the individual polymorphism. Wild type T/T showed 1 fragment (340 base bp), heterozygote T/C showed 3 fragments (340 bp, 200bp and 140 bp), and homozygote C/C showed 2 fragments (200 bp and 140 bp).[9]

The data was analysed using statistical software and the results were presented in frequency tables. Menopausal status is determined as cessation of menstruation for ≥ 12 months, excluding cessation of menstruatian caused by pregnancy or breastfeeding.Smoking was categorized as active and passive smokers. Past hormonal contraceptive use was defined as yes if ever used pill, injection, or implant contraception.

III. RESULT

Forty six breast carcinoma patients and 46 controls were analyzed in this study. Mean age of patients was 49.54 years old (median 49.5 years and range 33-68 years), while the mean age of controls was 43.32 years old (median 38.5 years and range 28-64 years). Past smoking and menstrual status is different between cases and controls, but there is no difference in hormonal contraceptive use.

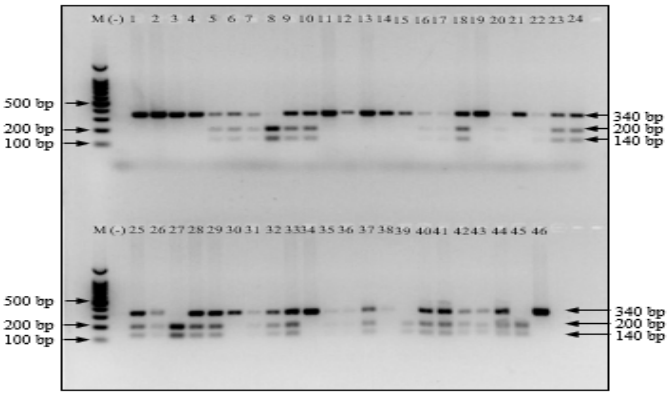

Figure 1. Gel electrophoresis showing PCR-RFLP product of CYP1A1 gene (3801TC) from patients on 32 well-2% agarose gel: Marker (lane1), blanco control (lane 2), samples 1-24 (lane 3-24 line 1), samples 25-46 (lane 3-22 line 2).

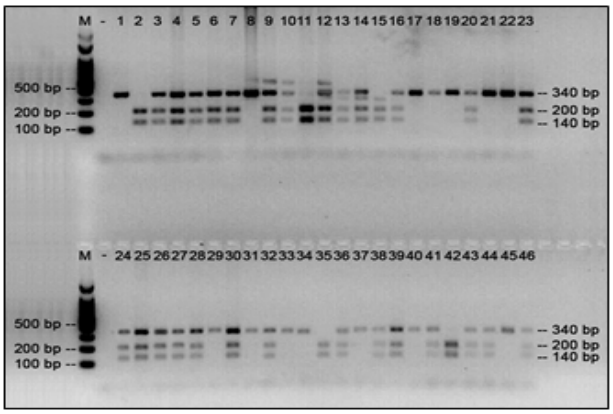

Figure 2. Gel electrophoresis showing PCR-RFLP product of CYP1A1 gene (3801TC) from controls on 32 well-2% agarose gel: Marker (lane1), blanco control (lane 2), samples 1-23 (lane 3-25 line 1), samples 24-46 (lane 3-25 line 2).

Analysis results showed that there were 26 (49.1%) patients with heterozygote T/C gene polymorphism, 16 (53.3%) patients with wild type T/T gene polymorphism, and only 4 (44.4%) patients with homozygote C/C gene polymorphism suffering from breast carcinoma. This study didn't find any significant relationship between CYP1A1 gene polymorphism (3801T/C) and breast carcinoma (p=0.877) (table 1), but if this relationship was assessed based on the association of CYP1A1 gene polymorphism (3801T/C) and clinicopathological characteristics, it showed that smoking patients with heterozygote T/C genotype were at risk 2.5 times higher to suffer from invasive breast carcinoma (table 2).

IV. DISCUSSION

The etiology of breast cancer involves various genetic, environmental, and behavior risk factors in each individuals. Genetic mutation with high susceptibility especially BRCA1 and BRCA2 gene is only found in trivial cases so it's suspected that there are other low penetrating genes can cause breast cancer.

The finding of this study was in accordance with most researches, including meta-analysis by Yao et al, Chen et al, Sergentanis et al, Khalili, and Garcia-martinez.[11-15] However, contrary to findings of several researches such as Shen et al, Shin et al, and Balmukhanov et al, we didn't find that heterozygote T/C genotype was associated with increased breast carcinoma risk.[16-18] Boyapati et al demonstrated that homozygote C/C genotype had lower risk for developing breast carcinoma, especially women with low body mass index and long endogenous estrogen exposure.[9] Controversial results was also discovered by Okobia et al stating that heterozygote T/C genotype can decrease risk of breast carcinoma about 21%.[19] Meanwhile, Naif et al said that homozygote C/C variant had higher risk for breast carcinoma, especially in post-menopausal women.[20] When comparing our results to those of older studies, we assumed that CYP1A1 gene polymorphism (3801T/C) wasn't a predisposing factor to invasive breast carcinoma.

Controversy between these studies could only attributable to ethnic diversity, giving difference in genetic and social factors. Different ethnic subjects had diverse culture and lifestyle contributing to diversity of genetics, susceptibility to malignancy, and exposure doses to procarcinogen in each populations. Specific genotype that could give protection/ susceptibility to any cancer usually showed protection/ promotion effect in subjects exposed normal dose procarcinogens.[20] Moreover, different study location caused different lifestyle, race, total samples and research sampling techniques.

Even though this study generally didn't find any relationship between CYP1A1 gene polymorphism (3801T/C) and invasive breast carcinoma, but after more specific analysis based on CYP1A1 gene polymorphism (3801T/C) was done, this study revealed that smoking women with heterozygote T/C genotype had greater risk about 2.5 times of suffering invasive breast carcinoma (P=0.004, OR=2.551[95%CI 1.304-4.989]) (table 2). This study was in line with Ambrosone et al stating that patients with CYP1A1 gene polymorphism (3801T/C) smoking more than 29 packs per year had higher risk.[21] Nakachi et al and Ishibe et al, concluded that smoking women with homozygote C/C genotype were at greater risk than other genotypes.[22,23]

Smoking is a potential risk factor in developing breast carcinoma. Cigarette smoke consists of thousands chemical metabolites such as PAH, aromatic amine, and N-nitrosamine, most of them are carcinogens to breast. Cell proliferation during pre-puberty until pregnancy can reduce DNA repair mechanism to correct damage before cell division, and breast tissue is more susceptible to carcinogen exposure during this period.[24] Palmer et al stated that smoking at young age could increase breast cancer risk.[25] Ishibe et al gave an impression that harmful effect of cigarette smoke exposure could occur during early maturation of breast tissue.[23]

Verde et al demonstrated that carcinogen from cigarette smoke will pass through alveolar membrane and then with lipoprotein will be transported to breast. In vitro study found that cigarette smoke will induce epithelial transition to mesenchymal, producing more aggressive fenotype.[26] Several researches had shown that smoke ingredients was found in breast milk, and nipple aspiration from smokers, suggesting direct involvement of cigarette smoke in breast tissue injury.[27,28] Perera et al in his study discovered that DNA adducts with cigarette smoke exposure was found in 4 of 7 smoking women with breast cancer but not in 8 non-smokers with breast cancer.[29] Another research also reported about the finding of benzo(a)pyrene-like adduct in breast tissue of breast cancer patients but not in control groups.[30]

Activation through AhR influencing cell signaling pathways reflected its role in tumor development. Interaction between AhR and CYP1A1 can cause changes in steroid levels modulating bioactivation of therapeutic and xenobiotic agents and increasing cancer risk in smoking women. Therefore, this gene polymorphism may decrease the ability of detoxifying carcinogen components of smoke cigarette causing a person more susceptible to breast cancer.[31]

There were several limitation to this study. First, lack of information about smoking, such as age began to be exposed to cigarettes, duration of smoking or smoke cigarette exposure, amount of cigarettes per year and etc. Second, there was no information about duration of hormonal contraceptive use, age at menarche, body mass index, age at first pregnancy, and parity. Third, the composition of contraception whether only consist of estrogen or combination of estrogen and progesterone was also not recorded in this study. Moreover, further studies are needed to evaluate other risk factors related to smoke exposure, such as previous occupation, inhabitation, history of eating burnt foods, all of which play important role in PAH metabolism.

V. CONCLUSION

This study found that CYP1A1 gene polmorphism (3801T/C) wasn't a predisposing factor to invasive breast carcinoma. However, smoking women with heterozygote T/C genotype had greater risk about 2.5 times of suffering invasive breast carcinoma.

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Table 1. Analysis of the association between CYP1A1 gene polymorphism (3801T/C) and invasive breast carcinoma

	Group				Total	P value
	Control	%	Case	%		
Polimorfisme gen						
• *Wild type T/T*	14	46,7	16	53,3	30	
• *Heterozygote T/C*	27	50,9	26	49,1	53	0,877
• *Homozygot C/C*	5	55,6	4	44,4	9	
Total	46	50,0	46	50,0	92	

Tabel 2. Association of hormonal contraception, smoking, and menstrual status and invasive breast carcinoma in each wild-type, heterozygote, and homozygote groups.

Variabel	Group				Total	OR (95% CI)	P
	Control	%	Case	%			
Wild-type T/T							
Hormonal contraception							
• No	6	35,3	11	64,7	17	0,574	0,290
• Yes	8	61,5	5	38,5	13	(95%CI:0,265-1,244)	
Smoking							
• No	6	42,9	8	57,1	14	0,857	
• Yes	8	50	8	50	16	(95%CI:0,394-1,867)	0,980
Menstrual status							
• Pre menopause	12	60	8	40	20	3,000	
• Pasca-menopause	2	20	8	80	10	(95%CI:0,826-10,901)	0,093
Heterozygote T/C							
Hormonal contraception							
• No	16	59,3	11	40,7	27	1,401	0,337
• Yes	11	42,3	15	57,7	26	(95%CI:0,801-2,421)	
Smoking							
• No	20	71,4	8	28,6	28	2,551	0,004*
• Yes	7	28,0	18	72	25	(95%CI:1,304-4,989)	
Menstrual status							
• Pre menopause	23	57,5	17	42,5	40	1,869	
• Pasca-menopause	4	30,8	9	69,2	13	(95%CI:0,793-4,407)	0,175
Homozygote C/C							
Hormonal contraception							
• No	4	50	4	50	8	0,5	1,000
• Yes	4	100	0	-	1	(95%CI:0,250-1,000)	
Smoking							
• No	4	1	1	20	5	3,2	0,206
• Yes	1	3	3	80	4	(95%CI:0,554-18,471)	
Menstrual status							
• Pre menopause	5	83,3	1	16,7	6	0,167	0,097
• Pasca-menopause	0	-	3	100	3	(95%CI:0,028-0,997)	

The Associations between HPV 18 Gene in The Blood, Contraception, Age of Menarche, Parity with Cervical Carcinoma

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***Abstract*- Background:** Cervical cancer is the second most frequent cancer in women wordwide and the leading cause of death in several developing countries. It is well established that the risk factors of cervical cancer are infection of Human Papillomavirus, contraception, age of menarche, and parity.
Objective: This study was aimed to analyse the association between HPV 18 gene in the blood, contraception, age of menarche, parity, and cervical cancer.
Methods: This is an observational analytic study with cross sectional approach, involving 46 blood samples from cervical cancer patients (case) and 46 pap smear samples from healthy individuals (control). The HPV gene identification was done using polymerase chain reaction (PCR) technique. The clinical and pathologic data was obtained by the medical record, questionnaire, and histopathologic test result.
Results: There were significant associations between HPV 18 gene, contraception, and cervical carcinoma.
Conclusion: The HPV gene identification from the blood is still needed in individual who is claimed normal from the pap smear results and is expected to be the method of HPV infection detection..

***Index Terms*-:** Polymerase Chain Reaction, HPV 18, cervical cancer.

I. Introduction

Cervical cancer is the fourth most frequent cancer in women with an estimated 570,000 new cases and resulting in 266,000 deaths in 2012.[1] Most cervical cancer cases occurred in developing countries. In USA, cervical cancer is the third most common malignancy. However, mortality and incidence rates have declined in developed countries due to routine papaniculou smear screening test (pap test).[2]

The risk factors of cervical cancer are generally associated with the exposure of Human Papillomavirus (HPV), smoking, and immune suppression. The infection of HPV occurs in 99.7% of all cervical cancer cases. Human Papillomavirus 16 is the predominant type (±50%), followed by HPV 18, 45, and 31. Other causes include having sexual intercourse at young age multiple sexual partners, history of sexual transmitted disease, smoking, high parity, and hormonal contraception.[2-6]

Infection of HPV is mostly transmitted sexually. Accordingly, most of the studies on HPV infection are focusing on sexually exposed women. However, HPV infection can also be transmitted non-sexually. These non-sexual modes are differentiated into vertical and horizontal transmissions.[7]

The studies of HPV DNA detection in the blood have often been done, but only few that have been conducted in healthy individuals. Considering the conditions mentioned above, the authors were interested in detecting the presence of HPV DNA (especially HPV 18) in the blood of cervical cancer patients and healthy individuals. This study was aimed to assess the association of HPV 18 in the blood, contraception, age of menarche, and parity with cervical carcinoma, which involving a group of cervical cancer patients and a group of control individuals.

II. Material and Product

This is an observational analytic study, using a cross sectional approach. The study was conducted at the Oncologic Gynaecology polyclinic and ward, Department of Clinical Pathology, Department of Anatomical Pathology in Haji Adam Malik Medan General Hospital. The research was held from September 2018 until March 2019, after approved by the University of North Sumatera and Haji Adam Malik General Hospital Health Research Ethics Committee.

The sample was divided into two groups. Case group was patients who were diagnosed with cervical carcinoma based on histopathological examination with HPV DNA positive from previous study stored preparation. Control group were social service participants whose pap smear test was normal. Each group was consisted of 46 participants and written informed consent was obtained from all participants. Participants were recruited using consecutive sampling technique. For control group, blood 3 ml sample was taken and DNA isolation was done. Blood sample was stored until pap smear cytology test was obtained.

The analysis of DNA was done in the integrated laboratory of University of North Sumatera. First step was DNA isolation (Wizard Genomic DNA Purification Kit), continued with PCR Mix, and last step was gel electrophoresis. For the stored DNA samples for each group, amplification (PCR) was done using Go

Taq® PCR master Mix from Promega. Applied BiosystemVeriti 96 was used for thermal cycler. Specific primer for HPV 18 were 5'-TCG TTT TCT TCC TCT GAG TCG CCT-3' (Forward) and 5'-CCG AGG ACG ACA GGA ACG ACT-3' (Reverse). A tube of 25 µl mixed solution, which consisted of 12.5 µl PCR mix solution (Go Taq® PCR master Mix); 1 µl forward primer 10 pmol; 1 µl reverse primer 10 pmol; 6.5 µl Nuclease-free water; 4 µl DNA template, was prepared for spindown. The mixture was then inserted to the PCR machine for HPV 18 primer amplification. The initiation was set in 95°C for 5 minutes, continued with 40 other cycles comprised of the process of denaturation (95°C, 60 seconds), annealing (59°C, 60 seconds), and extension (72°C, 120 seconds), and last extension (72°C, 5 minutes). After PCR, the process was continued with electrophoresis. The electrophoresis was done in 2% agarose gel, dyed with 2 µl Ethidium Bromide for 70 minutes in 80 V, and was visualised using UV transluminator 2 (Uvitec Cambridge). The result was determined HPV 18 positive if electrophoresis band was seen as many as 173 base pairs. Data was analysed with statistic software program and the results were shown in the table of frequency.

III. RESULT

The HPV 18 gene was found positive in 37 (80.4%) patients from case group. Some of the electrophoresis results of the HPV 18 gene of case group can be seen in Figure 1.

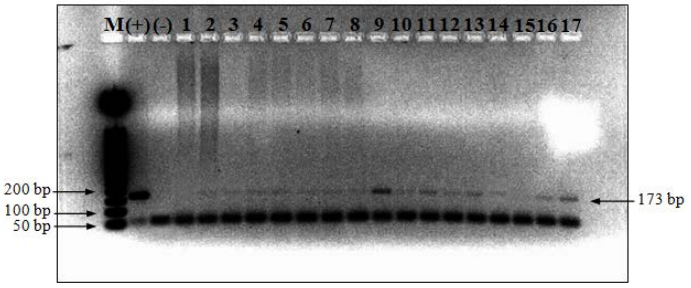

Figure 1. The electrophoresis results of HPV 18 gene PCR product in 2% agarose gel 20 well, case group: Marker of 50 bp (line 1), positive control (line 2), negative control (line 3), sample 1 - 17 (line 4 - 20).

None of the control group showed positive HPV 18 gene. Some of the electrophoresis results of the HPV 18 gene of control group can be seen in Figure 2.

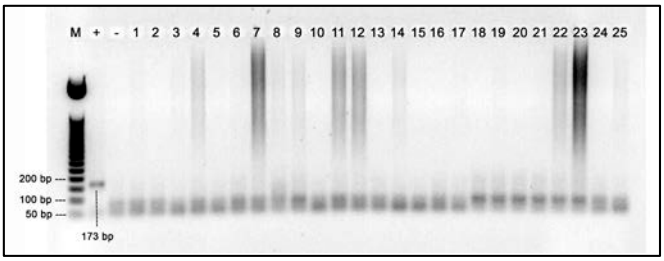

Figure 2. The electrophoresis results of HPV 18 gene PCR product in 2% agarose gel 20 well, control group: Marker of 50 bp (line 1), positive control (line 2), negative control (line 3), sample 1 - 17 (line 4 - 28).

In this study, analysis of association of HPV 18 gene in the blood, contraception, age of menarche, and parity with cervical carcinoma was done, comparing the case and control groups. The variables were HPV 18 gene, contraception, age of menarche, and parity (Table 1). (See below).

Nine (16.4%) participants without HPV 18 in blood serum had cervical cancer, while 37 (100%) participants with serum HPV 18 positive had cervical cancer. Statistical test showed p value = 0.001, concluded that there was a significant relationship between HPV 18 and cervical cancer.

For the association of contraception and cervical cancer, there were 12 (30%) participants who did not use contraception, 26 (78.8%) participants who used contraceptive pill, and 8 (42.1%) participants who used contraceptive injection had cervical cancer. Statistics showed p value = 0.001, thus there was a significant association between contraception and cervical cancer.

As many as 39 (54.9%) participants who had menarche at 13 – 19 years old and 7 (33.3%) participant who had menarche at 11 – 12 years old, had cervical cancer. Statistic test resulted in p value = 0.136, which meant there was no significant association between age of menarche and cervical cancer.

Last, the analysis of parity and cervical cancer showed that 10 (58.8%) participants who had 5 – 12 children and 36 (48%) participants who had 0 – 4 children had cervical cancer. Statistical analysis showed p value = 0.591, hence there was no significant relationship between parity and cervical cancer.

IV. DISCUSSION

It is well established that the most common cause of cervical cancer was HPV infection. Human papillomavirus 18 is one of the high-risk type of HPV that can cause cervical cancer.[2] Nevertheless, human papillomavirus is not the only causal factor of cervical cancer, other factors might contribute as well. In this study, there was a significant association between HPV 18 and cervical cancer (p = 0.001). Arias, *et al.* (2010) reported that HPV 18 was found in 100% cervical cancer cases.[8] Former study conducted by Pornthanakasem, *et al.* (2001) also found that the prevalence of HPV 18 was as much as 8%.[9] Asmiati, *et al.* (2018) also showed that HPV 18 was detected in 80.4% cervical cancer patients.[10] However, those studies did not analyse the relationship between HPV 18 and increased risk of cervical cancer, and the difference of number of the cervical cancer patients and control. In fact, several studies did not involve control group in investigating HPV 18 detection.

Contraception was reported to have a significant relationship with the risk of cervical cancer.[6] This was in line with the finding of this study where contraceptive pill and injection had a significant association with cervical cancer (p = 0.001). Similar result was reported by Paramita, *et al.* (2010), in which estrogen and progestin had a high association with the risk of cervical cancer (p = 0.001), increasing the risk of cervical cancer 4.21 times.[11] Baudu, *et al.* (2014) also concluded that pill contraception is very related to increased risk of cervical cancer (p = 0.012).[12] In contrast, Parija, *et al.* (2017) reported that women who did not use contraception significantly has high risk of cervical cancer, as much as 89.3% (p = 0.001).[13] The difference in study results might be the fact that some of those

studies included the length of contraception use, whereas our study did not. Other limitation in this study was that we did not explore the type of contraception, whether it contained estrogen or progesteron or the combination of both.

The age of menarche is very related with the risk of cervical cancer.[14] Da Silva, *et al.* (2017) reported that in 18 – 30 years old women who had their menarche in the age of 12 years old were 1.95 times more susceptible to CIN 2–3 or cervical cancer (CI = 1.17 – 3.25).[15] The study by Sharma, *et al.* (2018) stated that women who had menarche at 13 – 14 years old were 2.91 times more risky of having cervical cancer (p = 0.02).[16] On the contrary, Paramita, *et al.* (2010) argued that age of menarche was not associated with the risk of cervical cancer (p = 0.074), while women who menarche in 13 – 19 years old were 0.39 more risky to have cervical cancer.[11] This study also reported no significant relationship between age of menarche and cervical cancer. Previously, study by Fujita. *et al,* (2008) concluded that age of menarche had no role in causing cervical cancer (p= 0,33).[17] The discrepancy among these results may be due to the diverse age of menarche range categories in each study, some even did not limit the age of the first menstrual cycle. Difficulty in remembering the exact age of menarche is an issue in this study. Some samples only remember the grade of primary school when they experienced their first period. Thus, we have to convert it into an approximate age based on the grade of Indonesian primary school in general.

Parity was also strongly associated with the risk of cervical cancer, where Sharma. *et al,* (2018) reported that women who had 3-5 children significantly would be 3,16 times at risk for cervical cancer (p= 0,029).[6,16] In line with Parija. *et al,* (2017), high parity (>5) was strongly associated with the risk of cervical cancer, accounted for 57,1%, with p=0,05.[13] Paramita. *et al,* (2010) found no significant association between parity and cervical cancer (p=0,073).[11] However, they concluded that women who had 5-12 children had 2,62-fold risk of cervical cancer. Our study also found no significant association between parity and cervical cancer, which is in accordance with Fujita. et al (2008).[17] We consider that the similarity of these results might be related with the similarity of ethnicity and geographic region, despite one of the studies had a large number of participants in control group compared to the case group. Furthermore, we concluded that the society has the tendency of having few children these days due to the governmental program in limiting the rate of birth through the family planning program.

V. CONCLUSION

After conducted this study, which involving to cervical cancer patients (case group) and healthy individuals (control group), we highlighted several points in the following :

1. Each group, case group and control group, was consisted of 46 participants, in which most participants in case group were HPV 18 infected whereas none of control group was infected by HPV 18.
2. There were significant associations between HPV 18, methods of contraception and cervical cancer.
3. Detection of HPV in the blood of healthy individuals can be implemented and is expected to be one of the alternative options for screening and diagnostic tests of cervical cancer.

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Table 1. Association betwen *HPV* 18 gene in the blood, contraception, age of menarche and parity with cervical carcinoma.

Variable	Cervical cancer				Total	P
	Yes	%	No	%		
HPV 18						
• Positive	37	100	-	-	37	0,001
• Negative	9	16,4	46	83,6	55	
Contraception						
• Pill	26	78,8	7	21,2	33	0,001
• Injection	8	42,1	11	57,9	19	
• Other methods/ None	12	30	28	70	40	
Menarche (years)						
• 11-12	7	33,3	14	66,7	21	0,136
• 13-19	39	54,9	32	45,1	71	
Parity						
• 0-4 births	36	48	39	52,0	75	0,591
• 5-12 births	10	58,8	7	41,2	17	
Total	46	50	46	50	92	

Differences of Expression of PD-L1 in lung adenocarcinoma and lung squamous cell carcinoma

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Background : Most patients with NSCLC are diagnosed in advanced stage. Several investigators evaluated the possibility to modulate the immune system for treating lung cancer. PD-L1 expression on tumour cells leads to the inhibition of immune responses against cancer. The aim of this study is to differentiate expression PD-L1 in lung adenocarcinoma and lung squamous cell carcinoma.
Materials and Methods : We obtained 40 paraffin blocks of the lung adenocarcinoma and squamous cell carcinoma tumor specimens and assessed PD-L1 expression by immunohistochemistry. Clinicopathological characteristics of the patients were taken from the medical reports in Haji Adam Malik General hospital. Results were analyzed using H-Score to cut-off values of ≥ 30%.
Results : in our study we found PD-L1 expression was significantly higher in lung squamous cell carcinoma and in advanced stage.

keywords : lung adenocarcinoma, squamous cell carcinoma, PD-L1**,** imunohistochemistry**.**

I. Introduction

Lung cancer is the leading cause of cancer death worldwide.[1] Despite significant advances in multidisciplinary cancer therapies, the overall prognosis for lung cancer patients remains poor. Immunotherapy with checkpoint inhibitors (CPIs) is becoming a new standard of treatment for non-small cell lung cancer (NSCLC) patients.
Lung cancer is the leading cause of cancer death worldwide.[1] According to Persahabatan hospital, Jakarta, Indonesia, found 151 (90,4%) patients with the histopathology of adenocarcinoma, and follwed by *squamous cell carcinoma* 11 patients (6,6%).[2] Soeroso showed the study in Haji Adam Malik General hospital in Medan, Sumatera Utara, Indonesia, found from January 2010 until May 2012, there were 167 lung cancer patients. The cytology / histopathology found was adenocarcinoma (56.8%) dan Stage III B found in about (54.8%) in one hundred sixty seven patients.[3] Asrul HH et al. found 72 patients of lung adenocarcinoma from cytology and histopathology preparations in same hospital.[4] Accoding to the data, in Medan there are many lung cancer patients, especially lung adenocarcinoma and lung squamous cell carcinoma. Immunotherapy with checkpoint inhibitors (CPIs), such as the programmed cell death-ligand 1 (PD-1) is becoming a new standard of treatment for non-small cell lung cancer (NSCLC) patients. Thus far, three agents, namely nivolumab, pembrolizumab and atezolizumab, have proven antitumor efficacy in terms of improved response rates and overall survival compared to standard chemotherapy in the second-line setting.[1,5-8] Several studies have research PD-L1 expression on lung cancer and clinicopathological characteristics of the patients.[9-12] So that we want to know how differ PD-L1 expression between patients of lung adenocarcinoma (LAC) and lung squamous cell carcinoma (LSCC) in Haji Adam Malik General Hospital in Medan, North Sumatera, Indonesia.

II. Material and Methods

A. Patients and specimens
This is cross sectional study was conducted on biopsy (35 cases) and surgical specimens (5 cases) which diagnosed lung adenocarcinoma (LAC) and lung squamous cell carcinoma (LSCC) were included. The specimens were collected by random sampling from the unit of anatomical pathology and the clinicopathological characteristic of those patients were taken from the medical reports in same location, Haji Adam Malik General Hospital in Medan, North sumatera, Indonesia. This study has recieved permission from Health Research Ethical Medical Faculty of Universitas Sumatera Utara / H. Adam Malik General Hospital (no 697/TGL/KEPK FK USU-RSUP HAM/2018)

B. Immunohistochemistry and interpretations
Immunohistochemistry was performed in 40 paraffin blocks using formalin-fixed and paraffin-embedded tumor tissue sections according to the previously described PD-L1 immunohistochemistry protocol. The primary antibody was an anti-human PD-L1 rabbit monoclonal antibody (clone MD21R, ready to use, Medaysis, CA).[14] Immunohistochemical staining for PD-L1 was detected at the membrane or in the cytoplasm (or both) of tumor cells.[9] The PD-L1 expression of tumour cells staining level was counted using a semiquantitative evaluation, with cut off 30%.[9] PD-L1 expression score (H score) was calculated for each case according to the following formula : PD-L1 expression score (H score) (range, 0–300) =0×% of non-stained tumour cells +1×% of weakly stained tumour cells +2×% of moderately stained tumour cells +3×% of strongly stained tumour cells.[14,15] The specimens were describe by three researchers, including two pathologists using double blind.

Chi-square or Fisher's exact test was used to assess correlations between different immunoreactivity and clinicopathologic variables.

III. RESULTS

Based on clinical data obtained from medical records, it was found that the sample of this study had an average age of 58.4 (± 10.7) years, with the youngest age being 36 years and the oldest being 80 years old. Thirty-three specimens were male (82.5%) and women were 7 (17.5%). Of the 40 specimens, 23 were LAC and 17 were LSCC. Most of the 34 patients were smokers (85%) and 6 nonsmokers (15%). About the location tumor, 21 cases (52,5%) in central area and 17 (42,5%) in peripheral. There 2 difficult cases to define the exactly location, because of the massive pleural effusion.

One patients (2,5%), six (15%), 18 (45%), and 15 (37,5%) had stage I, II, III and IV disease, respectively.

A total of 40 tumor specimens were examined, 23 of them (57,5%) were AC and 17 (42,5%) were SCC. The growth pattern of lung adenocarcinoma was classified into lepidic (3 tumors), acinar (19), papillary (1). There were 22 patient (55%) with high PD-L1 expression, and 18 (45%) with low expression. (Table 1).

Table 1. Clinicopathological characteristic

Characteristic	(n)	Persentase (%)
Age, mean ± SD, year	57,5 ± 10,7	
Sex		
Male	33	82,5
Female	7	17,5
Smoking tatus		
Non-smoker	6	15
Smoker	34	85
Tumour Location		
Central	21	52,5
Peripheral	17	42,5
Unknown (pleural effusion)	2	5
Staging		
Staging I	1	2,5
Staging II	6	15
Staging III	18	45,0
Staging IV	15	37,5
Type of histopathology		
Adenocarcinoma	23	57,5
Lepidic	3	13,04
Acinar	19	82,6
Papillary	1	4,34
Micropapillary	0	0
Solid	0	0
PD-L1 expression		
> 30% (higher)	22	55
≤ 30% (lower)	18	45

From data in this study, we found there was no significant relationship between PD-L1 expression of smoking status and primary tumor location.

Stage I and II in this study, showed only 1 person (14.3%) with high PD-L1 expression and 6 persons (85.7%) with low PD-L1 expression. For stage III and IV, found that there were 21 persons (63.4%) with high PD-L1 expression and 12 people (36.4%) with low PD-L1 expression. There is a significant relationship between the expression of PD-L1 and the clinical stage, where stage III and IV have a tendency of 4,455 times to express PD-L1 compared to stages I and II.

Table 2. Distribution of PD-L1 expression according to staging

Staging	PD-L1 expression				P	PR (CI95%)
	High		Low			
	n	%	n	%		
Staging I & II	1	14,3	6	85,7	0,033	4,455 (0,713-27,847)
Staging III & IV	21	63,4	12	36,4		
Total	22		18			

We found 13 patients LSCC (76,5%) showing high PD-L1 exspression and 4 patients LSCC (23,5%) with low PD-L1 exspression. There were 9 patients LAC (39,1%) showing high PD-L1 exspression and 14 patients LAC (60,9%) with low PD-L1 exspression. There is differences of LSCC compared to LAC. LSCC has a tendency 1,954 times to express PD-L1 compared to LAC. (Table 3)

Table 3. Distribution of PD-L1 expression according to type of histopathology

Type of histopathology	PD-L1 expression				P	PR (CI95%)
	High		Low			
	n	%	n	%		
LSCC	13	76,5	4	23,5	0,043	1,954 (1,101-3,469)
LAC	9	39,1	14	60,9		
Total	22		18			

IV. DISCUSSIONS

In this study, in this study there are differences in PD-L1 expression in LSCC compared to LAC and PD-L1 expression was higher in advanced stage (stage III and IV) compared to low stage (I and II).

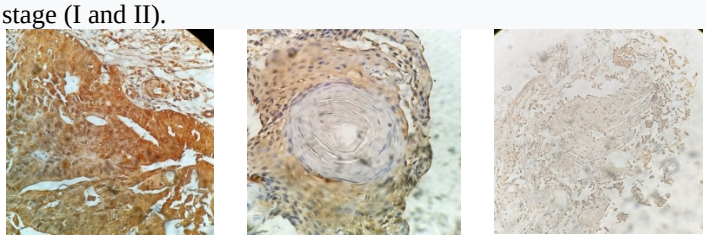

Figure 1. PD-L1 immunostaining intensity in the specimens with +3 (left figure), +2 (central figure) or +1 (right figure). PD-L1 expression was presented at the membrane or / and the cytoplasm.

Lin G et al. found a lower incidence of positive PD-L1 expression in their cohort of patients with early stage NSCLC and showed that the PD-L1 expression is more likely influenced by disease stage, which indicated that the induction of PD-L1 expression was not an initial event in the development of cancer. They also found squamous carcinoma tumors to be strongly associated with PD-L1 expression. The biological determinants

and potential clinical implications of these observations are unknown and require further study.[10]

Janzic et al. observed a significantly higher proportion of PD-L1 positivity among SCC than AC, when considering staining in the TC, whereas PD-L1 positivity in IC is quite high in both histological subtypes of NSCLC. SCC seems to be distinct from non-SCC. That reflects both in high PD-L1 positivity and in steady responses to immune checkpoint therapy across SCC subgroup of patients. One of the possible explanations could be high levels of acquired somatic mutations in SCC patients caused with carcinogens such as cigarette smoke, especially because most of the patients with SCC are smokers.[11]

D'Incecco et al. and Azuma et al. had different results. D'Incecco et al. analyzed PD-L1 expression in SCC and non-SCC was reported on TC positivity rate of 30% and 63%.[12] Azuma et al. analyzed that PD-L1 expression PD-L1 was significantly higher in adenocarcinoma, never smokers, and advanced stage.[9]

In this study, although PD-L1 expression is significantly different in LSCC compared to LAC, but there is no significant relationship in smoking status. We assumed that, there were several patients of lung adenocarcinoma with smoking status in our study, using different antibody and cut-off values. We also found that PD-L1 expression in advanced stage is significantly higher than low stage. And advanced stage is association with poor prognosis.

Based on the results of Azuma et al. and ours are consistent with previous studies showing that high expression of PD-L1 is associated with poor prognosis.[16-18]

V. CONCLUSION

Expression of PD-L1 was significantly different in lung adenocarcinoma than lung squamous cell carcinoma histology (P=0.027), and in those from advanced staging (III&IV) than in those from early staging (I&II) (P=0.033). No significant relationship was found between expression of PD-L1 and smoking status, or tumor location.

ABBREVIATIONS

PD-L1: programmed death ligand 1; NSCLC: non-small cell lung cancer; LAC: lung adenocarcinoma; LSCC: lung squamous cell carcinoma;CPI : Immunotherapy with checkpoint inhibitors; IHC: immunohistochemistry; CI: confidence interval..

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Theoretical Study on the effect of Radon emanation process in soil samples on the absolute efficiency of an HPGe detector

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Abstract- Radium-226 activity is determined by gamma spectrometry, based on the measurement of radon progeny short lived isotopes (^{214}Pb and ^{214}Bi) when Ra-Rn secular equilibrium is reached. Depending on the behaviors of radon emanation from the soil matrix, the homogeneous distribution of these radionuclides in measured soil samples may be lost, which may affect the quality of the obtained results if not taken into consideration. This paper highlights some assumptions regarding the distribution of radon daughters in the soil matrix and their effect on the detection efficiency of an HPGe detector using Mont Carlo simulation code.

Index Terms- Gamma spectrometry, Mont-Carlo simulation, Particle distribution, Radon emanation,

INTRODUCTION

Gamma spectrometry is a useful non-destructive method that is commonly applied to determine, indirectly, the concentration of radium-226 in environmental samples through the measurement of the progeny nuclides of radon isotopes [1]. The progeny of the radon isotope that is commonly used to determine its concentration is composed of the two short lived ^{214}Pb and ^{214}Bi radionuclides with corresponding gamma energy line groups of 295.0 , 352.0 and 609.0 1120.0 , 1764.0 keV; respectively.

The importance in the measurements of radon isotopes lies in their detrimental effect on human. Since they occur in nature, man has always been exposed, mainly through inhalation of their decay products. Radon is released to the atmosphere through three modes namely; i) emanation: as its atom emanated from radium decay is escaping by recoil energy into the pores of the grains; ii) transport or diffusion: which is the diffusion flow that causes the movement of radon atoms to ground surface and iii) exhalation: where the transported atoms are exhaled to the atmosphere [2]. The most important factor relating to radon concentration is the emanation coefficient which is the fraction of radon that reaches the pore space. It depends on different factors such as crystalline structure, grain size and moisture contents [374]. The values of emanation coefficient vary from 1% to 50% over a wide range of materials, conditions, definitions and measurement methods [5&6]. The radon exhalation from soil surface is affected by the soil's characteristics like radium contents, the internal structure, grain size, porosity, permeability and the emanation coefficient, etc.[7]

For the determination of emanation coefficient of ^{222}Rn using gamma spectrometry, the sample is sealed in a container and the count rates from ^{214}Pb or ^{214}Bi gamma lines are measured at the time of sealing and after the establishment of radioactive equilibrium between ^{226}Ra and its progeny (28 days) [8].

Several techniques are used to determine the emanation factor and the effective ^{226}Ra activity from ^{222}Rn exhalation [9&10]. Two main approaches use a time varying mean ^{222}Rn concentration approximation in a confined atmosphere [11&12].

The emanation coefficient "*E*" is calculated from the following equation [8]:-

$$E = \frac{N_{eq} - N_{\circ}}{N_{eq}} \text{---------} (1)$$

Where Neq is the specific counts selected from peaks of ^{214}Pb and ^{214}Bi in equilibrium condition; and *N0* is the number of counts corresponding to *Neq* in initial condition.

Based on the mentioned modes of Rn gas in the soil matrix, there are three probabilities for the existing the radon atoms in the soil where:-

1- Emanation of radon from radium nuclides without transport,
2- Emanation and transport of radon through the grain pores,
3- Emanation, transport and exhalation of radon to the adjacent atmosphere,

The activity concentration of Radium in soil, in the absence of radon transport can be calculated as [13&14] :-

$$C_{Ra-226,228} = \frac{C_{Rn-222,220}}{f * \rho_s * \epsilon^{-1} * (1-\epsilon)} * (\mu[k_T - 1] + 1) ----(2)$$

Where
CRn-222,220 : is the radon, thoron concentration in soil (Bq/m^3)

CRa-226,228: is the activity concn. in dry mass of ^{226}Ra,^{228}Ra in soil (Bq/kg),
f: is soil emanation factor: radon (0.2) and thoron (0.1),
ρ_s :is the density of soil, (kgm^{-3}),
ϵ : is the porosity, (0.25),
μ: is the porosity fraction that is water filled and is zero if the soil is dry
k_T : is the radon partition coefficient between water and air phases and if the soil samples are dried before measurement, then m is zero.

By normal gamma spectrometry where the calculation is fully based on the emanation of radon gas from radium and assuming complete homogeneous distribution of the decayed atoms on the soil matrix of the sample, the activity concentration of radium (Bq/kg) is calculated through the following equation [15]:-

$$A_{Ra} = \frac{\text{Net count}_i}{\varepsilon * T * m * B.R.} ----(3)$$

Where
Net counti : is the net count under peak area of radon progeny gamma line (i)
ε: is the efficiency of gamma spectrometry
T : is the total time of counting
B.R. : is Branching ratio of the selected gamma line
m: is the mass of the sample (kg)

This work is highlighting the effect of the other two radon modes in the soil matrix (namely, the transport and the exhalation), where the radon atoms transferred to the adjacent atmosphere and the decayed progeny is deposited on the surface of the sample, which leads to a non-uniform distribution of the atoms on the soil matrix of the sample. The absolute efficiency of the gamma detector was estimated for two assumptions i) uniform distribution of radon progeny in the soil matrix and ii) deposition of radon progeny on the surface of the soil sample. The study was carried out using the general Mont Carlo Code MCNP5 for the two assumptions considering the same properties of the soil sample as well as the same setup configuration of the modeled problem.

I. Material and Methods

The effect of different distributions of radon daughters in soil samples on the absolute efficiency of an HPGe detector was studied. The study was carried out on different soil samples using the MCNP5 general MC Code [16&17].

- ***Modeled Samples***

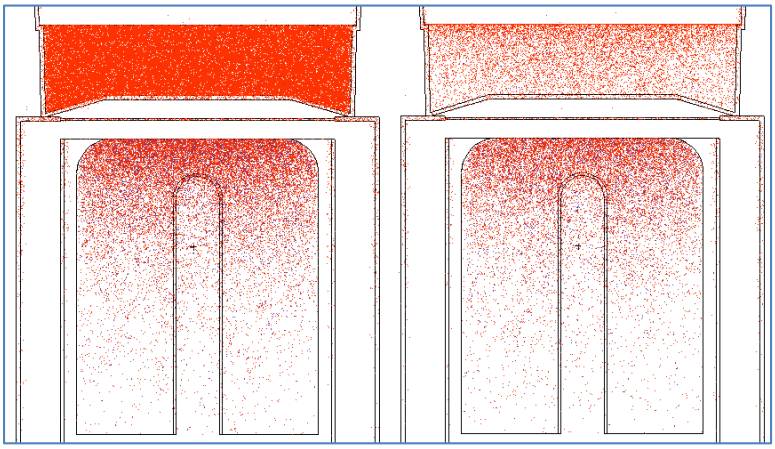
Three different samples were modeled in this study. The sample characteristics were assumed to be identical except for material composition and density. The model was applied to the IAEA reference materials RGU, 375 and soil 6. The activity concentrations of ^{226}Ra in the selected samples as well as their densities are illustrated in table (1) [18&19]. All samples were assumed to have the same volume (70 cm^3), and kept in polyethylene containers with the same shape and dimensions. The radon daughters that were considered in this study are ^{214}Pb and ^{214}Bi with corresponding gamma energy groups of 242.0, 295.0, 352.0 ,768.7keV and 609.0 ,665.4,1120.0, 1764.0 keV, respectively. The study includes two assumptions where; i) there is a homogenous distribution of the decayed isotopes on the whole volume of the sample (referred to volume source) and ii) there is a non-uniform distribution of the decayed isotopes where they will remain on the surface of the sample (referred as surface source).

- ***Monte Carlo Simulation***

Monte Carlo Calculations were performed using the MCNP5 Code to calculate the absolute full energy peak efficiency for an HPGe detector. The calculations were performed to investigate the effect of radon daughters' distribution on the accuracy of measurements. The samples were modeled according to the above mentioned assumptions. The material compositions were modeled using material cards based on data given in the references [19&20]. The fine details of the sample container and detector type and model as given in figures 1 and 2 are described elsewhere [21]. Source definition cards (SDEF) were specified to describe two cases i) volume source for which the modeled isotopes were assumed to be uniformly distributed over the whole sample volume and ii) surface source for which the isotopes were assumed to be distribute on a very thin layer on the surface of the sample. The particle display feature in the MCNP5 code is used to illustrate the two cases as shown in figure 1. The number of histories was chosen (1E7) to keep the uncertainty in MC calculations always less than 0.5%.

Table (1) : The activity concentration of ^{226}Ra in IAEA reference materials

Sample Name	Density (Bq/kg)	Type	^{226}Ra Activity (Bq/kg)
RGU	1.23	Uranium ore	857.0E+3
Soil -6	1.19	Soil	79.92±
IAEA-375	1.28	Sediment	20.0

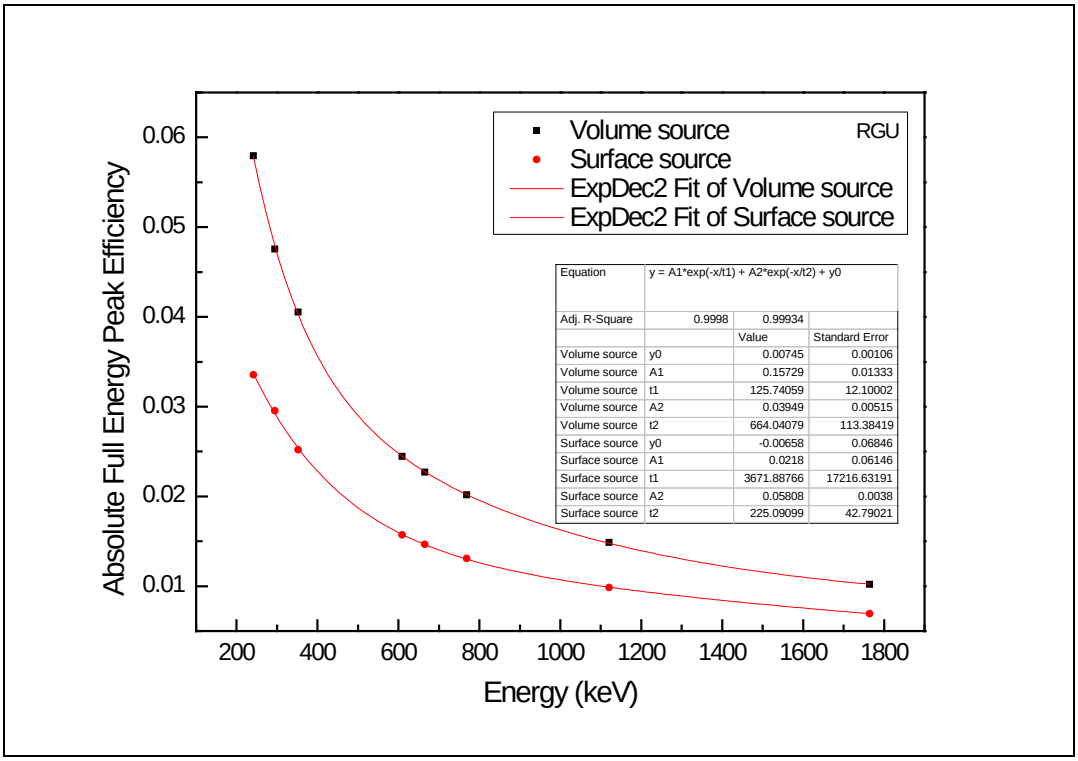


(a) (b)

Figure 1. Particle display illustrating (a) volume source and (b) surface sources

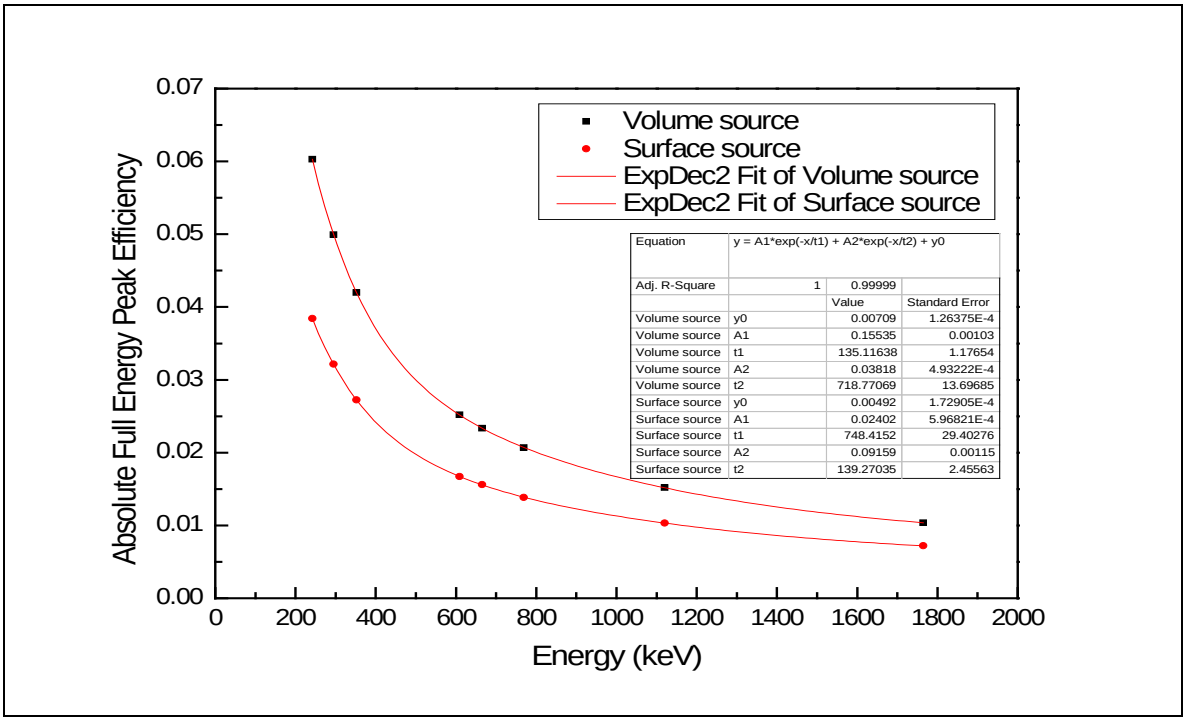
II. Results and Discussion

The difference in the efficiency of gamma spectrometer based on HPGe detector due to the distribution of radon progenies was carried out. Figures 2,3&4 illustrate the differences in the detector efficiency depending on the volume source and surface source for the selected reference samples .



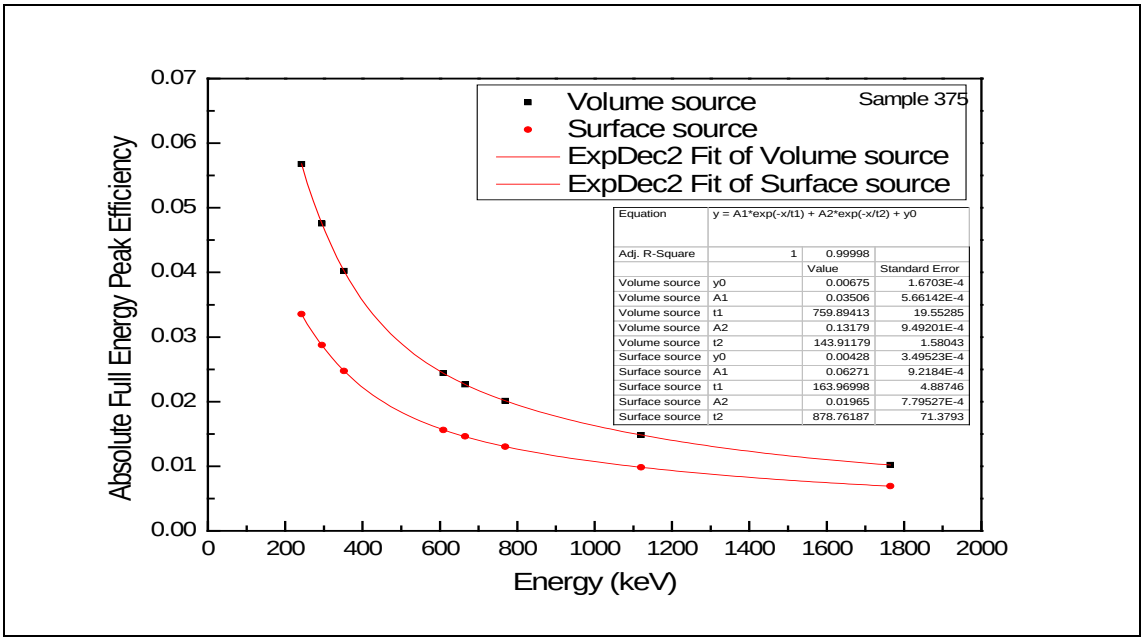
Equation	y = A1*exp(-x/t1) + A2*exp(-x/t2) + y0		
Adj. R-Square	0.9998	0.99934	
		Value	Standard Error
Volume source	y0	0.00745	0.00106
Volume source	A1	0.15729	0.01333
Volume source	t1	125.74059	12.10002
Volume source	A2	0.03949	0.00515
Volume source	t2	664.04079	113.38419
Surface source	y0	-0.00658	0.06846
Surface source	A1	0.0218	0.06146
Surface source	t1	3671.88766	17216.63191
Surface source	A2	0.05808	0.0038
Surface source	t2	225.09099	42.79021

Figure 2. The detector efficiency differences in RGU-1



Equation	y = A1*exp(-x/t1) + A2*exp(-x/t2) + y0		
Adj. R-Square	1	0.99999	
		Value	Standard Error
Volume source	y0	0.00709	1.26375E-4
Volume source	A1	0.15535	0.00103
Volume source	t1	135.11638	1.17654
Volume source	A2	0.03818	4.93222E-4
Volume source	t2	718.77069	13.69685
Surface source	y0	0.00492	1.72905E-4
Surface source	A1	0.02402	5.96821E-4
Surface source	t1	748.4152	29.40276
Surface source	A2	0.09159	0.00115
Surface source	t2	139.27035	2.45563

Figure 3. The detector efficiency differences in Soil-6



Equation	y = A1*exp(-x/t1) + A2*exp(-x/t2) + y0		
Adj. R-Square	1	0.99998	
		Value	Standard Error
Volume source	y0	0.00675	1.6703E-4
Volume source	A1	0.03506	5.66142E-4
Volume source	t1	759.89413	19.55285
Volume source	A2	0.13179	9.49201E-4
Volume source	t2	143.91179	1.58043
Surface source	y0	0.00428	3.49523E-4
Surface source	A1	0.06271	9.2184E-4
Surface source	t1	163.96998	4.88746
Surface source	A2	0.01965	7.79527E-4
Surface source	t2	878.76187	71.3793

Figure 4: The detector efficiency differences in IAEA-375

The average differences in the detector efficiency were found to be 36.23% (32.1%-42.1%), 33.7% (30.6% -36.2%) and 36.4% (32.1%- 40.9%) based on the data of RGU-1, soil-6 and IAEA-375 respectively.

It is clear from the three figures that the same trend is repeated for which the maximum efficiency differences occurs at low gamma energies, while they reduce gradually as energies increase. Three essential factors could effectively contribute to such differences. The fractional solid angle of the source subtended by the detector is the main factor [15&22]. An estimation of the differences in such geometry factor showed a value of about 29%. The other two factors, namely, material composition and density are responsible for the rest of differences.

In our study the effect of material composition and density are constant for each sample while the effect of the distribution of radon daughters on the soil matrix is examined.

For surface source the gamma self-attenuation is expected to be relatively high in comparison with volume source, since the all gamma rays have to cross the whole thickness of the sample before falling on the detector. The lower the energy of gamma rays, the higher the self-attenuation effect as it is clear from the figures.
Only two extreme cases were considered in this investigation, in which all the daughter nuclides of the emanated radon particles are either distributed homogeneously in the soil matrix, or they distributed on the surface of the sample due to complete exhale of emanated radon to the adjacent atmosphere. The results showed the importance of taking the emanation coefficient and exhalation flux calculations into consideration while performing gamma ray measurements on samples containing radon and radon daughters**.**

III. Conclusion

Modeling of the two assumption related to the behavior of radon gas on the soil matrix was carried out where there is a homogeneous distribution of the radon decay products on the soil matrix based on the emanation process of radon from radium atoms (referred as volume source), and the other is a non-uniform distribution of radon's progeny on the soil matrix based on the exhalation of radon gas from the soil matrix to the sample volume's atmosphere and re-deposition of the radon progeny on the surface of the soil (refereed as surface source). The results of the two assumptions showed that there are big differences in the absolute efficiency of the detector. The study highlighted that during the determination of ^{226}Ra through the short lived daughters of ^{222}Rn gas by gamma spectrometry; it is very important to take into considerations the behavior of radon emanation from the soil sample before measurements. Suggestion for using packed sample without volume space may increase the homogeneity of the nuclides on the soil matrix. Comprehensive study on the calculation of emanation coefficient and radon flux in soil samples and study their effect on the calculation of the detector efficiency is recommended.
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The Rare and Endemic Plants in Mountain and Foothill Territories of Kashkadarya Basin

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Abstract- This article involves the information on the level of degradation of vegetation communities spread in the upper parts of mountain and foothill territories of Kashkadarya basin. So, the list of rare and endemic species is also reflected in the article.

Index Terms- plant community, degradation, relief, endemic, rare, soil cover, ecological factor, edificatory, transformation, district.

I. Introduction

The Kashkadarya region includes of Karshi depression in southern Uzbekistan, bordered in the north by the mountains of Koratepa, Zirabulok, Ziyevuddin, in the east - by the foot of the southwestern part of the Gisar ridge [2]. As a result of the study, we analyzed a plant of mountain pastures and determined the current state of pastures in the Kashkadarya basin. The territory belongs to the temperate climatic zone. The climate is dry continental with long, hot and dry summer season; the winter season is short with mild frosts and little snow. The average annual temperature is 13˚ C - 14˚ C, the average temperature of January is 0˚ C - 2˚ C, average temperature of the July is 26˚ C - 28˚ C, the annual precipitation is 400 - 600 mm [12]. Restoration of the semi-arid shrub-steppe ecosystem has gained increasing attention over the last 20 years. This is the result of growing recognition of the values intact shrub-steppe ecosystems provide to communities. Soil stabilization may be the highest value of intact shrub steppe [9]. Intact shrub-steppe ecosystems also moderate wildfire spread, while disturbed shrub-steppe ecosystems dominated by invasive cheat grass (*Bromus tectorum*) cause increased fire frequency and intensity. In addition to increasing risk to lives and property, increased fire causes further loss of big sagebrush (*Artemisia tridentata*), the dominant plant in this ecosystem [11]. Intact shrub-steppe with sagebrush is needed as habitat for a number of birds [10], such as the sage grouse [1], which is now rare. Highly diverse communities dominated by native plant species are likely to be more productive [7] and thus support more diverse wildlife.

II. RESULTS AND THEIR DISCUSSION

One of the urgent tasks is to determine the level of change in anthropodynamic varieties (vegetation, degradation) of vegetative communities, which spreading in mountain and foothills areas of the Kashkadarya basin at a time when environmental tensions continue, including global warming. Because every plant in the nature has its own place, and it participates as a link in a food chain. Especially the age of endemic plants is divided into periods and stages, that is, the age and type of species should be subdivided. By the way information will be formed about their reserve potential. Mountain and foothills pastures' levels of degradation can be determined by drawing up a map for this region.

The map of the pastures is a scientific document, consisting of a geobotanical content of the district pastures, a combination of the distribution law, the area, the ecological status, the degree of distribution, the availability of the season. This map can be used to plan pastures, use plant raw materials, and protect nature conservation[6]. The relative importance of particular environmental variables for a species may vary according to the geographic and biotic contexts [8]. So there we can see the ecological niche. In our research area the level of ecological niche is declining due to there is no information about vegetation periods of plants in some people where they can pick vegetable bulb of plants.

It is important to analyze the distribution of endemic plants in the regions where we conduct scientific research. There are about 70 endemic, rare and relict species in the flora of Kashkadarya basin. Looking at the world's flora, endemic plants in Hawaiian Islands are 82-90%, New Zealand's – 72% and Madagascar – 60-65%. The decline in endemic plants is primarily due to the effects of environmental factors, on the other factor, because of non-observance of the protection measures. The list of rare and endemic species, spread in mountain and foothills of Kashkadarya basin is discussed.

Endemic plants with restricted and/or fragmented range often grow in stressful conditions. Their populations usually are characterized by unique internal organization, structure, morphology, and other biological features. Any anthropogenic impact (pollution, grazing, farming, recreation, etc.) exerts extremely negative influence on these populations, and can lead to their reduction or even extinction. For example, S. lilacinocoerulea is a perennial herbaceous plant 10 - 40 cm high growing on red beds, stony slopes and eroded clay soils among sparse juniper forests in the middle mountain belt (Figure 1) [13]. Considering these data, we conducted the research analyzes in Dehkanabad and Chirakchi district mountain ranges, including of Kashkadarya basin. According to research materials we defined the following plant species in the territories of mountain and

foothills in Table-1.

Figure 1. Typical habitat of *S. lilacinocoerulea*.Western spurs of the Hissar ridge, surroundings of the pass Tally. Photograph by N.Yu. Beshko.

Table-1
Rare and endemic species, spread in mountain and foothill areas of Kashkadarya basin

T/p	Endemic species	Status
1		
2	Astragalus komarovii	Rare
3	Astragalus massagetovii B. Fedtsch.	Rare, endemic
4	Astragalus leptophysus Vved.	Relict, endemic
5	Astragalus terrae-rubrae Butkov	Endemic
6	Astragalus butkovii	Rare, endemic
7	Calophaca reticulata Sumnev.	Endemic
8	Cicer incanum Korotkova	Endemic
9	Oxytropis tyttantha	Endemic
10	Hedysarum bucharicum	Rare
11	Hedysarum amankutanicum	Endemic
12	Hedysarum magnificum Kudr.	Endemic
13	Eversmannia botschantzevii Sarkisova	Endemic
14	Heliotropium bucharicum B. Fedtsch.	Endemic
15	Gladiolus italicus Mill.	Rare
16	Iris magnifica	Endemic

17	Iris svetlanae (Vved.) F. O. Khass.	Endemic
18	Ferula sumbul	Endemic
19	Ferula pratovii F.O.Khass. et I. I. Malzev	Rare, endemic
20	Ferula fedtschenkoana Koso-Pol.	Rare, endemic
21	Oenanthe heterococca	Endemic
22	Komarovia anisosperma	Rare, relict
23	Zeravschania regeliana Korovin	Endemic
24	Crambe gordjaginii Sprygin et Popov	Endemic
25	Spryginia winklerii (Regel) Popov	Endemic
26	Tulipa micheliana T. M. Hoog	Endemic
27	Tulipa korolkowii	Endemic
28	Tulipa affinis Botschantz.	Rare, endemic
29	Tulipa fosteriana Irving	Endemic
30	Tulipa orithyioides Vved.	Endemic
31	Tulipa ingens T. M. Hoog	Endemic
32	Tulipa uzbekistanica Botschantz. et Sharipov	Endemic
33	Colchicum kesselringii	Endemic
34	Spirostegia bucharica (B. Fedtsch.) Ivanina	Endemic
35	Pedicularis grandis Popov ex Vved.	Endemic
36	Euphorbia kudrjaschevii (Pazij) Prokh.	Endemic
37	Haplophyllum bucharicum	Rare, endemic
38	Allochruza gypsophiloides	Endemic
39	Silene popovii	Endemic
40	Silene oreina	Endemic
41	Dianthus uzbekistanicus Lincz.	Endemic
42	Allium botschantzevii Kamelin	Endemic
43	Allium majus	Endemic
44	Eremurus baissunensis O. Fedtsch.	Endemic
45	Eremurus robustus	Endemic
46	Eremurus luteus	Rare
47	Eremurus aitchisonii	Rare
48	Climocoptera pjataevae	Rare, endemic
49	Lagochilus inebrians	Endemic
50	Dracocephalum formosum	Endemic
51	Scutellaria fedtschenkoi Bornm.	Endemic
52	Scutellaria colpodea Nevski	Endemic
53	Phlomoides gypsacea	Endemic
54	Leonurus kudrjaschevii	Endemic
55	Ribes malvifolium Pojark.	Endemic
56	Cousinia allolepis	Endemic
57	Cousinia adenophora	Endemic
58	Cousinia butkovii	Rare
59	Cousinia campyloraphis	Rare, endemic
60	Cousinia spryginii	Endemic
61	Cousinia praestans Tscherneva et Vved.	Endemic
62	Lepidolopha nuratavica Krasch.	Endemic
63	Serratula lancifolia Zakirov	Endemic
64	Tanacetopsis botschantzevii	Endemic
65	Jurinea gracilis	Endemic
66	Jurinea asperifolia Iljin	Endemic
67	Jurinea sangardensis	Endemic
68	Koelpinia leiocarpa	Endemic
69	Aconitum talassicum	Endemic
70	Anemone bucharica	Endemic

We can see on the list of the table - 1, studying of the cenopopulation of these species and their preservation for the variety of flora of the region is one of the main criteria for environmental sustainability and sustainable development. In addition, anthropodynamic rows were also analyzed.

The level of the average degraded area (25-27%), a high degree of degraded area (60-72%), was defined. Population size was determined in each of them [3,5].

As a result of research which we conducted in Chirakchy district, 5 species of plants were identified on the area of $1m^2$. Poa and Carex, which is considered a good forage, are 10.2 grams, the remaining plants are 31.6 grams and they are plants which livestock badly eat the plants [4].

III. CONCLUSION

In conclusion, it can be said that in many pastured pastures, it was determined that the edificator species (Agropyron, Poa) were in the senile period, and regressive states were studied. When their yields were studied, the reproduction of the seeds is almost impossible. These vegetation communities were more transformed and these were observed in the districts of Chirakchy and Dehkanabad. Hence, the degree of degradation depends on the number of seeds in the soil, productivity and cenopopulation times and stages.

In order to prevent and minimize the process of degradation, there not to exceed the number of livestock and there is a need to change pasture lands. For this reason, it is necessary to develop methodological guidelines on the vegetative process of plants. For this purpose, it is necessary to introduce ecological science at schools, lyceums and colleges as the science, as well as to learn ecological concepts, use ecological projects for the pupils and organize the ecological pathways are today's main issues.

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Evaluation of Nutritional, Physico-chemical and Sensory Properties of Jackfruit (*Artocarpus heterophyllus*) Incorporated Frozen Yoghurt

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Abstract- The study was conducted to develop frozen yoghurt, flavoured with jackfruit pulp. Sensory data revealed that, the sample incorporated with 15% jackfruit pulp had the best qualities. Protein content of all jackfruit pulp incorporated frozen yoghurts was significantly higher ($p < 0.05$) and their fat content was significantly lower ($p < 0.05$) compared to the control. Significantly higher ($p < 0.05$) overrun was observed in the frozen yoghurt containing 20% of jackfruit pulp compared to the control. Titratable acidity increased and pH decreased in all samples during the storage. Though total plate count of all jackfruit pulp incorporated frozen yoghurts increased upon storage, it was less than that of the control. *Escherichia coli*, yeast and mould were not detected for a period of 35 days at frozen storage. In conclusion, physicochemical, microbiological, and sensory properties of frozen yoghurt improved significantly by adding jackfruit pulp at rate of 15% (w/w).

Index Terms- Frozen yoghurt, Jackfruit, Quality evaluation, Value addition

I. Introduction

Cow milk contains high uality proteins with a good balance of all essential amino acids and minerals, especially calcium and phosphorous than human milk (FAO, 2013). Milk obtained from dairy cows can be processed to produce various fermented dairy products such as curd, cheese, and yoghurt (Saarela, 2014). Yoghurt is one of the most popular fermented dairy products which has a wide acceptance worldwide as its nutritional and health benefits are well known for centuries. The origin of yoghurt is dated back to the 6000 B.C. (Igbabul and Shember, 2014).

Frozen yoghurt is a unique dairy product with physical properties related to ice cream while nutritional and sensory characteristics are similar to fermented dairy products (Desai *et al.*, 1994). Its process consists in mixing all ingredients to make natural stirred yoghurt with stabilizers/emulsifiers and sugar, then freezing the mix in a conventional ice cream freezer (Tamine and Robinson, 2007). Frozen yoghurt has evolved when the consumer started preferring low acidic foods over high acidic foods in late 1970s (Muzammil *et al*., 2015). Now frozen yoghurt popularity has increased and continues to grow making it one of the most frequently consumed frozen desserts around the world. Consumers are interested to the frozen yoghurt as a dessert because it is a low-fat replacement for ice cream and it has probiotic benefits of the live cultures present in the yoghurt (Davidson *et al*., 2000).

Jackfruit is a high yielding crop which bears fruits all over the year with peak production during the months of June and December. Jackfruit is consumed both as a vegetable in the unripen stage and also as a fruit when ripen (Jagadeesh, 2007). The pulp of jackfruit contains 74% of water, 23% of carbohydrates, 2% of protein and 1% of fat. Also 100 g of raw jackfruit portion provides 400 kJ (95 kcal) (Jetro, 2010). It is a rich source of vitamin B and C, potassium and phytochemicals including phenolic compounds (Jagtap and Bapat, 2010).

Addition of fruit pulp into frozen yoghurt may increase its beneficial and nutritional effects on the host. Also, it may increase the consumer's attractiveness towards the frozen yoghurt. In many cases, the plain frozen yoghurt is served by adding various toppings made from fruits. But incorporation of a fruit pulp into the frozen yoghurt will be a new approach for adding flavours to the frozen yoghurt. Moreover, it will be a solution for the people who do not like the flavour of plain frozen yoghurt. Therefore this study was conducted to develop frozen yoghurt and to determine the effect of addition of jackfruit pulp on the physicochemical, sensory and microbiological characteristics of frozen yoghurt.

II. MATERALS AND METHODS

This research study was conducted at the Dairy Science Laboratory, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura.

Materials: Fully matured Jackfruits were collected from Puliyankulama area and Fresh cow milk was obtained from the Dairy farm of Faculty of Agriculture, Rajarata University of Sri Lanka. Starter culture and stabilizer/emulsifier were purchased from Pettah essence at Colombo. Sugar, skim milk powder and gelatin were purchased from Cargills food city at Anuradhapura**.**

Milk composition: Composition of fresh cow milk was measured using milk analyzer. The total solid content of milk was measured by using oven dry method (AOAC, 2003). Temperature, specific gravity and pH of the milk were measured by using thermometer, lactometer (Fssai, 2015) and pH meter (Eutech700, USA) respectively.

Preparation of jackfruit pulp: Fresh well ripen jackfruit were peeled out and seeds were removed. The flesh was washed well and cut into small pieces. Then they were blended to make the pulp and the pulp was pasteurized at 70°C for 10 minutes in water bath.

Analysis of jackfruit pulp: Total soluble solid content and pH of the pulp were measured using refractometer and digital pH meter respectively (AOAC, 2003).

Preparation of plain yoghurt: Fresh cow milk was standardized up to 2.5% of fat, and it was heated to 60°C and homogenized about 15 minutes. Then sugar and gelatin were added and milk was pasteurized at 85ºC for 5 minutes. Then the mixture was cooled to 45°C and it was inoculated with 0.03% starter culture. The inoculated yoghurt mixture was poured into plastic cups and they were incubated at 45°C for 6 hours. Then, they were cooled rapidly to 4°C.

Preparation of ice cream mixture: Fresh cow milk was standardized up to 2.5% fat. Then it was heated to 60°C and homogenized about 15 minutes. Then milk was pasteurized at 85ºC for 5 minutes after adding sugar, butter, skim milk powder and emulsifier/stabilizer. Thereafter mixture was cooled to 10°C and it was aged about 18 hours at 4°C.

Preparation of frozen yoghurt incorporated with jackfruit pulp: Prepared plain yoghurt mixture and ice cream mixture were mixed well **(**75% yoghurt and 25% ice cream (w/w)). Then jackfruit fruit pulp was added at the rate of 10%, 15%, and 20% (w/w) separately. The final mixture was homogenized for 5 minutes in constant stirring. Then it was aerated and frozen in an ice cream maker about 15 minutes. Finally the mixture was poured into plastic cups and they were kept at -18°C until further analysis was carried out. Plain frozen yoghurt was made as the control without adding jackfruit pulp.

Sensory evaluation of frozen yoghurt incorporated with jackfruit pulp: Sensory evaluation was conducted using nine point Hedonic scale to evaluate colour, aroma, taste, texture, meltability and overall acceptability of the samples using 50 untrained panellists. The samples were served in white colour cups with randomly selected three digits numbers (Syed and Babar, 2018).

Chemical analysis of frozen yoghurt incorporated with jackfruit pulp: Fat, fibre, ash, dry matter and protein contents were analysed according to the AOAC procedures (AOAC, 2003). Titratable acidity was analysed by titrating the samples with 0.1N NaOH solution (Fssai, 2015). pH level was measured by using digital pH meter (Eutech700, USA). pH and titratable acidity were measured in 7 days time interval for 35 days at frozen storage.

Microbial analysis of frozen yoghurt incorporated with jackfruit pulp: Total plate count, coliform count, yeast and mould count of prepared frozen yoghurt samples were taken. Plate count agar was used to enumerate total bacteria in frozen yoghurt and the plates were incubated at 37ºC for 24 hours. MacConkey agar was used to enumerate coliforms in frozen yoghurt and the plates were incubated at 37ºC for 18 hours. Potato dextrose agar was used to enumerate yeast and mould counts in frozen yoghurt and the plates were incubated at 25ºC for 5 days. Spread plate technique was used for enumeration and colonies were counted manually.

Testing overrun of frozen yoghurt incorporated with jackfruit pulp: Overrun of prepared frozen yoghurt samples were tested by using the method described by Abdelazez *et al*. (2017).

Data analysis: Treatments were arranged according to the Complete Randomized Design (CRD) with four replicates. Parametric data were analysed using one way Analysis of Variance (ANOVA) procedure in Statistical Software for Data Analysis (SAS) software package version 9.0 (SAS, 2002) with 95% confidence interval. Data from sensory evaluation were analysed using Friedman non-parametric test in MINITAB software package version 17.1.0 (Minitab, 2010) with 95% confidence interval.

III. RESULTS AND DISCUSSION

Physio-chemical parameters of cow milk: Table 1 shows the physiochemical parameters of raw cow milk samples used for the production of yoghurt mixture and ice cream mixture. The high fat content and low protein content were observed in the milk with compared to the values found by Lampert (1970). Composition of cow milk may change with many factors such as diet of the cow, breed, age, lactation period, health conditions, and environmental conditions. Anyhow the observed values are in concordance with the accepted values for the cow milk composition.

Table 1: Physico-chemical parameters of raw cow milk

Milk composition	Value
Fat (%)	4.42 ± 0.36
Solid nonfat (%)	3.21 ± 0.18
Total solid (%)	7.61 ± 0.47
Protein (%)	2.80 ± 0.07
Lactose (%)	4.19 ± 0.1
Specific density (gm^{-3})	25.84 ± 0.001
pH	6.59 ± 0.06
Acidity %	0.15 ± 0.04

Data are presented as means±SD

Physico-chemical parameters of jackfruit pulp: Table 2 shows the physicochemical parameters of the jackfruit pulp used for the production of jackfruit incorporated frozen yoghurt. It contained more moisture than total solids. These results are in agreement with the findings of Jagadeesh (2007) and Muangwong *et al.* (2013) who reported the chemical composition of jackfruit pulp.

Table 2: Physico-chemical parameters of jackfruit pulp

Physiochemical Property	Value
pH	5.13 ± 0.31
Titratable acidity	0.15 ± 0.05
Moisture Content%	73.45 ± 0.33
Total Soluble Solids	27° Brix ± 0.18

Data are presented as means±SD

Nutritional properties of frozen yoghurt incorporated with jackfruit pulp: Table 3 shows the comparison of nutritional properties of frozen yoghurts incorporated with levels of jackfruit pulp. The fat% of all jackfruit incorporated frozen yoghurts was significantly different from that of plain frozen yoghurt ($p<0.05$). The highest fat percentage was recorded in plain frozen yoghurt. Fat content of frozen yogurt samples decreased with addition of jackfruit pulp. As jackfruit contains very lower amount (0.1-0.4%) of fat (Haq, 2006) and yoghurt and ice cream mix contributes more for the fat% of the final product, addition of jackfruit pulp to the frozen yoghurt may reduce the fat content of frozen yoghurt.

The protein% of all jackfruit pulp incorporated frozen yoghurts was significantly different from the plain frozen yoghurt ($p<0.05$). But there was no significant difference in the protein content among the jackfruit pulp incorporated frozen yoghurts ($p>0.05$). The highest protein% was noted in the frozen yoghurt containing the highest jackfruit pulp percentage. Increased concentrations of jackfruit pulp in the frozen yoghurt increased the protein content. A similar trend is reported by Sarmini *et al*. (2014) who studied the quality of jackfruit pulp added set yoghurt.

Ash content and the fibre content of the frozen yoghurts containing 15% and 20% of jackfruit pulp only showed a significant difference ($p<0.05$) with the plain frozen yoghurt. No significant difference ($p>0.05$) in ash content was observed among the jackfruit

pulp incorporated frozen yoghurt samples. Fibre content of the frozen yoghurt containing 10% of jackfruit pulp was significantly different from that of frozen yoghurts containing 15% and 20% of jackfruit pulp. These results showed that both ash and fibre contents increased with the addition of more jackfruit pulp. It may be due to the jackfruit is a good source of fibre. El-Bakri *et al.,* (2015) also reported that fruit added yoghurts contain higher fibre content than plain yoghurts.

There was a no significant ($p>0.05$) difference in dry matter content of all treatments. In the other hand incorporation of jackfruit pulp at a rate of 10, 15 and 20% had not a significant effect on the dry matter content of frozen yoghurts. But the highest dry matter content was noted in the frozen yoghurt incorporated with the highest jackfruit pulp concentration. These results are not in agreement with the findings of ozturk and Akyuz (1995). Because they observed that adding fruit pulp could increase the dry matter content of frozen yoghurt.

Table 3: Nutritional properties of frozen yoghurt incorporated with different levels of jackfruit pulp

Treatment	**Fat%**	**Protein%**	**Ash%**	**Dry matter%**	**Fibre%**
T1 (0%)	8.47 ± 0.50^{a}	4.85 ± 0.35^{b}	1.40 ± 0.41^{b}	31.21 ± 0.11^{a}	1.99 ± 1.36^{b}
T2 (10%)	5.30 ± 0.53^{b}	5.84 ± 0.12^{a}	2.29 ± 0.17^{ab}	30.81 ± 0.53^{a}	2.38 ± 0.63^{b}
T3 (15%)	3.59 ± 0.39^{c}	5.93 ± 0.39^{a}	2.55 ± 0.26^{a}	30.87 ± 1.12^{a}	9.83 ± 0.98^{a}
T4 (20%)	3.50 ± 0.15^{c}	6.01 ± 0.12^{a}	3.20 ± 0.46^{a}	31.34 ± 0.11^{a}	10.94 ± 1.93^{a}

Data are presented as means±SD
a, b, c, d means, within the same column with different superscripts are significantly different ($P < 0.05$)

Shelflife of jackfruit pulp incorporated frozen yoghurt: Shelflife of all the products was detrmined by measuring the variations in pH, titratable acidity and mirobial counts (total plate count, yeast and mould and coliforms) throughout the storage period of 35 days. During the storage period, pH of all frozen yoghurt**s** gradually decreased showing increase in acidity (Figure 1). These observations are in agreement with the previous research findings (Obi *et al*., 2010). The plain frozen yoghurt had the highest initial pH value. Jackfruit incorporated frozen yoghurts possessed lower pH values compared to the control. Normally pH of yoghurt decreased during storage due to post-acidification because of the accumilation of lactic acid (Tamime and Robinson, 2000). Anyhow the pH reduction was drastic in plain frozen yoghurt compared to the jackfruit pulp incorporated frozen yoghurts. It may be due to the heat treatment given to jackfruit pulp before incorporating into the frozen yoghurt which might result in reduced microbial growth.

Figure 2 shows the variation in titratable acidity of jackfruit incorporated frozen yoghurts with storage time period. The initial titratable acidity of all treatments was almost same and during the storage period, titratable acidity of all frozen yoghurt samples increased. The plain frozen yoghurt sample had the highest acidity at the end of storage period. The increase in titratable acidity values could also be attributed to the activity of lactic acid bacteria which usually convert lactose in to lactic acid (Temesgen, 2015). Acidity is one of the most important quality parameter for the yoghurt related products which is important for the palatability, shelf-life and consumer acceptance of the product (Sarmini *et al*., 2014).

During the storage period of 35 days, coliform, yeast and mould were not detected in all frozen yoghurt samples. But Total Plate Count (TPC) of all frozen yoghurt samples increased with the time (Table 4). The highest initial TPC was recorded by the plain frozen yoghurt sample and its TPC was comparatively high even at the end of storage period. With addition of jackfruit pulp, TPC reduced. This may be due to the high acidity of jackfruit pulp. But there are no standards used in Sri Lanka for the frozen yoghurt yet.

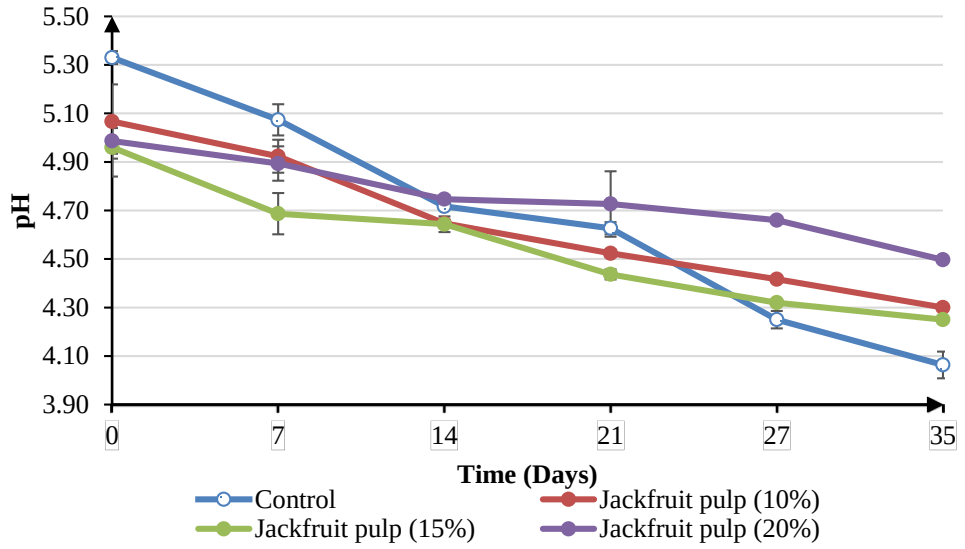

Figure 1: Variation in pH of frozen yoghurt incorporated with different levels of jackfruit pulp during 35 days of storage

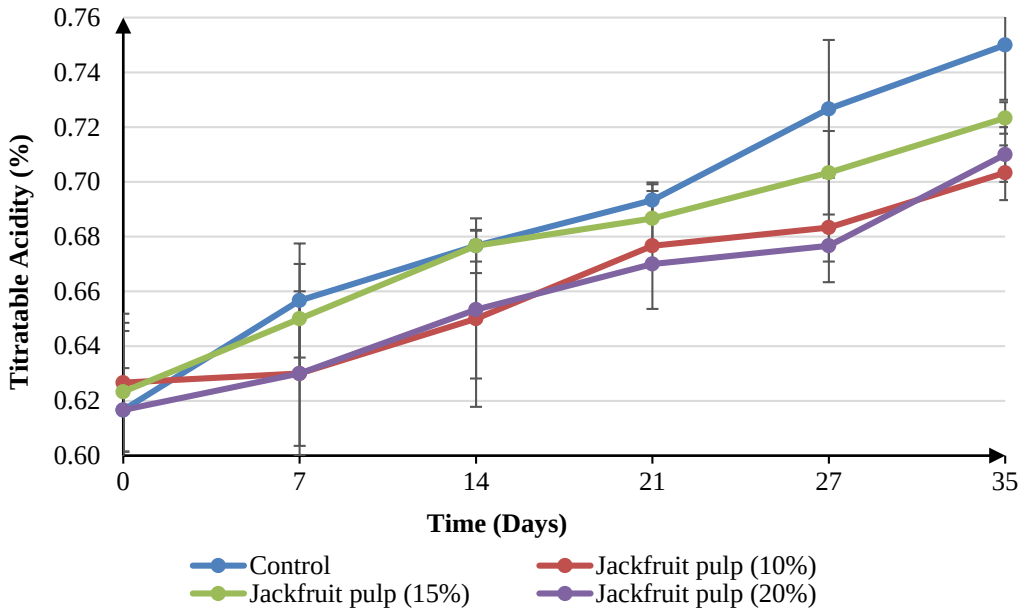

Figure 2: Variation in titratable acidity of frozen yoghurt incorporated with different levels of jackfruit pulp during 35 days of storage

Table 4: Variation of total plate count of frozen yoghurts incorporated with different levels of jackfruit pulp during 35 days of storage

Treatment	**Time (Days)**					
	1	7	14	21	27	35
T1 (0%)	8.90 ± 0.3	9.10 ± 0.2	9.50 ± 0.2	9.80 ± 0.2	10.00 ± 0.1	11.40 ± 0.1
T2 (10%)	8.00 ± 0.1	8.40 ± 0.1	8.70 ± 0.1	9.00 ± 0.2	9.40 ± 0.1	10.20 ± 0.1
T3 (15%)	7.60 ± 0.1	8.00 ± 0.3	8.40 ± 0.1	8.80 ± 0.1	9.00 ± 0.3	9.50 ± 0.3
T4 (20%)	7.00 ± 0.1	7.50 ± 0.1	7.80 ± 0.1	8.50 ± 0.2	8.80 ± 0.1	9.10 ± 0.2

Data are presented as means ±SD, (x 10^8) CFU/g

Sensory evaluation: The frozen yoghurt containing 15% of jackfruit scored best for all the sensory attributes except the meltability (Figure 3). Further, colour, taste, texture, meltability, and overall acceptability of prepared frozen yoghurts had significant difference ($P<0.05$) among the treatments. But aroma was not observed to be significantly different ($P>0.05$) among the treatments.

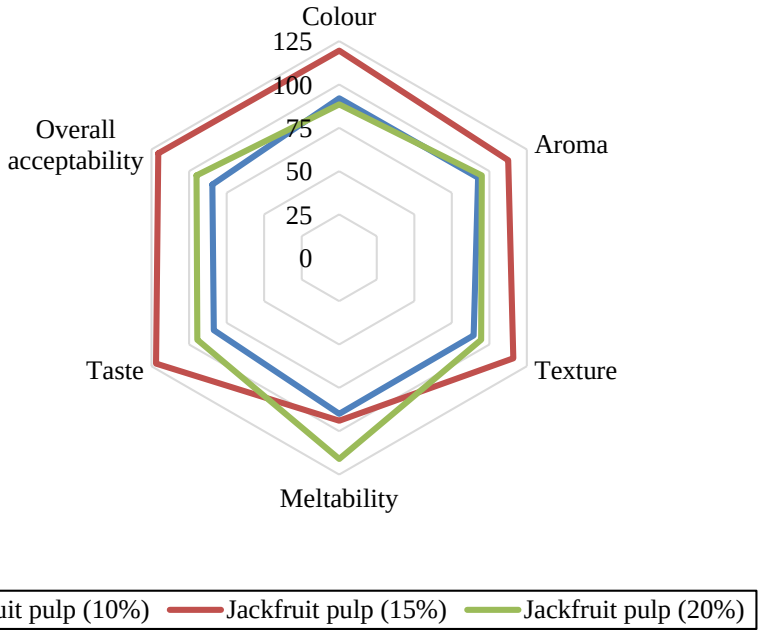

Figure 3: Sensory properties of frozen yoghurts incorporated with different levels of jackfruit pulp

IV. CONCLUSION

Physicochemical, microbiological, and sensory properties of frozen yoghurt improved significantly by adding jackfruit pulp at rate of 15%. Hence it can be introduced as a value added healthy dairy product. Frozen yoghurt containing 15% of jackfruit pulp had the best sensory properties and the developed products could be stored for 35 days with minimum alterations of microbiological and physicochemical properties.

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The Role of Mahinda thēra as Dīpaprasādaka in Sri Lanka.

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Abstract- Thēra Mahinda is stipulated as Dīpaprasādaka in Sri Lanka. In the Aśōkāvadāna, there is no reference at all of the Mahinda. He was the son of Emperor Aśoka. At the age of twelve years a monk (age of 32) guided by his teacher Moggaliputtatissa, thēra Mahinda visited to Sri Lanka with six other fellows. He introduced the Buddhism to Sri Lank.

Index Terms- introduce, Buddhism, culture, religion

I. Introduction

As depicts in the ***Dīpavaṃsa*** (***D.v***, 1992, 1:27, 119) and the ***Bōdhivaṃsa*** (***Bodi.v,*** 1999:157) Buddha has foreseen and said about King Asoka's son Mahinda, convertor of Laṅkādīpa. The ***Mahāvaṃsa*** describes when the price Aśōka, while ruling over the realm of Avanti, that his father had bestowed on him, halted in the town of Vedisa, before he came to Ujjenī, and where met there a lovely maiden named Devī, the daughter of a merchant, he made her his wife; and she was afterwards blessed with children by him, a son Mahinda, and when two years later born a daughter, Sanghamittā. (***M.v***, 1950, 13:8-11, 88). As stipulated in the ***Mahāvaṃsa*** Devī's farther didn't belong to the clan of kaśtriya. It is understood by the above fact that there is no any heir for kingship to Mahinda. Being the illegitimate son of Aśōka it is quite like that Mahinda preferred to join a religious order rather than be treated indifferently by the court at Pataliputra (Guruge Ananda W.P, 1993:45).

Mahinda was born two hundred and four years after the parinibbāna (***D.v,*** 1992, 6:19, 148). As stipulated in the ***Dīpavaṃsa*** when Mahinda was ten years old, Aśōka put his brothers to death (***D.v,*** 1992, 6:21, 148). Aśōka was anointed for the second time in Mahinda's fourteenth year (***D.v***, 1992, 6:22, 148). ***Mahāvaṃsa*** describes, that since the time of the prince Tissa's pabbajjā, Mahinda looked forward to enter the order. King Aśōka wished to confer on Mahinda the dignity of prince regent (***M.v***, 1950, 5:202, 43). Mahinda received the pabbajjā at the age of twenty (***M.v,*** 1950, 5:204, 43). He received upasaṃpadā ordination on the very same day. Prince Mahinda's master was the thēra Moggali. His pabbajjā ordination was conferred on him by thēra Mahādeva (***M.v***, 1950, 5:207, 44). The thēra majjhantika pronounced the upasaṃpadā ordination. Mahinda reached the statues of an arahant in the very place where he received the upasaṃpadā. He received the pabbajjā in the sixth regnal year of king Dhammāśōka (***M.v,*** 1950, 5:209, 44). The ***Mahāvaṃsa*** further says that Mahinda thēra learned, three piṭaka with his master, in three years (***M.v,*** 1950, 5:210, 44). The thēra Moggaliputtatissa has taught all the Pitaksa, their whole meaning, and the doctrine to Mahinda thera. Ten years after Asoka's coronation, Mahinda had completed four years, and had become a teacher of the whole scriptures as handed down, and he had many pupils (***D.v,*** 1992, 7:27, 156). When thēra Moggaliputta dwelled, all alone on the Ahogaṅga Mountain, he committed his great company of bhikkhus to the direction of thēra Mahinda. It seemed that he was also not been able to control the heretics and their unruliness.

In the ***Aśōkāvadāna,*** on the other hand, there is no reference to this tradition, and no mention at all of the elder Mahinda either. Later in Sanskrit sources, there are references to an elder Mahendra who is perhaps identified with Mahinda and is variously portrayed as a disciple of Ānanda, a contemporary of the Buddha, or a younger brother of Aśōka (Watters, vol 2, 93 & Strong S. John, 1989:16). But in the Aśōkāvadāna, as we have seen, Aśōka's son is called Kunāla, and his story serves to point out the workings of karma in the lives of both the prince and the father (Strong S. John, 1989:25).

II. Xuanzang's records

There is another piece of information which contributes historical facts about Mahendra thēra. Mahendra was the half-brother of Aśōka (mother's brother) (Rongxi Li 1996:92-93). In dress he arrogated the style of the king, he was extravagant, wasteful and cruel. The people were indignant, and the ministers and aged officers complained the king about him. When the king was about to punish Mahendra, he asked an extension of his life for seven days. On this the king placed him in a dark dungeon, and placed over him a strict guard. He was provided with every kind of exquisite mat and every necessary article. On Last day he mounted into the air and exhibited his miraculous powers. Late emperor Aśōka constructed a dwelling place for his brother. Here we are lucky enough to get biographical data of Mahendra thēra, which Vaṃsa tradition does not speak. It is presumably wise to critically analyze all these assertions. One may presumed that, writers of vaṃsa might have purposely, not mentioned the weaknesses of the Mahēndra as he was called as the dīpaprasādaka within the tradition in Sri Lanka.

As in the test the king Aśōka's younger brother, Mahendra has introduced Buddhism to Sri Lanka. According to the vaṃsa tradition, Mahendra was the son of Aśōka. Mahendra had been highly exaggerated in the vaṃsa tradition. As in the Xuanzang's records the king Aśōka's younger brother Mahēndra gave up the (worldly) passions, set (his) mind to the fruit of sainthood,

achieved the six supernatural powers and the eight liberations, walked through the air and travelled to this kingdom in order to propagate the true dharma and to spread the inherited teaching. He further says that, there are several hundred monasteries and more than twenty thousand monks who follow the *dharma* of the Sthavira-nikāya of the Mahāyāna.

Whether Mahinda was a son or a brother of Aśōka neither adds to nor detracts from the prestige of the royal missionary. But Zuanxang, records says that Mahinda was brother of Aśōka. This Chinese traveler is not always reliable recorder especially of places he did into visit. It is quite possible and this need not be disputed that one of Aśōka's brothers also carried the same name (Guruge Ananda W.P, 1993:55). Simhala ***Bōdhivaṃsa*** remarks, the stūpa in Vēdisagiri has been constructed by the Vēdhisa Mahā dēvi alias mother of thēra Mahinda. Having spent one month there thēra Mahinda decided to visit Sri Lanka on the full moon poya day of Poson (***Bodi.v,*** 1999:157). Bhaṇḍuka Upāsaka was the Vēdhisa Devi's sisiter's son (***Bodi.v.***, 1999:157). ***Bōdhivaṃsa*** illustrates that Mahinda thēra arrived Sri Lanka, when two hundred and thirty seventh year elapsed the passing away of the Buddha, when the 18th year elapsed Asoka's anointment, when the seventh months elapsed king Devanampiyatissa's anointment and when the twelfth years elapsed Mahinda thēra's Upasampada (***Bodi.v***, 1999:157).

At the age of twelve years a monk (age of 32) guided by his teacher Moggaliputtatissa, thēra Mahinda visited to Sri Lanka with six other fellows. They are Iṭṭhiya, Uttiya, Sambala, Bhaddasāla, Sanghamittā's son, sāmaṇera Sumana and the son of a daughter of Devi's sister a youth named Bhaṇḍuka. Their inclusion in the party signified, perhaps, a particular intimacy and friendliness towards Sri Lanka. The Youth Bhaṇḍuka was named as Paṇḍupalasa in ***Bōdhivaṃsa*** (***Bodi.v***., 1999:161).

The ***Mahāvaṃsa*** elaborates that Mahinda spent nearly six months in Dakkhṇāgiri to confer on his kinsfolk and he knew that the king in Sri Lanka was old, as such he waited there until his son became the king (***M.v***, 1950, 13: 2, 88).

III. Mahinda thera's visit to Sri Lanka

The ***Mahāvaṃsa*** remarks, the great Indra requested thēra Mahinda to visit Sri Lanka (***M.v,*** 1950, 13:15, 89). According to the ***Dīpavaṃsa*** god śhakra, called Vāsava has invited Mahinda thēra to visit Sri Lanka (***D.v***, 1992:12:30). When the seventh year had elapsed after the coronation of Aśōka, the king Mutasīva died (***D.v,*** 1992, 11:13, 165). Mahinda thēra and his six followers rose up in the air and alighted on the Missaka Mountain in Sri Lanka. The very first meeting of Mahinda and king Devanampiyatiss took place on the Missaka Pabbata, today known as Mihintalē about eight miles off Anurādhapura. The king was hunting a dear at this moment. ***Dīpavaṃsa*** remarks as follows, "King Devanampiyatissa was going a hunting, came to mount Missaka on that day. A god who had assumed the form of an elk appeared to the king. The king, seeing the elk, quickly rushed on him and running behind him came to a place enclosed by hills." (***D.v,*** 1992, 12:46, 171). The Pāli chronicles record that having asked few questions (***Pōjāvalī***, 1999:764). from the king thēra realized that the king is intelligent and having capacity of understanding the Buddhism. This can be regarded as the first recorded intelligence test in the history of Sri Lanka.

IV. Preaching Dhamma by Mahinda thēra

Thēra preached the monarch the Cūllahatthipadūpama sutra (***M.v***. 1950, 14:22, 93, ***D.v,*** 1956, 12: 53, 190). He bestowed the pabbajja on Bhaṇḍuka and upasaṃpadā ordination was also administered on him (***M.v,*** 1950, 13: 32, 93). When Sumara Sāmanēra announced the time for preaching Dhamma or Kālagośā, many gods also gathered and the thēra preached the Samachitta sutra (Illangasinghe Mangala 1997:195). The cētiya that was built on the place where the thēras first alighted is called, the Paṭhamakacētiya (***M.v.*** 1950, 14:45, 95). When queen Anulā had come with five hundred women and had bowed down and made offerings to the thēra, he preached them the Pētavatthu, Vimānavatthu and Saccasaṃyutta (***M.v***. 1950, 14:58, 64). It is reported in the ***Bōdhivamsa*** that, (***Bodi.v,*** 1999:164) thēra Mahinda had preached doctrine in the Sinhales language at two places in the island (***M.v.*** 1950, 14:65,64, ***Bodi.v***, 1999:164). The question that would naturally arise is how thēra Mahinda, preached the doctrine in the native language of Sri Lanka. Mahinda might have learnt the Sinhalese language whilst he was pondering on his visit to Sri Lanka.

The ***Mahāvaṃsa*** illustrates that there was not enough space for all the men who gathered to listen dhamma. Thence, the king had to cleanse the hall of the state elephants. Due to the above fact, it can be presumed that there was not a proper organized assembly hall even for the king. The thēra preached the Dēvadūtha sūtra at the hall of the state elephants. The thēra has preached the Bālapaṇḍitha sūtra at the Nandana garden of the royal park (***M.v.,*** 1950, 15:3-4, 97).

Thēra spent his second night at the Mahāmegha Park, donated by the king by pouring water which has been an ancient tradition, administered in offering (***M.v.*** 1950, 15:24, 99). Following the above offering it is reported that whilst thēra was offering flowers at eight places, eight earth quicks had taken place (***Bodi.v,*** 1999:173). Mahinda thēra has preached Aggikaṇḍhōpama sūtra, Ashirshōpama sūtra and Anamathaggiya sūtra during the third at the Nandana Park. Thēra accepted Tissārāma on the third day (***M.v***. 1950, 15:174, 110). He preached the Aggikkhandhopama sūtra to the people which had paved the way for thousands of people in to the fruit of Nibbāna. The ***Mahāvamsa*** further says that thēra preached the Āsīvisūpamā sutra on the same day and led thousands people into conversion. As stipulated in the ***Dīpavaṃsa,*** thēra has preached the Āsīvisūpamā sutra, Anamtaggiya tura and Charyapitaka (***D.v,*** 1956, 14: 46, 205).

The thēra Mahinda preached the Khajjanīyaka sutra, (***M.v***. 1950, 15:195, 111) Gōmayapiṇḍika sutra, (***M.v.*** 1950, 15:198, 112) Dhammachakkapavatthana sutra on the fifth, sixth and seventh day respectively. As per ***Dipavamsa*** Mahāsamaya stura has been preached by him (***D.v,*** 1956, 14:54, 206). The Mahappamāda sutra was preached to the king on the thirteenth day of the bright half of the month Āsāḷha (***M.v***. 1950, 16:2, 114). Mahā Arittha the king's nephew and the chief minister with fifty five of younger companions, had listened to the Vassupanaikkaṇḍha sutra and eventually were received the pabbajja (***M.v.*** 1950, 16:202, 112). The ***Mahāvaṃsa*** further says that he had taken effort in converting eight thousand five hundred persons into Buddhism only within a short span of seven day (***M.v***.

1950, 15:198, 112). Mahinda thēra has preached fifteen sutras within 13 days of his visit. They go as follows Cūllahatthipadūpama sūtra (1st day), Samachitta sūtra (1st day), Pētavatthu (2nd day), Vimānavatthu (2nd day), Saccasaṃyutta (2nd day), Devaduta sūtra (2nd day), Bālapaṇḍitha sūtra (2nd day), Aggikandhopama sūtra (3rd day) (***Bodi.v.***, 1999:174), Āsīvisūpama sūtra (3rd day) (***Bodi.v.,*** 1999:174), Anamthaggiya sūtra (4th day) (***Bodi.v.***, 1999:174), Khajjanīyaka sūtra (5th day) (***Bodi.v***., 1999:179), Gōmayapiṇḍika sūtra (6th day) (***Bodi.v***., 1999:179), Dhammachakkapavatthana sūtra (7th day) (***Bodi.v.,*** 1999:179), Mahāpramada sūtra (13th day) and Vassupanaikkaṇḍha sūtra (13th day). Most of these sermons dealt with the transition of life, the dreadful nature of the saṃsāra, and the noble life, needed to escape from the saṃsāra and to attain Nibbāna (Rahula Walpola 1956:56).

V. Epigraphical evidences in support of Sri Lankan vaṃsa tradition

The 2nd century, an inscription found in Rajagala, says "ye ima dipa paṭmaya idiya agatana iḍikateraha Mahidateraha tube." (***I.C,*** 1970, no 468). The meaning of it, is "This is the sūtpa of elder Idika and the elder Mahinda who came to this island by its foremost good fortune". The stupa which, the relics were deposited has been destroyed. Only ruins can be seen today (Bandara Anuradha Vijevardana, 2015:18). The Rock inscription of Mahintale mentions "Mahinda teraha ca bhadrasāla teraha ca Iṭika teraha ca Uti-teraha ca paṭhamaha [kara] pita……asita-va (ṇa). The meaning is, "The elders Mahinda, Bahdrasāla, Iṭṭhika and Uttiya-----" (Guruge Ananda 1993:544). Above epigraphical evidences can be testified with the vaṃsa tradition. Senerat Paranavitana says, "As far as archaeological evidence in favour of it is concerned, and inscription engraved within a century of the event at Rajagala or Rassagala in Eastern Sri Lanka confirms Mahinda's role and also mentions Iṭṭhiya, whom the Pāli sources have included as member of the missionary team." (***I.C***, 1970:35).

VI. Demarcating the Boundaries

When king Dēvanaṃpiyatissa asked "whether the doctrine of the conqueror stand sir? The thēra said "not yet and when the boundaries are established here for the uposata ceremony and the other acts of religion according to the command of the conqueror, shall the doctrine stand." (***M.v.,*** 1950, 15:180-181,110). Therefore the king established all the boundaries (***M.v.,*** 1950, 15:194,111). The Sīmabhandana story of ***Mahābōdivaṃsa*** deserves our attention on the demarcation of the boundaries of Mahāvihara, with the help of two royal elephants, called Mahapadumaya and Kunjaraya. These two elephants were tight in a plough made of gold. The Simabhandana story of Mahābōdivaṃsa helps us, to gain a better understanding of the boundaries of the Mahāvihara. The place where the great men dwelled is called the Mahā Vihāra (***Bodi.v,*** 1999:180). The following places can be taken as the boundaries; (***Bodi.v.,*** 1999:175). Kumbalwala near Kolomhoya Pahana, Kumbukkanpala, Maha Agunu ruka, Thōramailla, Pond of Muruta, North gate of the of the Vijayārāma Park, Atkumbhapahana, Tovitimeda, Baya Wewa Koggala, Mahason Meda, Diggalvila, Cemetery of Chaṇḍala, Hima Nuga, Belahanaya, Diyavas Brahmana's temple near Hiyagal

Thelumpela, Tala chatuskaya, Sepana, Port of Kalasa Kāla, Tīrta of Sinhasnana and Port of Pahanatota Kudavala Pahana.

VII. The monastic constructions

The Nandana grove, being the place where the holy one had made the true doctrine to shine forth is also called the Jōtivana (***M.v.*** 1950, 15:202,112). Devanampiya Tissa, who was the ruler of the Anuradhapura kingdom at that time, took many measures which contributed towards establishing its firm footing here(Dheerananda Hanguranketa 2016:145). The king commanded that a pāsāda to be built for the thēra in Tissārāma, and he had the bricks of clay dried speedily with fire. The dwelling house was dark coloured and therefore was named Kālapāsāda parivena (***M.v***., 1950, 15:205-206,112). The King set up a building for the great Bōdhi tree, the Lōhapāsāda, a Salāka house, many parivenas, bathing tanks and buildings, sixty eight rock cells at the Kantaka cētiya, as guided by the Mahinda thēra. King Devanampiyatiss had built many parivenas under the guidance of thēra Mahinda. For example;

- The pairvena on the bank of the bathing tank is called the Sunhata parivena.
- The paivena on the place, where the excellent, lighter of the island, used to walk up and down is called digha cankamana.
- The place where Mahinda thēra had meditated, bringing the highest bliss is called Phalaga parivena.
- The place where many hosts of gods had sought him out and sat at his feet is called the Marugana parivena.

King Dēvanaṃpiyatissa built Mahāvihāra, Cētiya Vihāra and the Thūpārāma as well. He built vihāras, in a yojana distant from one another on the guidance of the thēra (***M.v***., 1950, 20:8-12,136). Vihāra that was built in the place where the five hundred nobles dwelt when they were receiving the pabbajjā from the great thēra was named Issarasamaṇaka (***M.v.,*** 1950, 20:14,137). The vihāra where five hundred vessas dwelt, when they were receiving the pabbajja from the great thēra was called Vessagiri. The place where thēra Mahinda inhabited was called Mahinda-grotto. The author of the ***Mahāvamsa*** has summarized the following services rendered by king Dēvanaṃpiyatissa; (***M.v.,*** 1950, 20:17-26,138). They are building the Mahāvihāra, building the monastery named Cetiya vihāra, building Thūpārāma, planting the great Bōdhi tree, setting up stone pillars on the place where the great Cētiya and enshrining of the Saṃbuddha's collar-bone relic, building Issarasmaṇa vihāra, making the Tissa tank, building Paṭhama thūpa, building a nunnery called Upāsikā vihāra and the Hatthālhaka nunnery, building refectory called Mahāpāli, building the Jambukolavihāra in Nāgadīpa, building Tissamahā vihāraya and building Pācīnārāma. Sinhala ***Bōdivaṃsa*** depicts the location of historically important places by using a lion as a symbol.

The Bodhi house was located at the edge of the lion's tail.
The Mahāprasada was located at the right leg of the lion.
The Sannipāta hall was located at the left leg of the lion.
The Relic house was located at the focal of the lion.
The Rāshimālaka was located on the left of the lion.
The Arms giving hall was located on the right of the lion.
The Ratnamāli Stupa was located on the left of the lion.

The pond of Kantha located, was located at the throat of the lion.
The Great shrine room was located at the right of the lion.
The Introduction of Buddhism to Sri Lanka and the arrival of Arahanta Mahinda may be regarded as the beginning of Sinhala Buddhist culture in Sri Lanka (Dheerananda Hanguranketa 2016:145).

VIII. The arrival of Relics

Thēra Sumana was sent to Pushpapura to bring the relics of the sage and the alms bowel to build a stupa in Sri Lanka (***M.v.*** 1950, 17:11-12,117). Having received the alms bowl full of relics, donated by King Aśōka, thēra Sumana left for the Himalayan height (***M.v.,*** 1950, 17:18,117). The ***Mahāvaṃsa*** says that having kept those relics at Himalayan height, he had visited the king of the gods and delivered the Mahinda thēra's charge. Having taken the right collar bone of the Buddha, from the Cūḷāmaṇi-cetiya, Sakka, the lord of the gods, had given the same to sāmaṇera. Thereupon, Sāmanēra Sumana return to the Cētiya Mountain with relic and they were handed to Mahinda thēra. King Devanaṃpiyatissa built the Thūparama depositing the relics of the Buddha.

IX. Receiving Pabbajjā

The prince Mattābhaya, king Dēvanaṃpiyatissa's younger brother, who had the faith in Mahinda thēra, received the pabbajja of the doctrine with thousands of his followers (***M.v.,*** 1950, 17:58,121, ***Bodi.v,*** 1999, 185). The five hundred young men from the villages of Cetāvigāma, Dvāramaṇḍada, Vihārabija, Gallakapiṭa and Upatissagāma received pabbajja (***M.v***., 1950, 17:59-60,121). The seventh chapter, *the arrival of the relics*, in ***Mahāvaṃsa*** further says that thirty thousand people received the pabbajjā (***M.v***. 1950, 17:61,121).

X. Inviting Therī Sanghamittā

Ariṭṭa, the king Dēvanampiyatiss's nephew was entrusted upon the task of according the great Bōdhi tree and together with thēri Sanghamittā. As mentioned in the ***Mahāvaṃsa*** Ariṭṭa had requested to receive the pabbajja, once his duty was fulfilled (***M.v.,*** 1950, 18:5,122). It further says that having embarked from the Jambukōla port and having passed over the great ocean, he came by the power of the thēra, to the pleasant Pushpapura on the day of his departure itself (***M.v.,*** 1950, 18:8,122). This is a quiet miraculous fact, mentioned in ***Mahāvaṃsa***. Normally it takes 14 days to reach at Pushpapura. As stipulated in the ***Mahāvaṃsa*** a written message given by Mahinda thēra has been delivered to Dhammāśoka. Most probably it might have been written in Brahmi scripts.
Having received the pabbajjā together with her followers from the thērī Saṃghamittā, princess Anula attained the status of Arhathood. Following the Pabbajja, administered by Mahinda thēra, Prince Ariṭṭha also with a retinue of five hundred men, attained the status of arahthood (***M.v.,*** 1950, 19:66,133).

XI. The demise of the Mahinda thēra

Faxina doesn't speak even a single word on Mahēndra. Faxian noted us a cremation of a particular Arahat. At the time of Faxian's arrival, this particular arahat had passed away and he could only observe the cremation ceremony. Max Deeg in his book of Studies in Oriental Religions, says that, the cremation ceremony, mentioned by Faxian was that of Mahēndra. It could be assumed that this particular cremation ceremony could have been a chief incumbent who had lived at the time. This cannot be taken as the cremation of Mahendra, as Faxian had visited Sri Lanka during the reign of king Mahānāma (410-432 C.E). As appeared in the vaṃsa tradition, Mahēndra's cremation had been patronized by the king Utiiya, brother of king Dēvanamipitissa (210-200 B.C.E) (Geiger Wilhelm 1950, 20:31-32). That arises a question as to why Faxian had not made a mention on Mahēndra thera. Perhaps, Faxian seemed to have associated with the monastery of Abhayagriya, where he had stayed for two year. It is quite questionable why Faxian doesn't mention about Mahinda or Mahēndra. By embedding the Xuanzang's description, we are lucky enough to hear about Mahēndra thēra.

The twentieth chapter of the ***Mahāvamsa*** has been named as the Nibbāṇa of the thēra. King Dēvanaṃpyatissa passed away on his fortieth regnal year (***M.v.,*** 1950, 20:28,138). After his death, since he did not have a son, a prince known by the name of Uttiya, the younger brother of king Devanampiyatissa had been made the king of island. Thera Mahinda, aged sixty passed away in the eighth year of during the reign of king Uttiya, while spending rainy season, on the Cētiya Mountain, on the eighth day of the bright half of the month Assayuja (***M.v***., 1950, 20:33,139). King Uttiya had made arrangements to lay dead body of the thēra in a golden chest sprinkled with fragrant oil, and the well closed chest was laid upon a golden, adorned bier (***M.v.,*** 1950, 20:35,139). He commanded solemn ceremonies. The chest was brought to the Mahāvihāra. The chest was kept at a place called Panhambamālaka. As ***Mahāvaṃsa*** says king commanded diverse offerings throughout the week. Finally the pyre was kept at the Baddhamālaka, made of sweet smelling wood. According to the ***Mahāvaṃsa*** the above place had been situated on the right of the great stupa.

Having deposited the relics of the late Mahinda, King Uttiya built a Cētiya. Half of the relics had been deposited in the Cētiya Mountain as well as in all the Vihāras. In honouring the place where the burial of this sage's body had taken place is called, Isibhūmaṅgaṇa (***M.v.,*** 1950, 20:46,140). The ***Mahāvaṃsa*** further says that from that time onwards, the dead bodies of the holy men were used to bring from three yojanas around this particular place and where they were burnt. ***Dīpavaṃsa*** says, "When the twelfth year after his Upasampada had been completed, Mahinda came hither; at the end of his sixtieth year he attained Nibbana on the Cetiya Mountain. When the enlightener of the island has attained Nibbāna, king Uttiya, having ordered full vases, triumphal arches, garlands, and burning lamps to be prepared, erected the most excellent hearse which was worth seeing. He paid reverence to the enlightener of the island. Both gods and men, Nagas, Gandhabba grieved and paid reverence to the enlightener of the Island." They performed great ceremonies for seven days in the Mahāvihāra. They erected the most excellent Thupa which contained his relics, and monasteries at a distance of one yojana from each other. After the funeral ceremony for Mahinda, the enlightener of the island,

had been performed, this particular got the name of *Isibbūmi* (***D.v,*** 1992, 17:109).

XII. Conclusion

The holy city of Anurādhapura was originally planned and laid out by Mahinda. As stipulated in the vaṃsa Mahinda thēra introduced Buddhism, art and architecture into the island. He can be regarded as the father of the Sinhalese literature. Strong S. Jhon remarks that story of Mahinda, which is given in more details than the others, is clearly governed, once again, by the desire of the author of the Mahāvaṃsa to enhance the prestige of the Theravādins of Sri Lanka and emphasize the intimate family connection between their founding father Mahinda and the great emperor Aśoka (Strong S. John, 1989:25).

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The Study of the Historical Records of Xuanzang on Sri Lanka

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Abstract- The main objective of this research paper is to identify the authenticity of the historical facts compiled on Sri Lanka, by Xuanzang. He travelled to India in seventh century C.E. Although he wanted to visit Sri Lanka, he could not visit the island owing to a famine and political unrest in Sri Lanka. He visited Kānchipuram, and there he met the chief monks of Bodhimegehsvar and Abhayadrustra with three hundred other fellow monks, who stayed in South India, owing to the famine and the political unrest that occurred in Sri Lanka. Xuanzang's records of Sri Lanka was based on, what he has heard from the above monks. In this research the attention is made to compare the records of the Xuanzang with the chronicles of Sri Lanka, the Divyāvadāna, the records *Faxian* and the *Jātaka stories*.

Xuanzang reveals two stories regarding the origin of Sinhalese people. One of the stories is much more similar with the Mahāvaṃśa and the other is similar to that of the Divyāvadāna. It is deemed to study all these literary sources and its influence on the records of Xuanzang. As recorded by Xuanzang, Buddhism was introduced to Sri Lanka by the youngest brother of Asoka, prince Mahendra, not by his son as the vamsa have. It is presumably wise to critically analyse all these assertions. Xuanzang says that the royal palace is situated next to the alms hall. This can be testified with the archaeological findings and the epigraphical data. There are differences between Faxian's and Xuanzang's descriptions as well. The present study is an attempt to trace the differences between above records.

Xuanzang sheds light on the fraternity of the sangha's, Tooth Relic Temple of Sri Lanka and the ceremonies conducted for the veneration of it, monasteries of monks, trade and the economy. The valuable historical facts can be gathered, which belongs to the 14th century as well. This paper proposes to discuss the significance of all these scenarios.

Index Terms- monks, records, chronicles.

I. Methodology

The Samel Beal's English translation of the Buddhist Records of Western world, (1906) and the Li Rongxi's the Great Tang Dynasty Record of the Western Regions, (1996) were studied. The Max Deeg's unpublished English translation of Xuanzang's document strengthened my knowledge and it contributed me to compile this article. The historical evidences were collected from the Faxian's travel records of, *Divyāvadāna, Jātaka* and the theravāda vaṃsa tradition. The inscriptions belonged to Sri Lanka have been studied. The evidence of the different texts permits us to conclude with some certainty of what there really existed.

II. Geographical location

The Geographical location of Sri Lanka has been recorded by Xuanzang. As he has drafted "the Kingdom of Siṃhala has a circumference of more than seven thousand miles. The great capital has a circumference of more than forty miles"[1] Further he mentions that this land is fertile, and the seasons are hot. Although there are differences in the figures, the Dīpavaṃsa which is considered as the first chronicle of Sri Lanka which has written in 5th Century gives similar description to the Xuanzang.[2] As mentioned by him the farming is done according to the seasons. The Tōṇigala rock inscription to the third year of king Śrīmegahavarṇṇa (303-331 C.E.) sheds light to prove that the farming was done according to the seasons.[3]

It says that this land originally was an island with treasures, (because) there were (so) many rare jewels. The main income of the kings in the Rōhana kingdom was the gem trade. This is one of the main reasons why Sri Lanka is known as *"Ratnadipa"*. The *Mahāvaṃsa* refers to eight kinds of pearls, presented to the Emperor Aśoka by the King Dēvānampiyatissa (circa 250-210 B.C.E.). The eight kinds of pearls are horse-pearl, elephant-pearl, waggon- pearl, myrobalan pearl, bracelet pearl, ring pearl, kakūdha fruit pearl and common pearl.[4] The Pāli literature *Abhidhānappadīpikā* also reports these eight types of pearl as quoted in *Mahāvaṃsa*.[5] As in the record Laṅka was settled by ghosts. In most of the literary sources give evidence on this. This doesn't testify that there were ghosts dwelled in Lanka. The analytic approach to be needed on the word ghosts. Why they have addressed the people in Sri Lanka as ghosts? Sri Lanka maintained very close cultural, political and trade relations with South India. Tamil traders were very active in Sri Lanka from the 4th century B.C.E. to 11th century C.E. Most probably the south Indian traders who gained the maximum profit by the trade might have spread the news as the dwellers in Laṅka as ghosts. Hence they gained the maximum profit from the trade and could not face any competition for the trading activities.[6] The Osmund Bopearachchi says during this period, the South Indian traders may have played the intermediary role between the Roman traders and the Sri Lankans.[7]

III. The appearance of Siṃhalese people

Xuanzang describes the appearance of the people of the lion-kingdom as common and dark, they have square chins and big foreheads; their temperament is rude and violent, and they can bear drinking poisoned wine. The people are mostly brave and strong.[8] What our view is the Xuanzang makes an effort to prove the leonic origin of Sinhalese from these characteristic features. The Xuanzang says the kingdom of Sinhala formerly was addicted to immoral religious worship. It is indisputably clear. The worshiping of ancestors,[9] worshiping of trees,[10] worshiping of Yaksas,[11] worshiping of gods or Devās,[12] Nigaṇṭas,[13] Ṡaivaism[14] can be identified. Paribbājakas and Ājīvakas,[15] Pāsaṇḍas and Pabbajitās and many other ascetics, known as Samaṇas seem to have been found in fair numbers in the island.

IV. The port at Kāncipuram

According the Xuanzang's description the port situated near to the Kāncipura could be assessed to Sri Lanka very easily.[16] The *Seehalawaṭṭuppakaraṇaya*, the oldest existing literary source, written in the 3rd or the 4th century C.E., states that the traders of Sri Lanka had sailed from Mahākoṇḍa and landed at Kāvēripaṭṭana in India and from there they had further been to North India and China. A story says that, to worship the Bō-tree in the Uttarāpatha, nearly sixty monks from the down South in Sri Lanka (Rōhanadesa) had entered Anurādhapura and embarked the journey from the Mahākoṇḍa and disembarked at the Kāvērapaṭṭana.[17] The port Mahākoṇḍa is hither to unknown. This might be the port of Mahātittha (Mānthai). As mentioned, most of the monks might have used this route to visit the Bō-tree.[18] Perhaps the thero Bōdhi might have used this sea rout to visit Kānchipuram. Having met the chief monks of the Bodhimegheśvara and Abhayadanstra who have come from Sri Lanka Xuangzang asked few questions on Yogasastra. At the point of Xuangzang, they have not explain it properly as Shilabadra whom he had previously studied with at Nālandā.

V. Why Xuanzang couldn't visit Sri Lanka?

The Chinese pilgrim Xuangzang was in India for abut sixteen years from 630-645 A.C.[19] Although the Xuanzang wanted to visit Sri Lanka, couldn't not visit owing to the famine and the political unrest in Sri Lanka. He has visited to Kānchipuram, and there he met the chief monks of the Bodhimegehsvara and Abhayadrustra with three hundred other fellow monks who have visited to South India, owing to the political unrest in Sri Lanka. The Xuanzang's records of Sri Lanka was based on, what he has heard from the above monks. It should be happy to noted, that the monk Bodhimegehsvara's name can be identified as the Bodhi in Vaṃsa tradition.

As recorded in the second part of the Mahāvaṃsa the monk Bodhi dwelled at the monastery of Abhayagiri. The Bodhi thera who had seen many undisciplined bhikkhus in the Abhayuttara vihāra, requested for Sangakamma[20] by the king. The king Silāmēghavanna (623-632 C.E.) having accepted the thera's request, allowed him to do the Sanghakamma. Then all the undisciplined bhikkhus who had been expelled from the order, took a counsel together, murdered Bodhi secretly and annulled the act. When the king heard that, he was worth, seized them all together, their hands cut off and made them guardians of the bathing tanks. Another hundred bhikkhus there he expelled to Jambudipa. As stipulated in the Mahāvaṃsa in remembrance of Bodhi's efforts king cleansed the order. When the king Silāmēgahavanna invited the bhikkhus of the Thera School or the Mahavihara with the others to celebrate together the Uposatha festival, he was refused. The king flew into a rage and offending all respect, he abused and reviled them with harsh workds. Then he took himself without demanding pardon of the bhikkhus, to Dhakkhinadesa. There the king was attacked by a disease and died suddenly.

As stipulated in the Mahāvṃsa Bodi thera has been killed secretly by a group of monks who stood against his order. Perhaps Bodi thera might have not killed and banished by the country. He might be the one who met by the Xuanzang as Bodimegeshvara. If the Bodi thera has been killed due to the above conflict, there must have been a thera called Bodhimegeshvara among the hundred bhikkhus where the king expelled to Jambudipa. By embedding the Xuanzang's texts into a broader context many historical facts can be textified through Sri Lankan's vaṃsa tradtion. The hundred bhikkhus have been expelled to Jambudipa by the king Silāmēghavanna (623-632 C.E.). This incident can be taken as an authentic historical evidence with the help of Xuanzang.

The unexpected death of the king Silāmēgavarnna arouse the chaotic situation in Sri Lanka and this background might have made the other monks to visit South India too. The three hundred monks have been met my by the Xuanzang at the Kanchipuram. The king Silāmēgavarnna has banished only hundred bhikkhus as following the Vaṃsa tradition. The question that would naturally arise is who are these three hundred monks? To which monastery do they belong? What made them to come to Kanchipuram.? The Xuanzang's book recalls us that there was a famine and the political unrest during this particular period in Sri Lanka. Owing to the above incidence the monks from the Abayagiri vihara as well as Mahavihara made to visit Kanchipuram. It should be noted from the travel records of Xuanzang. There were to historical traditions sprang up based on two monasteries called Abayagiriya and Mahavihara in Sri Lanka. It should first be emphasized that Xuanzang has associated these two traditions whilst compilation of his historical records. He admits the two different tradition, without being partial has reported it.

VI. The origin of the Sinhalese

Xuanzang's description sheds light on two stories of the origin of the siṃhalese. These two stories have been taken by the two different historical traditions that exist in Sri Lanka. The first story has been taken from Maha viahara tradition. As mentioned by the Xuanzang a king in India had a daughter. When she was sent to the neighboring kingdom to get married, a lion abducted her. They dwelled in the wilderness, in consequence they had two children. When the children are grown up, they were reluctant to stay in the jungle and they secretly came out of the jungle without informing their father, lion. There was no family left and their ancestral line was extinguished. All the people pitied them and immediately provided them with funds. The lion got tempered without seeing his family and started to kill villagers. The king

was unable to settle this devastation caused by the lion. The king announced, "that whoever would catch the lion and free the kingdom from the disaster, would receive a high reward and be honored luxuriantly for his achievement". Finally the lion was killed by his son and after hearing the relation of the lion and the son, the children were expelled by the king from the county. The boat of the son was carried to Ratnadīpa and the daughter was carried to the west of the kingdom of Persia. Having killed the merchants eventually, the son of the lion was able to establish his power in Ratnadīpa. As recorded by the Xuanzang all the characters are anonymous. This lacunae can be filled by an examination of the vaṃsa tradtion in Sri Lanak. As described in the Dīpavaṃsa the king's name was Vaṅga, king's daughter was Susīmā, the son's name was Siṅhabāhu and the daughters name was Siṅhasīvale.[21] The story is quite compatible with the story of Dīpavaṃsa and the Mahāvaṃsa. The son of the Sinhabāhu by the name of Prince Vijaya had been banished from India as mentioned in the Vaṃsa tradition in Sri Lanka. Faxian doesn't mention the story at all.

There is another piece of information, regarding the origin of the Siṅhalese, which is not highlighted in the Maha vihara vaṃsa tradition or the Theravada vamsa tradtion. This story has been taken from a tradition belonged to the Abayagiri. Xuanzang emphasized, this story is in the Buddhist texts. We can find this story only in the Divyāvadāna and the Jātaka.[22] This story is more compatible with the Siṃhalāvadāna, in Divyāvadāna. As mentioned in the text of Xuanzang there was a great merchant leader on the Jambu-continent called Sengjia, and his son was called Simhala. He embarked together with five hundred merchants, set to sea in order to collect jewels, and the wind drifted them on the waves until they reached the treasure-island. Thereupon the merchant leader had pleasure and amused himself with the queen of the *rakṣa*-women in that island. Each of the other merchants also found a matching partner, and after a year, all the *rakṣa*-women bore a child. Then, one night, Siṃhala had a nightmare and knew that they were not in a lucky situation he secretly looked for a way out. He arrived at an iron prison and then heard the sound of wailing. He then climbed on a high tree and asked: "Who is retained here to make these sad complaints?" The inmates said: "Do you not know? The women in the city are all *rakṣa*s. They said: "We heard that on the shore of the ocean there is a divine horse, and that if one implores, it sincerely, it will certainly save us all." When Siṃhala heard this, he secretly told the other merchants that they should go to the sea shore together and put their energy in looking for help. Thereupon the divine horse came and said to the men: "Each of you should grasp my mane and not look back; I will save you. The divine horse leaped up highly to its cloudy path and crossed over to the other shore of the ocean. When the *rakṣa*-women suddenly realized that their consorts had escaped they told each other about it and wondered where they could have gone; each of them took her child, went forth and back in the sky. Having encountered the merchants, they shed tears and started weeping. The merchants fell in love again, could not master their emotions. The *rakṣa*-women congratulated each other, took those merchants and carried them away. Only Siṃhala in his steadfast wisdom did not waver in his determination. Thereupon the *rakṣa*-queen returned to the Iron City without her husband and the child. The other *rakṣa*-women said to her that she is not capable enough to take her husband and wife back and should not live there. Then the *rakṣa*-queen took her own child, flew in front of Siṃhala and used all her seductive power to lure him into coming back. The raksa princess went to the Siṃhala's home and cheated his father too by convincing relation of the Siṃhala and the son. Siṃhala's mind did not change and he refuse by saying that she is a raksa.

Thereupon the *rakṣa*-woman accused Siṃhala before the king. The king was delighted by her delicate beauty and said to Siṃhala: "If you have to abandon this woman, leave her in the inner palace." Siṃhala said: "I am afraid that this will become a disaster. Because she is a *rakṣa*, she only partakes of flesh and blood." The king did not listen to Siṃhala's words. In the later half of the night she flew back to the treasure-island, summoned the other five hundred *rakṣa*-demonesses and went with them to the royal palace and killed everyone. The next day morning nobody knew the reason of this disaster. Siṃhala explained everything and having seen the distinguished features of the siṃhala, ministers helped him to become the king of this particular area. Later Siṃhala destroyed the Iron City and the iron prison, rescued the merchants and gathered many pearls and jewels. He recruited people to move to the treasure-island and live there, founded a capital and built settlements, and finally a kingdom existed there. According to the name of the king the kingdom was called Siṃhala.

The above story illustrates "The top of the gate-tower two banners were erected, indicating as signs luck or evil. In case of lucky circumstances the banner of luck moved, in case of evil matters the banner of evil moved".[23] This could be admitted as modern days, the giving signals through flags might have existed in the pre historic period in Sri Lanka.

Although this story quite compatible with the Divyāvadāna, there exists few discrepancy. It is indisputably clear Xuanzang gives us the whole story, but Divyāvadāna doesn't reveal the whole story and it says, for the further clarification to refer the Rakshasi sutra.[24] Either Divyāvadāna or Jātaka don't give us the full story of this. This lacunae can be only filled up by the records of Xuanzang. Faxian does not mention the story at all.

As in the previous story Sri Lanka was ruled by a princess raksa. This testifies that the administrative powers were vested even to the women. As mentioned in the Mahāvaṃsa goddess were worshiped by the people even in the 5th century B.C.E.[25] The king Paṇḍukābhaya (5th B.C.E) has constructed house for the yaksani Valavāmukhī within the royal precincts and made early sacrificial offerings. It is undisputable that the women were privileged. It is completely different from the social structure that was existed in India by this time.

According to the Valāhassa Jātaka there were she goblins in the town called Sirisavatthu in Ceylon. These she goblins used to come to the merchants with the children on their hips in order to make them imagine that there is a city of human beings. Once the five hundred shipwrecked traders were disembarked and the she goblins came up to them and enticed them, till they brought them to their city. The chief she goblin took the chief man, and the others took the rest, till five hundred had the five hundred traders; and they made the men their husbands. When her man was asleep, the chief she-goblin rose up, and made her way to the house of death, slew some of the men and ate them. The others did the same. When the eldest she goblin returned from eating men's flesh, her body was cold. The eldest merchant embraced her, and perceived

that she was a goblin. Then the chief trader with two hundred and fifty, who were ready to obey him, fled away in fear of the goblins. At that time, the Bōdhisattva had come into the world as a flying horse.[26] From Himalaya he flew through the air until he came to Ceylon. There he passed over the ponds and tanks of Ceylon, and ate the paddy that grew wild there. As he passed on thus, he thrice uttered human speech filled with mercy, saying—"Who wants to go home? who wants to go home?" The traders heard his saying, and cried—" We are going home, master ! "they climbed up, some laid hold of his tail, and some remained standing, with a respectful salute. Then the Bōdhisattva took up even those who stood still saluting him, and conveyed all of them, even two hundred and fifty, to their own country, and set down each in his own place; then he went back to his place of dwelling. The she-goblins, when other men came to that place, slew those two hundred and fifty who were left, and devoured them. Xuanzang's description illustrates the whole story of the above.

VII. Theravāda Tradition

There is another piece of information which contribute historical facts about the Mahendra thera. Mahendra was the half-brother of Aśoka (mother's brother)[27] In dress he arrogated the style of the king, he was extravagant, wasteful and cruel. The people were indignant, and the ministers and aged officers complained him to the king. When the king was about to punish the Mahendra, he asked an extension of his life for seven days. On this the king placed him in a dark dungeon, and placed over him a strict guard. He was provided with every kind of exquisite mat and every necessary article. Last day he mounted into the air and exhibited his miraculous powers. Late emperor Aśoka constructed a dwelling place for his brother. Here we are lucky enough to get biographical data of Mahendra thēra, which Vaṃsa tradition do not speak. It is presumably wise to critically analyse all these assertions. The writers of vaṃsa might have purposely didn't mention the weaknesses of the Mahēndra as he was called as the dīpaprasādaka.

As in the test the king Aśoka's younger brother, Mahendra has introduced the Buddhism to Sri Lanka. According to the vamsa tradition Mahendra was the son of Aśoka. Mahendra has been highly exaggerated in the vaṃsa tradition. Faxina doesn't speak even a single word on Mahēndra. The question arises here is what made Faxian not to mention about Mahēndra thera? Perhaps, most probable Faxian associated with the monastery of Abhayagriya. He was there for two year. It is quite questionable why Faxian doesn't mention about Mahinda or Mahēndra. By embedding the Xuanzang's description we are lucky enough to hear about Mahēndra thēra.

As in the Xuanzang's records the king Aśoka's younger brother Mahēndra gave up the (wordly) passions, set (his) mind to the fruit of sainthood, achieved the six supernatural powers and the eight liberations, walked through the air and travelled to this kingdom in order to propagate the true dharma and to spread the inherited teaching. He further says there are several hundred monasteries and more than twenty thousand monks who follow the *dharma* of the Sthavira-nikāya of the Mahāyāna.

VIII. The schism

This description recalls us two hundred years after the advent of the teaching of the Buddha different groups of the *saṅgha* arrogated as schools. This evidence can be elucidated with the help of vaṃsa tradition in Sri Lanka. The king Vattagāmani Abhaya (89-77 B.C.E) having constructed the monastery of Abhayagiri and donated it to Mahātissa thēra who has assisted him. Therefore Mahātiss thēra was expelled by the brotherhood from the Mahā Vihara monastery.[28] The Mahātissa thēra was accompanied by the Bahalamassutissa, and moved in anger to the monastery of Abhayagiri, abode there forming a separate faction. It is indisputably clear that the Xuanzan gives the authentic data about the fraternity of saga. As in the text the *nikāya* of the residents of the Mahāvihāra reject the Mahāyāna and study the Hīnayāna; the other is called *nikāya* of the residents of the Abayagirya who simultaneously study the two vehicles, developed a broader *tripiṭak* and whose monks' keeping of the precepts is pure and true. Xuanzang further mentions that the contemplation and wisdom is strong and clear, whose demeanor can serve as a model, of the thēras at the monastery of Abayagiriya. This evidence can be testified with the one of inscriptions which is in the Colombo national museum today. This inscription has been found at the premises of the Jetavanārama. This has dated to the king Mahasena's period (276-303 C.E). As mentioned in the inscription rules and regulations have been imposed to the monks who dwelled at the Panca mahā āvāsa or five main monasteries that existed in the Anurādhapura period. The Mahāvihāra, the Isurumuni, the Chētiyagiri, the Thūpārāma and the Vessagiri were considered as the panca mahā āvāsa. The word "nana magina pavanēna" symbolizes that "they have engaged with sin in various ways". There is another piece of information which contributes to strengthen the above fact. The Thēro Sanghamitta who has visited Sri Lanka during the 3rd C.E said "The dwellers in the Mahā vihara do not teach the true vinaya, we are those who teach the true vinaya"[29] The deterioration of the vinaya of the monks may have caused the demolision of the Mahāvihāra during the period of the king Mahāsena with the help of Sangamitta thēro. The king has established a royal penalty whosoever gives food to monks dwelling in the Mahāvihāra is liable to a fine of a hundred pieces of money. Xuanzang's perception of the Abhayagiri monastery can be taken as an authentic data. The Mahāvihāra has become the owner of massive land and the properties owing to the donation of rulers as well as the laymen approximately 600 years from 3rd B.E.C to the 3rd C.E.

IX. Location of temple of Tooth Relic

Xuanzang illustrates to the side of the royal palace is a monastic structure, more than one hundred feet high, containing the Buddha's tooth. The building is glittering of pearls and is adorned with precious jewels. On the top of the monastic structure a pillar is erected as a sign, on top of which one has installed a big padmaraga. The king bathes the Buddha's tooth three times a day, washes it with scented water or heats it with incense powder, and this service is very particular as a practice of offering. Senaka Bandaranayke suggests that the building known today as Daḷadāgē Tooth Relic Temple could be the royal palace.

(Royal palace?)

(Tooth relic temple?)

As denoted by the Xuanzang to the side of the monastic structure containing the Buddha's tooth is a small monastic structure also glittering of an embellished with many jewels. Inside is a golden statue of the Buddha, casted in the corporal size. The former king of this kingdom and its *usniṣ* embellished with a very valuable jewel. This building could be easily identified.

(image house)

(Image house)

This could be considered to be an image house built in the gediga architectural tradition in the period between 7th -9th Century. The gedige is known as Ginjkavasatha in Pāli and accordingly the whole image house is built using only bricks. It is evident from the arched roof of the structure, made in brick walls. Architectural analysis shows that the structure is designed mainly to the Pallava architecture. The patronage of its construction is unknown. No evidence of the image of the Buddha is available at present. As Xuanzang records a story of a thievish servant has stolen the gem that embellished the usnisa. This story doesn't reflect in any vaṃsa tradition.

X. Mahāpāli Alms giving hall

As in the Xuanzang's description, to the side of the royal palace there is a huge kitchen through which eighteen thousand monks are fed every day. The king Devampiyatiss (250-210 B.C.E) constructed the Mahāpāli alms hall for the monks.[30] When the monks come at the time of the meal, they carry their alms bowls and receive the food, and after they have eaten, each of them returns to his cell. The travel reports in the accounts of Chinese Buddhist pilgrims claimed to have found realistic descriptions of the geographical features of sites.[31] Further it has recorded since some decades, however, there is political turmoil in the kingdom, and since they have not yet selected a ruler to continue this action and it was given up. Following the due clarification this was the time of the king Silamegavanna in Sri Lanka (623-632 C.E). Faxian says that there five thousand to six thousand monks dwelling at the capital city.[32]

(Gruel trough of the Mahāpāli alms giving hall)

(Well of the Mahāpāli alms giving hall)

XI. The trade of pearls

Pearl (*mutthu* in Tamil and Sinhala) is considered as the queen among the jewels. Though, the pearls were available in the Persian Gulf, a richer source was in the Gulf of Mannar at the tip of the peninsular India, facing the coast of Sri Lanka. This region also has one of the most productive chank fisheries in the world.[33] The chief sources of pearls were located in South India and Ceylon.[34] Xuanzang testifies this as follows in a nook of the kingdom at the shore of the sea the ground produces a lot of precious jewels, and when the king comes in person to the ancestral temple, the deities present him with valuable items. There is a law that they have to pay taxes according to how many gems that they receive. Faxian says the amount of this taxation is 3/10.[35] The occurrence of chank and pearl shell remaining all along the North Western Sri Lanka and in Jaffna peninsula indicates an exchange network from the Southern and South Western coast of India to the coastal Sri Lanka.[36]

XII. Cheng Ho's visit to Sri Lanka

Xuanzang's record sheds light on the Cheng Ho's visit to Sri Lanka. This part has been added by the later period. Cheng Ho has visited twice to Sri Lanka. In his first visit Cheng Ho attempted to persuade Vīra Alakeshvara to give up his heretical practices and adhere to the teachings of the Buddha. The Vīra Alakeshvara oppose this and attempted to kill the Cheng Ho. Having convinced this, Cheng Ho sailed to China again. As a result of this, emperor of the China send the Cheng Ho again with another troop and they fought with the Sinhalese arms nearly six days and finally they return to China having done a ceremony to the Tooth Relic.

It was not an accidental landing but a deliberate and integral aspect of the foreign policy of the Min dynasty. The Mahāvaṃsa doesn't speak about this invasion of Cheng Ho that it would hurt the national pride of the Sinhala people to know that their ruler was carried away to China as a prisoner. The Chines historical sources on the other hand are very eloquent regarding this event because it would certainly add to their self-esteem and imperialistic vision of the world, to say that a ruler of the far famed Chetsee-kouo or the kingdom of the lion as the Chinese called Sri Lanka was a captive in the court of the Ming Emperor.[37] We are lucky enough to get facts of Cheng Ho's invasion from the Saddarmaratnākara[38] and the Rajavaliya.[39] According to the Saddaramratnākaraya, Alakeshwara has been deceived or cheated by Chines.

XIII. Construction of the shrine room

As in the book once, the particular king in Sri Lanka had a brother and he became a disciple of Buddha. The king's brother or the thēra visited India to worship the holy traces of Buddha. He was treated with disdain as a foreigner. On this, he returned to Sri Lanka, and he was disappointed and convinced it to the brother king. The king in Sri Lanka sent envoys to the Maha Rāja, the ruler of the India, with all the jewels, and requested from him to give the permission to build a place of rest between their journey to India. The ruler of the India, the Maha Rāja permitted to the king in Sri Lanka to take one of the places in which Tathagata has left the traces of his holy teaching to construct the resting place. The king in Sri Lanka selected the place where the Bōdhi tree located and then sent all the jewels of the country to build this convent to entertain priests of this country, he caused to be engraved this proclamation on copper.[40] This evident can be testified from another Chines source as well. Van-Hi-unt mentions in the book of Hint -wo –uan the emperor Samudragupta (335-380 C.E) has constructed a convent to entertain the priest in Sri Lanka at the request of the king Kirtimegavanna (303-331 C.E).[41]

Xuangzang says two miles away for the monastery of Kapothika a particular king Sri Lanka has constructed a shrine room, stupas and statues. As he further says king has visited the above place and this was situated on the top of the small mount at the city of Magada.[42] The king's name couldn't be identified from the Vaṃsa tradition.

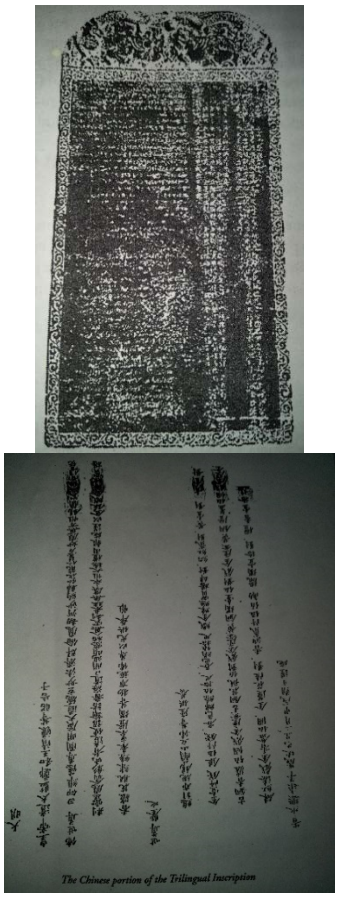
XIV. Rules and regulations

As Xuanzang mentions we can observe that, there were similar rules and regulations were existed India and Sri Lanka. The monks who experts with vinaya sutra and abhidhamma were treated differently. He who can entirely explain on class of these books is exempted from the control of the Karmadana. If he can explain two classes, he receives in addition the equipment of an upper seat (room), he who can explain three classes has allotted him different servants to attend to and obey him, he who can explain six classes of books is allowed a surrounding escort.[43] The content of the tablets of Mahinda IV (956 - 972 C.E.) at Mihintale are the best inscription at evidence on the administration of a monastery. As mentioned in it, to the monks who reside in this Vihāra and reading the *Vinaya Piṭaka* shall be assigned five *vasag* of food and raiment: to the monks who read the *Sutta- Piṭaka*, seven vasag and to the monks who read the Abhidamma pitaka twelve *vasag* have been given.[44]

XV. Trilingual inscription of Cheng Ho

Queyorz Father Fernao De has mentioned about this inscription in his book called The Temporal and Spiritual Conquest of Ceylon.[45] As mentioned in the above book, the inscription has been kept near the temple of Trincomalee.

The Trilingual inscription



This might have kept there to pay homage to the statues there.[46] This bears the date 15 February 1409 and is now preserved in the National Museum Colombo. It was discovered in 1911 by a provincial Engineer called H. E. Tomlin at a culvert in the town of Galle. It is written in one slab in three languages Chinese, Persian and Tamil. The Chinese letters are well preserved there. The Persian letter are largely defaced but what is readable makes it clear that this too lists offerings to the light of Islam. The Tamil inscription follows the same pattern and the beneficiary is Tenavaria Nayanar. S. Paranavithana identifies as the deity at Devinuvra or Vishnu. The translation of the Chinese version, as published in the Epigraphia Zeylanica is given below.[47]

The Ming Emperor ordered the Sri Lanka captives to select a worthy member of their tribe to be their ruler and the choice fell on Yeh-pa-nai-na according to the Chinese account. Accordingly he was sent back to Sri Lanka bearing the seals of office and proclaimed king under the power and the guidance of the Ming Emperor. The Alakesvara was also sent back. There is a dispute among Sri Lankan scholars regarding the identity of Yeh-pa-nai-na, the nominee of the Chinese Emperor. S. Paranavitana identifies him as Parakramabahu VI of Kotte whereas other scholars are of the view that he was Parakrama Apana. G.P.V. Somaratne deriving his evidence from Portuguese and Sinhala sources has arrived at the conclusion that Parakrama Apana the new king was assassinated on the same night as he arrived in Sri Lanka in 1414 C.E. and Parakramabāhu VI who had been ruling in Rayigama for 3 years became king of Kotte. He was the last great ruler of Sri Lanka who unified the country and ruled till 1467.

XVI. Conclusion

Mas Deeg says some of the details may be carefully reconstructed by the information given by Xuanzang. But It should be kept in mind that he is not to be taken as a trustworthy witness in all cases, and also that what he saw or reported on need not necessarily have been so two hundred years earlier when Faxian was there.[48] As far as the above facts are taken in to account, it is understood that Xuanzang's description demonstrates the historical, social, economic and cultural aspects of ancient Sri Lanka, while giving a considerable contribution to the restoration of the Sri Lankan history as well. Xuanzang always give more detailed information than the laconic Faxian. The present work owes much to the professor Max Deeg, the chair professor of the School of History, Archaeology and Religion in the Cardiff University in UK. He is the one who encouraged me to write this article by providing, all the reading materials.

1. Rongxi Li (1996), 323.
2. Oldenberg Hermann (1992), 1:18, (17:1,2)

(The excellent island of Lanka is thirty two yojanas long, eighteen yojanas broad, its circuit is one hundred yojanas; It is surrounded by the sea).

3. Wickremasinghe Don Marino De Silva &Codrington (1933),. vol. iii: 178. Pitadada hasa, akala hasa, made hasa in these three words, hasa stands for Pāli sassa (Skt. śasya) and means 'harvest' or 'crop'. From these terms, it becomes apparent that in ancient Sri Lanka there were three crops of paddy during the year, just as there are to-day in the villages of the North-Central Province where fields are irrigated by means of tanks and do not depend on the uncertain rainfall. The names of the three crops occurring in this inscription, two can be identified with their modern equivalents. Akala (from Skt. akāla, 'out of season') is the crop now known as yala. The yala crop is sown at the time of the south west monsoon which, for these parts of Sri Lanka, brings only a small quantity of rain. The principal harvest of the year in all parts of Sri Lanka is now known as māha, a word which is a contraction of maha-hasa; and is sown during the north east monsoon. The name corresponding to this in the present inscription is pitadada. There is no doubt that the word stands for māha as its being first mentioned points to it as the principal harvest of the year. The third crop called because it intervenes between the two major harvest.
4. Geiger Wilhelm (1950), 11:14.
5. Childers (1976), 1061.
6. Casson (1991), 8-11.

Lionel Casson has convincingly shown that, at the time of the Periplus the starting point for ships leaving Egypt for India, was the ports of Myos, Hormos and Berenice. It is now believed that the goods to be exported were brought via the Nile and from there, transported across the desert by camel or donkey to the corresponding ports. The proper time to leave Egypt for India was July. Making use of the South West monsoon winds, the ships,

sailed through the Gulf of Aden and reached the ports of the west coast of India in September or in October. The return journey had to be scheduled for the month of November taking advantage of the North East monsoon winds. Merchants hardly had a month to sell their goods and load their ships with new merchandise. Sailors may have not continued their voyage up to Sri Lanka, for risk of missing the North-East winds which assured their return journey. It was certainly more profitable for the merchants to buy the Sri Lankan products from the Indian markets, rather than spending a year on the island waiting for the next North East monsoon.

7. Bopearachchi. O (2008), 4.
8. Rongxi Li (1996), 326
9. Geiger Wilhelm (1950), 10:85. The mention is made that the slave woman who had helped the king Pandukābhaya in time past and was re born of yaksini, to thankful to her the king has made a house at the South gate of the city.
10. The trees are called chetiyas. It is believed that the Bo tree was worshipped in Mohenjodaro (Marshall John, vol . i: 63). The king Pandukābhaya settled Vyādha deva the god of huntsmen in Palmyra tree near the Western gate of the city (Geiger Wilhelm (1950), 1:89). There is no other evidence to prove that the Palmyra palm was included in the category of sacred trees. The Mahāvaṃsa further mentions banyan tree was dedicated to the yaksa king Vaisravaṇa (1950, 1:89).
11. The king Pandukābhaya (5th B.C.E) has constructed houses for the yakśas such as Citrarāja and the Kālavela. The mention is made in Mahāvaṃsa as follows "he settled the yakkha Kālvēla on the east side of the city, the Yakkha Cittarāja at the lower end of the Abhaya tank" (Geiger Wilhelm (1950), 10:84).
12. The same king has housed the yaksani Valavāmukhī within the royal precincts and made early sacrificial offerings them and to other yakśas (Geiger Wilhelm (1950), 10:86).
13. There were three famous Nigṇthans called Jotiya, Giri and Kumbanda. The king Pandukābhaya built a house for the nigaṇtha Jōtiya east ward of the lower cemetery (Geiger Wilhelm (1950), 10:97).
14. The Mahāvamsa shed light on the Sivika Sāla build by king Paṇḍukābhaya. The Mahāvamsatīkā gives two interpretation as hall where the śivalinga was deposited and a lying in home (2001: 223).
15. The king Pandukābhaya has built a monastery for praibbrājakas and a house for ājivakas (Geiger Wilhelm (1950), 10:101-102). The various Pāsandas and samanas also live during this period. These two categories were known in this island as Panduvāsdeve disembarked here in the guise of Paribbarājakas and princess Bhaddakacchayanā disembarked as nuns. Tāpasa were also lived during this period (Geiger Wilhelm (1950), 10:96). It further gives details that the five hundred families of various beliefs also lived (Geiger Wilhelm (1950), 10:100).
16. Buddhadatta P. (2014), 311.
17. Buddhadatta P. (1958), 35.
18. Buddhadatta P. (1958), 37-39.
19. Wang B.& Sen. Tansen (2011), 95
20. Geiger Wilhelm (1950), 44:75-80
21. Oldenberg Hermann (1992), 9:2.
22. Fausboll. V (1962), no. 195, 89-91.
23. Rongxi Li (1996), 326.
24. Senevirathna N.A (1999), 467
25. Geiger Wilhelm (1950), 10:86.
26. Anderson, Catalogue of the Indian Museum, 189. On one side of a pillar in a Buddhist railing at Mathura, is a flying horse with people clinging to it, perhaps intended for this scene.
27. Rongxi Li (1996), 92-93.
28. Geiger Wilhelm (1950), 33:95.
29. Geiger Wilhelm (1950), 37:4,5.
30. Geiger Wilhelm (1950), 20:17-27.
31. Deeg Max (2003), 8.
32. Balagalle G. Vimal (2017), 97.
33. Ray H. P (1994), 14.
34. Verma V. K (2009), 73.
35. Balagalle G. Vimal (2017), 94.
36. Seneviratne S. (1985), 522; Ray H. P (1994), 14.
37. Dewaraja Lorna (2000), 197.
38. Wimalakitti M.& Indavaṃsa H. (1962), 263.
39. Premananda V (1926), 74.
40. Rongxi Li (1996) 134-135.
41. Seneviratne, John M. (1915), vol. xxiv: 75.
42. Rongxi Li (1996), 184-185.
43. Rongxi Li (1996), 81.
44. Wickremasinghe D.M.D.Z. (1912), vol. i: 100.
45. Perera S.G (1930), 18.
46. Hettiarachchi S.B (2004), 301.
47. Paranavitana S. (1928), 331-341.
48. His Majesty, the Emperor of the Great Ming dynasty had dispatched the eunuchs Ching-Ho, Wang Ching-Lien, and others to set forth his utterances before Buddha, the World Honoured One, as follows: Deeply do we reverence you, Merciful and Honoured One, whose bright perfection is wide embracing, and whose ways of virtue passes all understanding, whose law enters into all human relations, and the years of whose great Kalpa (period) are like the sand of the river in number, you whose controlling influence ennobles and converts, whose kindness quickens, and whose strength discerns, whose mysterious efficacy is beyond compare!

'Whereas Ceylon's mountainous isle lies in the south of the ocean, and its Buddhist temples are sanctuaries of your gospel, where your miraculous responsive power imbues and enlightens. Of late, we have dispatched missions to announce our mandate to foreign nations, and during their journey over the ocean they have been favoured with the blessing of your beneficent protection. They escaped disaster, or misfortune and journeyed in safety to and fro. In everlasting recognition of your supreme virtue, We therefore, bestow offering in recompense, and do now reverently present Buddha, the Honoured One, oblations of gold and silver, gold embroidered jeweled banners of variegated silk, incense burners, and flower vases, silks of many colours in lining an exterior, lamps and candles with other gifts, in order to manifest the high honour of our worship. Do you, Lord Buddha, bestow on them your regard'!

List of Alms bestowed at the Shrine of the Buddhist Temple in the mountain of Ceylon of offerings

1,000 pieces of gold, 5,000 pieces of silver, fifty rolls of embroidered silk in many colours, fifty rolls taffeta in many colours, four pairs of jeweled banners, gold embroidered, and of variegated silk, to pairs of the same picked in red, one pair of the same in yellow, one pair in black, five antique brass incense burners, five pairs of antique brass flower vases picked in gold on lacquer with gold stands, five pairs of yellow brass candle sticks picked in gold on lacquer, with gold stands , five yellow brass lamps picked in gold on lacquer with gold stands, five incense vessels in vermilion red, lacquered gold picked on lacquer, with gold stands, six pairs of golden lotus flowers, 2,500 catties of scented oil, ten pairs of wax candles, ten sticks of fragrant incense.

49. Deeg Max (2003), 16.

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NUMERICAL STUDY OF FORCED CONVECTIVE HEAT GENERATION FLOW THROUGH A PERMEABLE WALLS WITH SUCTION/INJECTION

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Abstract

In this paper, forced convective heat generation in a steady flow of an incompressible viscous fluid through a channel permeable walls was studied. The nonlinear governing equations along with boundary are converted into ordinary differential equations using appropriate similarity transformations. The nonlinear governing equations were solved numerically using weighted residual method and the residuals were minimized using the collocation method and computed using mathematica software for various values of physical parameters. The effect of various flow parameters on velocity and temperature profile are graphically discussed.

Keywords: Heat Generation, Forced Convective, Weighted Residual Method, Collocation Method.

1 Introduction

In the last several years, there has been a very rapid increase in the intensity of researches in the field of forced convectives,The increased intensity is due to the importance of convective heat transfer in science and engineering. Such flow can be found in magnetohydrodynamics(MHD) generator, heat exchanger, oil extraction, geothermal reservoirs, flow meter and mircofluid devices [1]. various categories of fluid flows and heat transfer problems for stretching surfaces have been explored in some of investigations [2]. Also, [3] stressed on the combined effect of variable viscosity and electrical conducting on hydromagnetic flow and transfer between a fixed plate and moving parallel plates was numerically analyzed. Numerical analysis of heat transfer and inherent its reversibility in compressible fluid flow through

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a channel partially pulled with porous medium was studies by [4]. [5] investigated the radiation effect of heat generation and viscous dissipation on MHD free convection flow along a stretching sheet. In [6-8], it was discovered that the layer value of buoyancy parameter can be used to control the temperature and concentration boundary layer and that suction stabilizes the boundary layer. Researchers have discussed heat and mass transfer fluid under various physical situations.The combined effect of free and forced convection on MHD flow in porous channel under the uniform magnetic field was investigated and the solutions were obtained for all heat absorption condition and restricted heat generation condition[9]. The study of hydromagnetic natural convective fluid flow between vertical parallel plates with time periodic boundary conditions using Adomian decomposition method was analyzed and the results of their computation shows that an increase in the magnetic field intensity has significantly influenced the fluid flow where the effect of heat generation and suction are neglected [10]. Efficient energy utilization during the convection in fluid is one of the fundamental problem of engineering processes to improve the system, several researchers have theoretically studied heat generation in the flow systems under many physical situations, see [11-13]. However, no attempt has yet been presented for effect of variable heat generation on forced convective with surface boundary condition. Hence, in this study, the effect of heat generation on forced convective fluid flow through a channel with permeable walls was investigated and the model equations were obtained numerically using collocation method and the results were presented graphically to analyze the effect of various parameter on velocity and temperature profile.

2 PROBLEM FORMULATION

In this study, we considered a steady incompressible flow of an electrically conducting variable viscosity fluid between two fixed permeable parallel infinite plates. The flow is fully developed and the edge effects are disregarded. A constant magnetic field of strength B_o is imposed transversely in the y-direction. The applied magnetic field is assumed to be strong enough so that the induced magnetic field due to motion is weak, It is assumed that the lower permeable plate, where fluid injection occurs is convective heated, while at the upper permeable plate both fluid suction and convective heat loss takes place. Under these assumptions, the governing equation for the momentum equation and energy balance in one dimension can be written as [13,5,7]:

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$$V\frac{du}{dy} = -\frac{1}{\rho}\frac{dP}{dx} + \frac{1}{\rho}\frac{d}{dy}\left(\overline{\mu}(T)\frac{du}{dy}\right) - \frac{\sigma B_0^2 u}{\rho} \tag{1}$$

$$V\frac{dT}{dy} = \alpha\frac{d^2T}{dy^2} + \frac{\overline{\mu}(T)}{\rho c_p}\left(\frac{du}{dy}\right)^2 + \frac{\sigma B_0^2 u^2}{\rho c_p} + \frac{Q_0}{\rho c_p}(T - T_f) \tag{2}$$

The boundary conditions are

$$\begin{aligned} u(0) = 0, \qquad & u(h) = 0, \\ -k\frac{dT}{dy}(0) = \gamma_0(T_f - T(0)), \qquad & -k\frac{dT}{dy}(0) = \gamma_1(T(h) - T_\infty) \end{aligned} \tag{3}$$

(x, y) is the axial and normal coordinates, u is the velocity of the fluid, p is the fluid pressure, v is the uniform suction/injection velocity at the channel walls, γ_0 is the heat transfer coefficient at the lower plate, γ_1 is the heat transfer coefficient at the upper plate, α is the thermal diffusivity, ρ is the fluid density,σ is the fluid electrical conductivity, k is the thermal conductivity coefficient, c_p is the specific heat at constant pressure, where (G) is the pressure gradient parameter, T_f is the temperature of the hot fluid at the lower permeable plate, T is the channel fluid temperature and T_∞ is the ambient temperature above the upper plate. The temperature dependent viscosity μ can be written as [14,17].

$$\overline{\mu}(T) = \mu_0 \ell^{-m(T-T_\infty)} \tag{4}$$

where m is a viscosity variation parameter and μ_0 is the fluid dynamic viscosity at the ambient temperature. Thus, the following non-dimensional quantities were introduced:

$$\begin{aligned} & G = \frac{\partial \overline{p}}{\partial x}, \quad \mu = \frac{\overline{\mu}}{\mu_0}, \quad \alpha = \frac{k}{\rho c_p}, \quad \mu(T - T_\infty) = \epsilon, \epsilon\theta = (T_f - T_\infty) \\ & Q = \frac{Q_0}{\rho c_P}(T - T_f), \quad W = \frac{u}{v}, \quad X = \frac{x}{h}, \quad \overline{P} = \frac{ph}{\mu_0 v} \\ & \theta = \frac{T - T_\infty}{T_f - T_\infty},, \quad P = \frac{\overline{P}\mu_0 v}{h}, \quad \eta = \frac{v}{h}, \quad V = \frac{\mu_0 v}{\rho} \end{aligned} \tag{5}$$

Substituting equation (5) into (1)-(4) we obtain

$$\frac{d^2w}{d\eta^2} - \epsilon\frac{d\theta}{d\eta}\frac{dw}{d\eta} - \ell^{\epsilon\theta}\left(Re\frac{dw}{d\eta} + Haw - G\right) = 0 \tag{6}$$

$$\frac{d^2\theta}{d\eta^2} - RePr\frac{d\theta}{d\eta} + EcPr\ell^{-\epsilon\theta}\left(\frac{dw}{d\eta}\right)^2 + EcPrHaw^2 + Q_0\theta = 0 \tag{7}$$

The corresponding initial and boundary conditions are:

$$w(0) = 0 \;\; and \;\; w(1) = 0 \tag{8}$$

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$$\frac{d\theta}{d\eta}(0) = Bi_0(\theta(0) - 1) \;\; and \;\; \frac{d\theta}{d\eta}(0) = Bi_0(1) \tag{9}$$

$$Re = \frac{vh}{v}(Reynold - number) \quad Pr = \frac{v}{\alpha}(Prandtl - number)$$

$$Ec = \frac{v^2}{c_p}(T_f - T_\infty)(Eckert - number) \quad Q = \frac{Q_0}{\rho c_P}(T - T_f)(Heat - Generation)$$

$$Ha = \frac{\sigma B_0^2 H^2}{\mu u}(Hartmann - number) \quad \epsilon = m(T - T_\infty)(Viscosity - parameter)$$

$$Bi_0 = \frac{y_o h}{k}(Biot - number for lower - plate) \quad Bi_1 = \frac{y_1 h}{k}(Biot - number for upper - plate)$$

3 NUMERICAL COMPUTATION

Collocation Weighted Residual

The system of coupled non-linear ordinary differential equations (6) and (7) together with the boundary conditions (8) and (9) was solved numerically using Collocation Weighted Residual Method.

$$w = \sum_{K=0}^{10} a_k \eta^k \; and \; \theta = \sum_{K=0}^{10} b_k \eta^k \tag{10}$$

Which can be interpreted as

$$w(\eta) = a_0 + a_1\eta + \eta^2 a_2 + \eta^3 a_3 + a_4\eta^4 + a_5\eta^5 + a_6\eta^6 + a_7\eta^7 + a_8\eta^8 + a_9\eta^9 + a_{10}\eta^{10} \tag{11}$$

$$\theta(\eta) = b_0 + b_1\eta + \eta^2 b_2 + b_3\eta^3 + b_4\eta^4 + b_5\eta^5 + b_6\eta^6 + b_7\eta^7 + b_8\eta^8 + b_9\eta^9 + b_{10}\eta^{10} \tag{12}$$

Substituting equation (6) into (10), we obtain

$$w(\eta) = 2a_2 + 6a_3\eta + 12a_4\eta^2 + 20a_5\eta^3 + 30a_6\eta^4 + 42a_7\eta^5 + 56a_8\eta^6 + 72a_9\eta^7 + 90a_{10}\eta^8 - \ell^{\left(b_0 + b_1\eta + \eta^2 b_2 + b_3\eta^3 + b_4\eta^4 + b_5\eta^5 + b_6\eta^6 + b_7\eta^7 + b_8\eta^8 + b_9\eta^9 + b_{10}\eta^1 0\right)}(a_0 + a_1 + a_1\eta + 2a_2\eta + a_2\eta^2 + 3a_3\eta^2 + a_3\eta^3 + 4a_4\eta^3 + a_4\eta^4 + 5a_5\eta^4 + a_5\eta^5 + 6a_6\eta^5 + a_6\eta^6 + 7a_7\eta^6 + a_7\eta^7 + 8\eta^7 a_8 + \eta^8 a_8 + 9\eta^8 + \eta^9 a_9 + 10\eta^9 a_{10} + \eta^{10} a_{10}) - (a_1 + 2a_2\eta + 3a_3\eta^2 + 4a_4\eta^3 + 5a_5\eta^4 + 6a_6\eta^5 + 7a_7\eta^6 + 8a_8\eta^7 + 9a_9\eta^8 + 10a_{10}\eta^9)(b_1 + 2b_2\eta + 3b_3\eta^2 + 4b_4\eta^3 + 5b_5\eta^4 + 6b_6\eta^5 + 7b_7\eta^6 + 8b_8\eta^7 + 9b_9\eta^8 + 10b_{10}\eta^9) \tag{13}$$

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Substituting equation (7) into (11), we have

$$\theta(\eta) = \Big(2b_2 + 6\eta b_3 + 12\eta^2 b_4 + 20\eta^3 b_5 + 30\eta^4 b_6 + 42\eta^5 b_7 + 56\eta^6 b_8 + 72\eta^7 b_9 + 90\eta^8 b_{10}\Big) - \Big(b_1 + 2b_2\eta + 3b_3\eta^2 4b_4\eta^3 + 5b_5\eta^4 + 6b_6\eta^5 + 7b_7\eta^6 + 8b_8\eta^7 + 8b_8\eta^7 + 9b_9\eta^8 + 10b_{10}\eta^9\Big) + \ell^{\left(b_0+b_1\eta+\eta^2 b_2+b_3\eta^3+b_4\eta^4+b_5\eta^5+b_6\eta^6+b_7\eta^7+b_8\eta^8+b_9\eta^9+b_{10}\eta^{10}\right)} \Big(a_1 + 2a_2\eta + 3a_3\eta^2 + 4a_4\eta^3 + 5a_5\eta^4 + 6a_6\eta^5 + 7a_7\eta^6 + 8a_8\eta^7 + 9a_9\eta^8 + 10a_{10}\eta^9\Big)^2 + \Big(a_1\eta + \eta^2 a_2 + \eta^3 a_3 + a_4\eta^4 + a_5\eta^5 + a_6\eta^6 + a_7\eta^7 + a_8\eta^8 + a_9\eta^9 + a_{10}\eta^{10}\Big)^2 + (b_0 + b_1\eta + \eta^2 b_2 + b_3\eta^3 + b_4\eta^4 + b_5\eta^5 + b_6\eta^6 + b_7\eta^7 + b_8\eta^8 + b_9\eta^9 + b_{10}\eta^{10}) \tag{14}$$

Using the boundary conditions,

$$w(0) = 0 \Rightarrow a_0 = 0 \tag{15}$$

$$w(0) = a_0 + a_1 + a_2 + a_3 + a_4 + a_5 + a_6 + a_7 + a_8 + a_9 + a_{10} = 0 \tag{16}$$

$$\theta(0) = -b_0 + b_1 + 1 = 0 \tag{17}$$

$$\theta(1) = b_0 + 2b_1 + 3b_2 + 4b_3 + 5b_4 + 6b_5 + 7b_6 + 8b_7 + 9b_8 + 10b_9 + 11b_{10} = 0 \tag{18}$$

4 RESULTS AND DISCUSSION

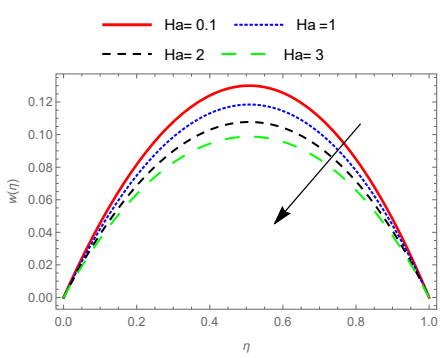

Fig. 1: velocity profile for different values of Ha when $Re = 0.1$,Pr=0.7,$Ec = 0.1$,$\epsilon = 0.1$,$Q = 0.1$,$Bi_0 = 0.1$,$Bi_1 = 0.1$

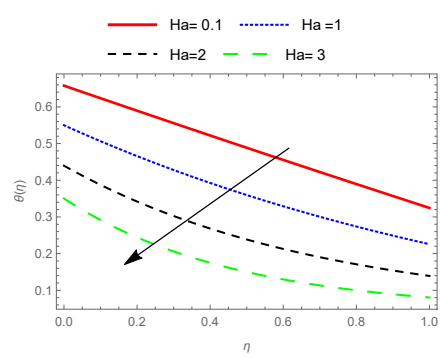

Fig. 2: Temperature profile for different values of Ha when $Re = 0.1$,$Pr = 0.7$,$Ec = 0.1$,$\epsilon = 0.1$,$Q = 0.1$,$Bi_0 = 0.1$,$Bi_1 = 0.1$

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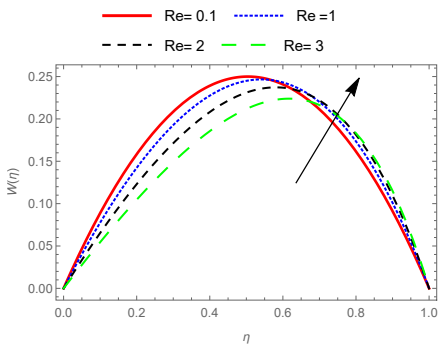

Fig. 3: velocity profile for different values of Re when $Ha = 1, Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Bi_0 = 0.1, Bi_0 = 0.1$

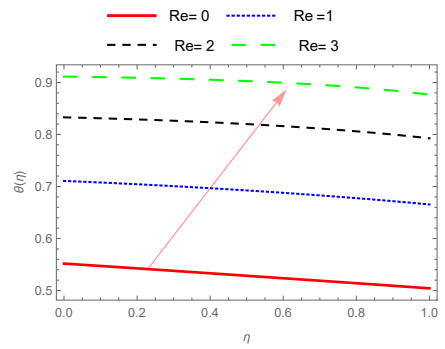

Fig. 4: Temperature profile for different values of Re when $Ha = 0.1, Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Bi_0 = 0.1, Bi_0 = 0.1$

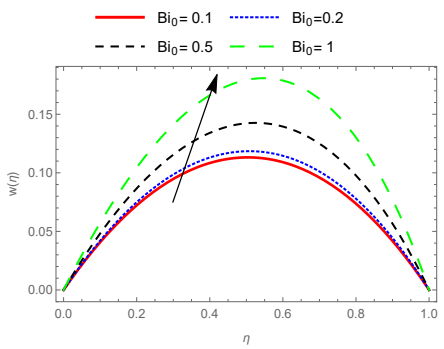

Fig. 5: velocity profile for different values of Bi_0 when $Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Ha = 0.1, Bi_0 = 0.1, Re = 1$

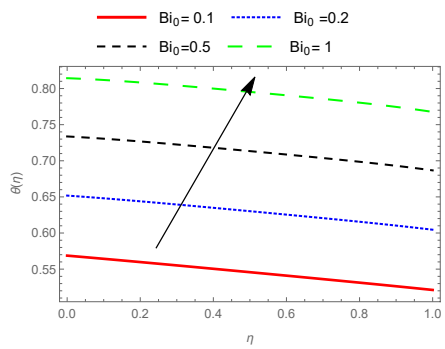

Fig. 6: Temperature profile for different values of Bi_0 when $Ha = 0.1, Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Bi_0 = 0.1, Re = 0.1$

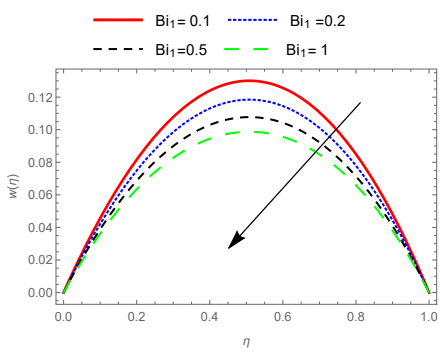

Fig. 7: velocity profile for different values of Bi_1 when $Re = 1, Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Bi_0 = 0.1, Ha = 0.1$

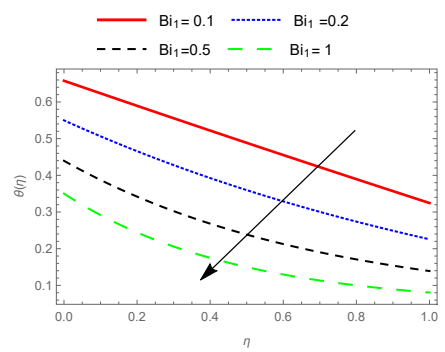

Fig. 8: Temperature profile for different values of Bi_1 when $Ha = 0.1, Pr = 0.7, Ec = 0.1, \epsilon = 0.1, Q = 0.1, Bi_0 = 0.1, Ha = 0.1$

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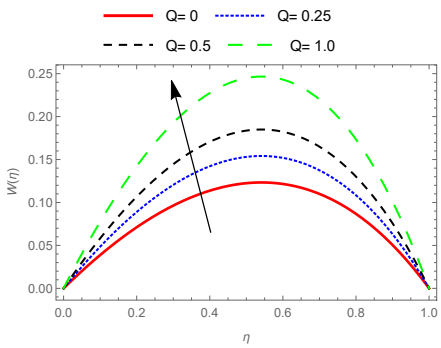

Fig. 9: velocity profile for different values of $Q =$ when $Re = 1$,$Pr = 0.7$,$Ec = 0.1$,$\epsilon = 0.1$, $Bi_1 = 0.1$,$Bi_0 = 0.1$,$Ha = 0.1$

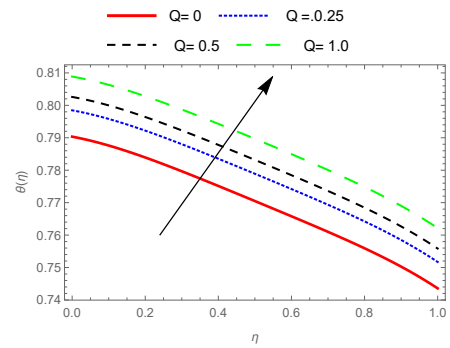

Fig. 10:Temperature profile for different values of $Q =$ when $Ha = 0.1$,$Pr = 0.7$,$Ec = 0.1$,$\epsilon = 0.1$,$Bi_1 = 0.1$,$Bi_0 = 0.1$,$Ha = 0.1$

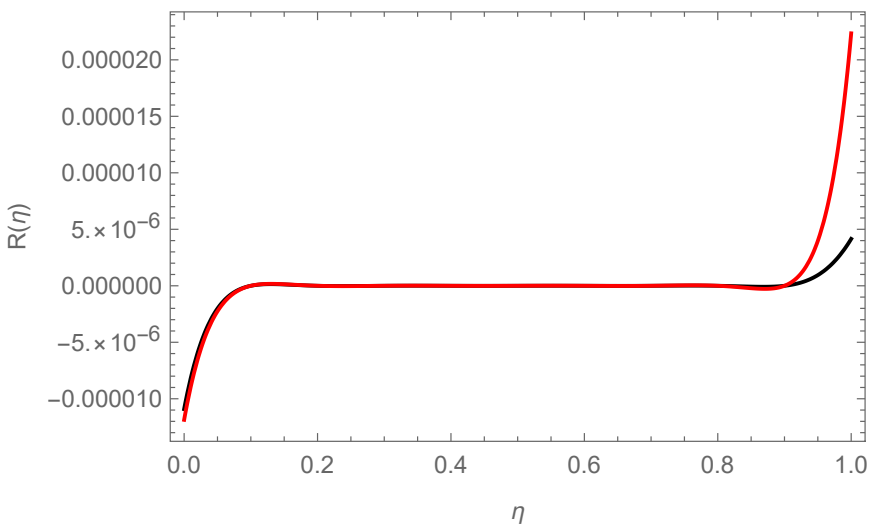

Fig 11: Minimized residual error $(R(\eta))$

Fig. (1) shows the effect of Hartmann number (Ha) on velocity profile and we observed that decrease in Hartmann decreases the velocity profile and it serves as electromagnetic force to the viscous force. The presence of Lorentz force also act as resistance to flow. **Fig. (2)** shows the effect of magnetic (Ha) on the flow fluid, Increase in values of (Ha) decreases the Temperature profile, then the fluid suction and convection losses despite the presence of Lorentz heating which serves as additional heat source to the flow.**Fig. (3)** shows the response of the fluid velocity to variation in suction Reynolds number, the fluid velocity decreases and skewed towards the upper plate as Reynolds number (Re) increases due to increase in injection at the lower plate and injection and suction at the upper plate.**Fig. (4)** shows that the suction Reynolds number (Re) increases with increases number then

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suction Reynolds number (Re) increasing the fluid viscosity becomes lighter and viscous heating increase due to increase convective heating at the lower plate increase leading to a rise in fluid in the temperature. **Fig. (5) and (7)** shows that the effect of (Bi_0) rise in the fluid temperature is observed with increasing convective heating at the lower plate, (Bi_1) in the fluid temperature decreases due to increase in convective heat loss at the upper plate.**Figs. (6) and (8)** graphically shows that the (Bi_0) increases with increase in connectivity heating at lower plate and (Bi_1) decreases with increase in convection cooling at the upper plate, this is expected since the fluid become lighter and flow faster with increasing temperature due to convective heating. **Figs. (9) and (10)** shows the heat generation due to the viscous heating increasing with the parameter values of heat generation and it is observed that fluid velocity and temperature profiles increase with increasing value of heat generation (Q), hence produces an increase in the heat transfer and flow faster.**Fig. (11)** shows the graph of the residual functions $R(\eta)$ and it was observed that the residuals are minimized in the domain ($0\ to\ 1$)

5 CONCLUSION

This study investigated the effects of heat generation on variable viscosity channel flow with suction/injection together with convective heating/cooling at the walls have been investigated. The nonlinear model problem is tackled numerically using (WRM) collocation method. Based on the results presented above, the following conclusions are deduced.

The impact of different parameter such as effect of different parameter such as Hartman number (Ha), Biot number lower plate (Bi_0), Biot number upper plate (Bi_1), Reynold number (Re), Heat Generation (Q) are discussed graphically.

- An increase in (Q),(Pr),(Bi_0),(Ec),(ϵ) and increases the velocity profiles, while an increase in (Ha) and (Bi_1)decreases the velocity profile.
- An increase in (Q),(Pr),(Bi_0),(Re),(Ec),(ϵ) and increases the temperature profiles, while an increase in (Ha) and (Bi_1) decreases the temperature profile.

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The Migration of Helminthes Between Wild And Domestic Birds And Regularity of Their Circulation In Biocenosis

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Abstract- This article analyzes the laws of helminthes exchanging among wild and domestic birds and their circulation development in different biocenoses.

Index Terms- circulation, migration, helminth, parasite, worm, biocenoses, laws, analyze, birds, environment, invasion, host.

I. Introduction

The rich fauna of birds of Uzbekistan, inhabiting in different landscapes for characteristic natural conditions are peculiar, causes a great diversity of the species composition of their helminthes. Numerous wild birds, often changing their habitats, contribute to the reservation and spread of helminthes. They carry them on the territory of various poultry farms, participating in the formation here of hearth of invasions.

II. Materials and Research Methods

In order to study the law of helminthes exchange in wild and domestic birds, found in the mountainous, foothill, as well as tugays and anthropogenic zones of southern territories of Uzbekistan and on the basis of the above mentioned information in 2018-2019 years, helminthological researches were conducted. In the process of the research, generally accepted methods of studying in helminthological science Scriabin (1928) “Method of complete helminthological dissection”, Dubinina (1972) “Parasitological study of birds” were used.

III. Results and Discussion

According to our own research and literature data among parasitic helminthes in wild and domestic birds of Uzbekistan, there are 53 species, of which 23 species are the causative agents of serious helminth infections and cause significant damage to the poultry farms of the republic [1,2,3,4]. Of the common types of helminthes in domestic chickens, there are 28 parasitizing species; domestic ducks - 33, turkeys - 6. Among wild birds, the most common parasitic worms with domestic birds are Acridotheres tristis and Sturnus vulgaris, Turdus merula and etc. (Table 1)

Extensiveness of bird invasion by separate species of parasitic worms was 12–28%, the intensity of invasion ranges from 1.8 to 274.1 copies.

Table-1
The commonality of helminthes of wild and domestic birds of Uzbekistan

Species of helmenths	Wild birds	Domestic birds
Cestoidea		
Raillietina echinobothrida	Streptopelia orientalis	hen
Raillietina weissi	Columba eversmanni and Columba livia	hen
Skriabinia cesticillus	Columba eversmanni and Columba livia	hen
Choanotaenia constricta	Acridotheres tristis	hen
Choanotaenia infundibulum	Phasianus colchicus, Acridotheres tristis	hen
Raillietina frontina	Columba livia	hen
Echinolepis carioca	Acridotheres tristis and Sturnus vulgaris	hen
Sobolovitaenia sobolovi	Acridotheres tristis	Hen, duck
Cloacotaenia megalops	Anas crecca, Anas acuta	duck
Trematoda		
Ehinosnotoma revolutum	Anas crecca, Anas acuta	Duck, goose
Ehinostoma transfretanum	Fulica atra, Anas crecca, Anas acuta	Hen, duck
Bilharziella polonica	Chroicocephalus ridibundus, Anas crecca	Duck
Prosthogonimus ovatus	Phasianus colchicus, Sturnus vulgaris	Hen, Duck
Notacotylus attenuatus	Anas clypeata, Anas penelope	Duck
Acanthocephala		
Polymorphus magnus	Anas crecca, Fulica atra	Duck

Polymorphus minutus	Anas acuta	Duck
Prosthorhynchus transverses	Turdus merula, Corvus corone, Upupa epops	hen
Nematoda		
Ascaridia galli	Phasianus colchicus, Columba livia	hen
Heterakis gallinarum	Streptopelia orientalis	hen
Capillaria obsignata	Upupa epops, Corvus corone, Acridotheres tristis	Hen
Amidostomum filicae	Anas crecca, Fulica atra	Duck
Dispharynx nasuta	Corvus corone, Upupa epops, Turdus merula	Hen
Tetrameres fissispina	Anas crecca, Anas acuta	Duck

Peculiarities of seasonal dynamics are associated with the presence in nature of intermediate hosts of helminthes, which mainly include beetles - (Dilalaevicollis, Gonocephalum pubiferum, Tenebrio molitor), woodlice (Porcello scaber, P. laevis, P. fedtshencoe, Armadillum vulgare), and rain worms (Allolobophora fassiensis, A. calliginosa, Eisenia rosea), and some other representatives of the invertebrate fauna.

The high indexes of helminthes contamination were recorded in Acridotheres tristis and Corvus corone (EI 70.7-92.4%, AI 9.4-17.6 samples).

Recently, the process of synanthropization of some wild birds has been noted. In search of food of anthropogenic origin, they became regular visitors in poultry farms, which leads to an increase of parasitic diseases in poultry farms.

The main role in the spread and maintenance of helminth infestation belongs mainly to synanthropic birds, including the Acridotheres tristis, having 4 common species with the domestic birds, and Sturnus vulgaris - 2, Corvus corone - 3, Anas crecca - 7, Anas acuta - 5, Fulica atra - 3, Streptopelia orientalis and Streptopelia senegalensis - 2.

To clarify the role of individual species of birds in the spread of helminth infestations by various species of helminthes, as well as some other indicators, we have identified the following groups: helminthes, in the distribution of which the main role is played by domestic birds – Echinostoma revalutum, Prosthogonimus ovatus, Notocotylus attenuatus, Raillietina tetragona, Scriabina cesticillus, Choanotaenia infundibulum, Ascaridia galli, Heterakis gallinarum, Capillaria obsignata.

In the distribution of helminthes, which the dominant role belongs to wild birds such as – Ehinostoma transfretanum, Bilharziella polonica, Echinolepis carioca, Dicranotaenia coronula, Cloacotaenia megalops.

Helminthes, in the distribution of which in the same level contribute as domestic, so and wild birds - Echinostoma revolutum, Prosthogonimus ovatus, S.cesticillus, Dispharynx nasuta, Raillietina echinobotrida.

In the distribution of helminthes, which the main role belongs to human activities such as helminthes – Echinostoma revolutum, Scriabina cesticillus, Ascaridia galli, Heterakis gallinarum, Capiilaria obsignata.

Further strengthening by anthropogenic press (drying up the Aral Sea, the emergence of new reservoirs, etc.), which resulted in global environmental changes in large areas, which lead to a change in the habitats of many species of wild birds, including migratory ones, they provide prerequisites for a significant increase in the number of helminthes species that they are common to wild and domestic birds. The number of such helminthes, we can note following types – Ehinostoma transfretanum, Bilharziella polonica, Cloacotaenia megalops, etc. We should define the epizootic groupings of parasitic worms, to which we attribute the widespread pathogens of invasions well-adapted and causing the greatest harm to the poultry farming (Prosthogonimus ovatus, Notocotylus attenuatus, Raillietina echinobotrida, Choanotaeniainfundibulum, Ascaridia galli, Heterakis gallinarum, Capillaria obsignata, Polimorphus magnus), the pathogen agents of local foci of invasions are as follows: Raillietina weissi, Dicranotaenia coronula, Dilepis undula, Anonchotaenia globata, Amidostomum fulicae, Clinostomum complanatum; rare pathogens of invasion, representing a potential threat (Collyriclum faba, Diorchis brevis, Vitta rustica, Monopylidium passerum, Sobolevitaenia sobolovi) are studied.

In general, the process of helminthes migration between wild and domestic birds has recently been activated. Permanent habitats, feedings, and overnight stays of most species of wild birds are often carried in territories that are closely related to economically used areas and settlements. In many respects, this is facilitated by social measures for the development and reclamation of new lands and other anthropogenic impacts on the natural environment.

The migration of parasitic worms between wild and domestic birds is ecologically interconnected with the characteristics of the circulation of helminthes in biocenoses and both concepts are one. Regularities of helminthes circulation are no less significant biocenoses and parasiticcenosis of one or another host, living in these conditions and also should lie down to the basis of biological principles of regulation of natural - focal parasitic systems. In aquatic biocenoses, mainly various aquatic birds (wild - coot, teal whistle, pintail, great cormorant, etc; domestics – duck, goose) and invertebrates (aquatic crustaceans, mollusks, etc.) were concentrated. Meanwhile, among the surveyed birds, the bulk of the population was terrestrial birds (orders - sparrows, pigeon, chicken) and invertebrates (insects, woodlice, mollusks, earthworms). At the same time, the presence and biocenoses of representatives of the invertebrate and vertebral fauna create favorable conditions for the circulation of helminthes in the natural environment among various components. An ecological analysis of these relationships in various biocenoses allowed basing the following 11 ways of circulation of the relevant groups of parasitic worms:

The bird (Fam. Phasianinae, Anatidae) is a terrestrial bird environment. The families of Ascarididae (Ascaridiagalli) and Heterakidae (Heterakisgallinarum) will participate in the circulation of helminthes by this way.

The bird (Fam. Anatidae) – aquatic environment – a bird. The families of the Amidostomatidae (Amidostomum anseris), Heterakidae (Gangulaterakis dispar) will participate in the circulation of helminthes by this way.

The bird (Fam. Accipitridae, Sturnidae, Ploceidae, Phasianidae, Corvidae) – terrestrial environment – intermediate host (earthworms, insects, rodents) – a bird. The representatives of this birds family such as Davainiidae (Raillietina echinobothrida, Scriabinia cesticillus, Davainea proglottina), Dilepididae (Choanotaenia infundibulum, Ch.constricta, Monopylidium passerum, Vitta rustica, Sobolovitaenia sobolovi,Anomotaenia constricta), Hymenolepididae (Aploparakis larina, A. filum, Diorchis brevis, Passerilepis crenata, P. stylosa) and Collyriclidae (Collyriclum faba) play a key role in the circulation of the helmenthes.

The bird (Fam. Anatidae, Laridae, Phalacrocoracidae) – aquatic environment – intermediate host (aquatic crustaceans) – a bird. The families of Polymorphiidae (Polomorphus magnus, P. minutus) and Filicollidae (Filicollis anatus) will participate in the circulation of helminthes by this way.

The bird (Fam. Galliformes, Corvidae) – terrestrial environment – reservoir hosts (earthworms) – a bird. The Syngamidae family (Syngamidae trachea) will participate in the circulation of helminthes by this way.

The bird (Fam. Anatidae, Sturnidae, Phasianidae, Ploceidae) – terrestrial environment – the first intermediate host (woodlice) – a bird, the second intermediate host (insect) – a bird. The families of Prosthogonimidae (Prosthogonimusovatus, P. cuneatus), Plagiorchidae (Plagiorchis arcuatus) will participate in the circulation of helminthes by this way.

The bird (Fam. Anatidae, Laridae) – aquatic environment – the first intermediate host (aquatic crustaceans) – the second intermediate host (fish) – a bird. The family of Ligulidae (Ligulaintestinalis, etc.) will participate in the circulation of helminthes by this way.

The bird (Fam. Galliformes) – terrestrial environment – intermediate host (mollusks) – additional host (crustaceans) – a bird. The Dicrocoeliidae family (Brachulectihumdonicum, Lyperosomumlongicauda, L. coracii) will participate in the circulation of helminthes by this way.

The bird (Fam. Anatidae, Galliformes, Rallidae) – aquatic environment – intermediate host (mollusks) – additional host (amphibians) – a bird. The Echinostomatidae family (Echinostoma revolutum, Eh. Transfrenanum, Eh. Chlorpodis) will participate in the circulation of helminthes by this way.

The bird (Fam. Anatidae, Podicipedidae, Charadriidae) – aquatic environment – intermediate host (crustaceans) - reservoir host (fish) – a bird. The Streptocaridae family (Streptocaracrassicaudas) will participate in the circulation of helminthes by this way.

The bird (Fam. Podicipedidae, Phalacrocoracidae, Ardeidae, Accipitridae) – aquatic environment – the first intermediate host (aquatic crustaceans) —the second intermediate host (fish) —the reservoir host (predatory fish, birds, amphibians, reptiles) — a bird. The families of Anisakidae (Contracaecum microcephalum) and Diplostomidae (Neodiplostomumattenuatum) will participate in the circulation of helminthes by this way.

The above mentioned data indicate that 23 species of definitive hosts among wild and domestic birds, 12 species of intermediate, additional and reservoir hosts, consisting of representatives of invertebrate and vertebrate fauna are participated in the circulation of various parasitic worms in biocenoses.

In order to circulation one or another type of helminthes in the biocenosis, besides the epizootological chain “helminth - final host - intermediate host” and passing to the abiotic factor, there are also synchronization of the appearance in the environment of a sufficient number of invasive onset and susceptible to invasion of animals, as well as permanent and stable connections between the final and intermediate hosts of helminthes and other components, participating in the circulation of helminthes. In general, we can see that in the complex mechanisms of the formation of parasitic systems, numerous articulate biocenoses willmparticipate, each of which is an integral part of the formation of a particular composition of the helminthofauna.

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Formation of Motivation to the Upbringing of Healthy Life Style in Students

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Abstract- The article involves the problem of a healthy lifestyle and the formation of motivation for the upbringing of a healthy lifestyle (HL) of future teachers of educational institutions. The concept of motivation principles of the formation of the motivation of healthy lifestyle is described; information on the results of experimental studies is given.

Index Terms- health, healthy lifestyle, components of healthy lifestyle, motivation, structure of motivation, attitude to healthy lifestyle, principles of motivation of healthy lifestyle, healthy-saving culture.

I. Introduction

HL (healthy lifestyle) is a social category. When we talk about healthy lifestyle, it means that we are talking about the active life of society (class, social group, personality, etc.). At the same time, humanity is an integral part of the biological world, and we should not forget about the spreading of the biosphere laws to the organic and inorganic world [4, p. 122].

The problem of a healthy life style is the most important problem for a person, contributing to the full development of a person in the field of work and have a rest, scientific justification, social and hygienic activities. In solving this problem, the large significance involves the formation of motivation for the upbringing of healthy lifestyle.

When we talk about the role of the motivational factor in the formation of a healthy lifestyle, first of all, future educators should know what is the motivation. The motivation is to act in such a way, that a person, in its content, can begin to perform certain activities. In particular, the motivational factor in the problem of the formation of healthy lifestyle is aimed at ensuring that people understand the importance of health preservation and health culture [3, p.301].

Culture of health is a scheme of life values, based on knowledge about the essence of health (including the ways and methods of its formation, preservation and strengthening) and regulating people's behavior in the process of vital activity. It is possible to successfully educate a health culture may be under forming a healthy lifestyle motivation on the basis of relevant principles. According to literary data, the basic principles of the formation of the motivation for healthy lifestyle, directed at creating a system of personal values, which occupies an active life position, developmental motivation for self-development and self-improvement, allowing to ensure the formation of health-saving behavior strategies and the creation of a health-saving environment, the followings are:

-the principle of acceologicality, ensuring the formation in people of worldview ideas about universal values, respect for themselves, for their health and the health of others, about the preservation of somatic, mental and moral health;

- the principle of gradualness, which provides for the sequence of realization of the goals and objectives for the formation of a healthy lifestyle, achieved through the regulation of physical and mental loads and their consistent increase, complementing factors that contribute to the preservation of children's health;

-the principle of individuality, based on the experience of intercultural activity, including the system of the concept of knowledge and skills, leading to the rejection of negative deviations and the formation of the correctness of students' behavior;

-the principle of acquiring the skills of health preservation and sannogenic thinking, allowing to optimize the lifestyle of the individual, to actively engage in individual health, based on changes in the motivational environment of the individual;

- the principle of holism, orienting to consider a person as a holistic being in the system of "personality-environment";

-the principle of causality, related with the knowledge of cause- investigative relations in the organism and allowing person can see the whole process of formation of a healthy lifestyle motivation as the choice of one's being;

-the principle of apperception, promoting awareness and search for the presence in the organism of health mechanisms;

-the principle of anticipation, which allows to anticipate behavioral models, focused on holistic health-saving activities, sociocultural standards of healthy lifestyle;

- the principle of functional consistency, related with the formation of health standards, taking into account the characteristics of diseases;

- the principle of ethnic differentiation is based on Eastern and Western health doctrines, being the main reference point in the understanding of painful manifestations at the psychophysiological and socio-psychological levels [1, p. 102].

It is established that motivation is an external or internal motivation of the subject to work in order to achieve some goals, the presence of interest in such activities and the ways of its initiation, urge. The motives for maintaining healthy lifestyles are formed under the influence of the entire system of pedagogical influences, first of all is tried in the process of direct educational activities. The education of positive motivation for healthy

lifestyle depends on the content of training, the organization of the educational process, the personality of the teacher [2, p. 192].

As you know, basic information about healthy lifestyle, students receive in the studying of course subject of "Basics of Valeology", in the process of assimilation of which he acquires health-saving knowledge.

In the context of the above, we carried out research with students of the faculties of biological, preschool and methodology of primary education in order to determine the level of the formed motivation of the healthy lifestyle of students of a pedagogical educational institution. The following indicators of motivation for the formation of a healthy lifestyle were considered:

-degrees of displaying the healthy lifestyle in life activity;
- components of a healthy lifestyle;
- motivation composing of a healthy lifestyle;
- socialization of healthy lifestyle;
- the direction of motivation for healthy lifestyle;
- the direction of the motivation of healthy lifestyle, depending on ability (according to ability);
- energy of motivation of healthy lifestyle;
- - truthfulness (justice)of the motivation for healthy lifestyle.

During the survey of future teachers, it became clear what does influence them to conduct healthy lifestyle and why do they lead healthy lifestyle, which did make it to characterize the composition of the structure of the motivation of healthy lifestyle, generalization and focus of motivation for healthy lifestyle, as well as the focus of motivation on methods of healthy lifestyle, the energy of motivation of healthy lifestyle and its effectiveness.

At the first stage of research, the initial level of motivation for healthy lifestyle was identified, which was compared with the data obtained at the end of the pedagogical experiment, in the course of which the program of the experiment developed by us was implemented, including the holding of special classes on the methodology for the formation of healthy lifestyles, interactive methods, games and health-saving technologies, the formation of the philosophy of health and healthy lifestyle were used.

A comparative analysis of the data, obtained during the course of the pedagogical experiment, it was revealed that significant positive shifts in the development of motivation for a healthy lifestyle among students of experimental groups.

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Health Service Innovation in Local Government : Analyzing the effect of organizational culture and knowledge management on the Health Service Innovation and Performance

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Abstract- Organizational culture and knowledge management become the prominent dimensions in developing the health service innovation into achieve the high performance of the health service institution in the era of decentralization and competitiveness for local government Organizational culture has benefits to improve the condition of performance and innovation, and also knowledge management can help to make the organization stability and organization performance. Surprisingly, there is little research conducted to measure the organizational culture and knowledge management by using the health service innovation as a moderating variable toward the performance of health service institution. The primary purpose of this article is to examine the effect of organizational culture and knowledge management on the health service innovation and performance of the health service institution at Sinjai Regency, South Sulawesi Province. This research is a quantitative approach and the type of research was surveyed exploratory. The population of research was 420 those who work at the Local Hospital and Central Health Service in Sinjai Regency. The research sample was 201 participants that are gained through Krejcie table in the margin of error 95%. The data were gathered through questionnaires which used Likert scale. In analyzing the data, we used structural equation modelling through AMOS software version 24. The research findings showed that five proposed hypotheses were supported respectively. Therefore, local governments and the health service institution should be strengthening organizational culture and knowledge management in improving health service innovation and performance in local government.

Index Terms- health service innovation, knowledge management, organizational culture, performance

I. INTRODUCTION

This article article seeks to analysis the organizational culture and knowledge management effect on the health service innovation and performance of health care institution performance in local government. Nowadays, they have become prominent dimensions which play a key role in implementation of innovation in public service and performance, especially the health service at local government. Organizational culture is a critical factor in building and reinforcing knowledge management in organizations[1]–[4]. Consequently, better understanding of cultural diversity in the public organization can help to integrate cultural realities in order to use their advantages to overcome paralyzing cultural limitations and compensate for the limits of organizational culture to enhance creativity, innovation, and entrepreneurship in the increasingly globalized social, economic, and business environments [5]. There are some empirical researchers found that there were relationship between organizational culture and organizational innovation in nonprofit human service organizations [6]–[8]. Developing an organizational culture that emerges and promotes creativity and innovation is an imperative for organizations [9].

Knowledge management in the competitive era seemed necessary to be studied during the term of developing the health service innovation, and there was a relationship between organizational culture and knowledge management to improve the organizational innovation and performance[2], [5], [6], [8], [10]–[14]. Knowledge management in the competitive era seemed necessary to be studied in the term of developing the health service innovation. Actually, organizational culture and knowledge management have a close relationship to improve the organizational innovation and performance [6], [8], [10], [12]–[16]. We then argue that knowledge management in public service should be maintained and developed because it's important to motivate and supported the leader and employee in the public organization in achieving the organizational innovation and highest performance in the local government. It is also relevant with the spirit of public service innovation and service reform for local government. According to literature review shows that there is a relationship between organizational culture and knowledge management [17].

Based on those empirical research, the researchers argued that investigate the organizational culture and knowledge management toward public service innovation and performance is necessary to be studied, because it can give the worthiness for local government to improve the health service system for the citizen. Unfortunately, there was very seldom the research conducted to examine the effect of organizational culture and knowledge management on the health service innovation and performance, meanwhile they seemed necessary to improve and need to be implemented in local government. So then, in this article, we try to examine those dimensions in the termination of health service innovation especially in local government in Sinjai Regency.

Today, Sinjai Regency Government has been being paid careful attention to develop the health service innovation in the last three years. Based on the innovation in health service of Sinjai Regency, the Ministry of National Apparatus Empowerment and Bureaucratic Reform Republic of Indonesia has chosen Sinjai Regency as the Top 99 and Top 40 award in health innovation in the 2017. Based on the Regulation of the Minister of Health of Indonesia Number 75 of 2015 about Public Health Center, Sinjai Regency Government conducted the health service innovation programs in the whole of local hospitals and the public health center (PUSKESMAS). Based on the secondary data showed that in the last three years, the condition of health service in Sinjai Regency gets more benefits and the satisfaction of the society concerning to the health service innovation.

The availability of good health service facilities and human resources determine the success in the health sector. Over the past three years the number of public hospitals in Sinjai has not increased, there is only one hospital. However, maternity homes have increased with the construction of only one maternity hospital in 2015. Sinjai Government has provided the best service innovation for the pregnant women in order to give birth with the help of health workers who have been distributed to various regions including remote areas, namely rural areas. This effort paid off with a decrease in the percentage of births assisted by non-medical personnel. The health service facilities and infrastructure of Sinjai Regency can be seen in the following table:

Table 1: Health service statistical facilities

Facilities	Years		
	2015	2016	2017
Hospitals	1	1	2
Public Health Center	16	16	16
Subsidiary of public health service (Puskesmas Pembantu)	62	62	62
Mobile Public Health Center Units (Puskesmas Keliling)	15	15	15
Maternal & Child Health Center (Posyandu)	325	325	324
Maternity House (Rumah Bersalin)	1	1	1
Total	420	420	420

Source: Secondary data, 2019

II. LITERATURE REVIEW

A. *Organizational Culture*

Literature on organizational culture and innovation reveals that researchers largely have focused on the strength of organizational culture and sought to identify organizational values, norms, beliefs, and assumptions characterizing innovative organizations [6]. Organizational culture may enhance the whole of national culture towards quality management dissemination both in public organization or profit organization [18]. Organizational culture also can develop the organizational performance and effectiveness, and the organizational culture assessment instrument (OCAI) is a variety of indicators of organizational effectiveness, including four factors such as; dominant characteristics, organizational leadership, organization glue, strategic emphases, and criteria of success. Cameroon and Quinn then classified into four types of organizational cultures for critical managerial competencies including; clan, adhocracy, markets, and hierarchy [1]. Meanwhile, the culture typologies in the public sector organization can be classified into four types such as; *macro cultures* include nations, ethnic and religious groups, occupations that exist globally; *organizational cultures* involved private, public, nonprofit, government organizations); *subcultures* consist of occupational groups within organizations, and *micro cultures* involved microsystems within or outside organization [[19]. In this study, the researchers will examine on those dimensions to examine the organizational culture in the health service innovation and performance in Sinjai Regency. There are some researches have been conducted to prove the effect of the organizational culture in public service organization and they found that organizational culture and innovation have a positive effect on business performance in the healthcare industry [20]. There is a role of organizational culture in the knowledge management process and performance whether in the profit or non profit organization found that organizational culture that consists of results-oriented, tightly control, job-oriented, sociability, solidarity, need for achievement and democracy, and the effectiveness of the knowledge management process will also have influenced to increase employees' satisfaction and willingness to have conscious of organizational objectives and performance [21]. Based on the literature review, we then proposes the hypothesis as follows:

Hypothesis 1a: The organizational culture will have an effect toward the health service innovation in local government.

Hypothesis 1b: The organizational culture will have an effect toward the health service performance in local government.

B. *Knowledge Management*

In the development of organizational performance, there is a relationship between knowledge management on organizational learning culture in the context of organizational performance [22]. The benefit of knowledge management in a public organization can enhance the organizational elements and the performance of knowledge transfer [23], and also organizational commitment and knowledge-worker performance [24]. Beside that, it has been useful for developing the organizational capabilities [25], and organizational innovation [26].

Accordingly, knowledge management have become the interesting issues to be studied in the public sector organizations. Knowledge Management and Innovation have benefits to interact between collaboration and openness [27]. It also has an effect on the

organizational performance [28]. Basically, knowledge management in a public organization has a relationship between organizational elements and the performance of knowledge transfer [23]. In this study to test the knowledge management, we used the knowledge management in the organizational perspective namely the Wiig KM Cycle that used to develop the quality of knowledge in achieving high performance [29] which is consisted of four major including; (a) *Building knowledge* (BK) refers to an effort to learn from personal experience, formal education and training, intelligence source, media, books, and peers. (b) *Hold knowledge* (HK) refers to the employee or people in tangible forms used books to learn by reading and applicated. (c) *Pool knowledge* (PK) refers to knowledge management systems from intranet, dbase, groups of people brainstorming, and (d) *Use knowledge* (UK) means that in the work context the knowledge to be used and embedded in work processes. Based on the four constructs, then the Wiig KM cycle approach can be involved into seven indicators as the key of knowledge management cycle; *creation, sourcing, compilation, transformation, dissemination, application, and value realization* [11]. Actually, the purpose of knowledge management in an organization is to create a wide opportunity and space for individual to communicate and interact with each other for exchanging and creating knowledge [30]. Many organizations, whether in public or private sectors have been trying to invest more heavily in technologies to provide and support knowledge management process in order to leverage the knowledge resource [31]. However, it needs the organizational contextual factors that affect knowledge management success, because without those factors the knowledge management will be useless and failed. The contextual factors that can influence knowledge management success include: top management and leadership support, organizational culture, strategy, organizational structure, process, technology infrastructure, and training and education [30], [32], [33]. Therefore, in this study, we focused on the Wiig KM Cycle approach to examine the knowledge management effect on the health service innovation and performance. Based on the literature review, we propose the hypothesis as follows:

Hypothesis 1c: The knowledge management will have an effect on the health service innovation in local government.
Hypothesis 1d: The knowledge management will have an effect on the health service performance in local government.

C. Health Service Innovation and Performance of Health Service System

The need for make the health service innovation in Indonesia has been rapidly engaged by the Indonesia Government, since the Minister of Health of Indonesia issued the Minister of Health Regulation Number 75 of 2015 about Public Health Center. All of the region in Indonesia should provide the best service innovation for the citizen in order to reduce the chronic disease or stunting all over the region in Indonesia. According to the review of literature showed that health service innovation is the innovation involves the development, introduction and mainstreaming of new technologies, which traditionally have had a high failure rate in the health care sector [34]. The Advisory Committee on Measuring Innovation in the 21st Century Economy (2007) defines innovation as ―the design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers…[35].

Actually, there are many factors to maintain the health service innovation include; (1) leadership and management that are supportive and committed to change, including the articulation of a clear and compelling vision; (2) early and widespread stakeholder involvement, including staff and service users; (3) dedicated and ongoing resources, including funding, (4) staff, infrastructure and time; (5) effective communication across the organization; (6) ongoing adaptation of the innovation to the local context; (7) ongoing monitoring and timely feedback about progress; and (8) evaluation and demonstration of the cost effectiveness of the innovation being introduced, including assessment of health benefits [34].

Innovation is the implementation of a new or significantly improved product (goods or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations [36]. OECD made the distinction among the four types of innovation, namely: (a) product innovation: the way to prepare a new or significantly improved those products with respect to its characteristics or intended uses. It needs significant improvements in technical specifications, elements and materials, technology, internets or other functional characteristics. (b) process innovation: the effort to apply a new or significantly production improvement or delivery system. (c) marketing innovation: it used a new marketing method involving significant changes in product design. (d) organizational innovation: an effort to conduct and produce a new organizational system or method in the workplace organization and building the supports from external relations [36].

In building the organizational innovation and performance in the health care system, we argue that the role of the external environmental dimensions include physician acceptance, organizational culture, regulatory acceptance, and partnerships and collaborations. However, the operational dimensions of healthcare contributed significantly on the health care system innovation service that may influence the performance of health systems included; patient satisfaction, profitability, effectiveness, efficiency, patient safety, aging population, productivity, cost containment, labor shortage, clinical outcomes, and quality [36]–[39].

The literature review showed that innovation may influence the performance of health care organization [40]. Another research also suggest that to examine the possibility that innovations change during their implementation and that multiple forms of implementation outcomes can results, and they suggested to use four dimension of innovation to develop the performance of health care system such as; innovation characteristics, social factors, organizational factors, and individual factors [2]. There was a systematic methods can be based directly on scientific evidence by combining available evidence with expert opinion, or they can be based on clinical guidelines, and basically, the characteristic of quality or the performance of quality health care consisted of five dimensions,

included; acceptability, feasibility, reliability, sensitivity to change, and validity [41], [42].

However, based on the empirically research to evidence the performance indicators of health system in the eight countries found that there were four indicators to measuring the performance of health service, such as; effectiveness, access, safety, and efficient. Those four indicators have a high rank based on the study in eight countries included Australia, Canada, Denmark, England, the Netherlands, New Zealand, Scotland and the United States [43]. Likewise, other researchers divide three indicators to examine the performance of health care institution such as; effectiveness, equity, and efficiency [44]. In this study, the researcher try to combine those indicators to measure the performance of health service institution, because its indicators have relevance with the efforts of the government of Sinjai Regency as a local government that supported and motivated all of the health care institution to establish the innovation of health service and promoting the bureaucratic reform in health system through innovation in health service system. The innovation in health service of Sinjai Regency is built a new system of maternity hospital. In the new system of health service innovation, the Sinjai Regency has been establishing community health centers for childbirth and breastfeeding mothers. The aim is to reduce the mortality of mothers who give birth, especially those who live in the island region. Based on the literature review, we then proposed the hypothesis as follows:

Hypothesis 1e: The health service innovation will have an effect on the health service performance in local government.

D. Conceptual Framework

The conceptual framework in this study, the researchers intended to give the summarizing idea in order to contribute the development of theories of organizational culture [1], [5], [19] and knowledge management [11], [27], [29], [45] toward the health service innovation [34], [46]–[48]] and performance of health care institution [40]–[42]. Local government health service innovation seemed very necessary to be maintained and strengthening in order to achieve the citizen satisfaction and stakeholders. According to Farazmand do rightly pay close attention to how important the role of local government as the energizer and key implementation of policy decision and creating the outcomes of the governance process in the competitive era and decentralization [49]. Therefore, in this study health service innovation and performance of health care institution could be examined and analyzed through organizational culture and knowledge management at the local level of government as shown in Figure 1.

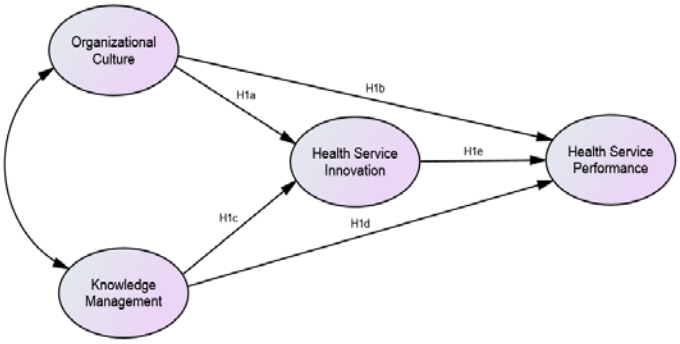

Figure 1. Research model

III. METHODS

Measuring the hypotheses proposed, we applied a quantitative methodology, and the type of research was surveyed exploratory to the public health center in the whole of district and village of Sinjai Regency. The population of research 420 people, which consist of doctors in the public health centers, nurses in subsidiary of public health service and mobile service of public health center units, and also the maternal and child health center. In this study, we used the Krejcie table to determine the research sample in the margin of error α = 0.05) or the level of significance was 95 percent. It was used to make the simple technique to determine of the participants in the need for an efficient method of the sample size needed to be representative of a given population [50]. All of the sample involved in this study, so consequently 201 questionnaires were distributed to all respondents.

Before applying the actual survey research on the sample research, a pilot study was undertaken to test the reliability and validity of the questionnaire and need to assess the respondents' feedback from the completing survey exploratory. We used 120 participants in this study as the pilot study, and after collecting the previous data, so that the researchers used basic statistical by using SPSS version 22 in order to analysis the exploratory factor analysis (EFA). We have wasted time approximately four weeks to collecting data and analysis of the pilot data. After conducting and analyzing the data from the pilot study, so that we have found the EFA data analysis results. The researchers then distributed the instruments to 201 participants and took approximately 8 weeks started from 5th October to the end of November 2018. The questionnaires were designed by using 6-point Likert scale which ranged from strongly disagree to strongly agree. Whereas, the organizational culture was examined by four dimensions of organizational culture that include 12 questions, knowledge management includes fourteen questions, health service innovation involves 13 items, and the health service performance involves 13 questionnaires. The measurements of the independent and dependent variables were adapted with modification from [1], [27]–[29], [33], [34], [36], [40], [41], [43], [44]. The researchers used the collected data analysis through SPSS software version 22 and structural equation modeling (SEM) through the analysis of structures (AMOS). Table 2 shows the dimensions and indicators based on the CFA analysis namely; (a) clan culture consists of two indicators such as; managing teams and managing the development of others; (b) adhocracy culture involved two indicators such as; managing innovation and managing continues improvement; (c) market involves two indicators such as; managing competitiveness and managing customers service; (d) hierarchy involves one indicators namely; managing coordination. Meanwhile, knowledge management variable

involve five indicators such as; creation, Top management and leadership support, technology infrastructure; and training and education. Next, the health service innovation variable involve six indicators include resources, funding, staf, effective communication , evaluation, monitoring. Finally, the health service performance involved four indicators namely; standard operating procedures, unit cost of health service provision, outcomes, and effectiveness.

Table 2: Dimensions and indicators exogenous and endogen variables

Variables	Dimensions	Indicators	Code	Questionnaires
Organizational Cultures (Cameron and Quinn 2011)	Clan	*Managing teams*	OC1	The teams need to facilitate effective, cohesive, smooth functioning, high performance teamwork.
		Managing the development of others	OC2	The team should be helping individuals improve their performance, expand their competencies, and obtain personal development opportunities.
	Adhocracy	*Managing innovation*	OC 3	Managing innovation is needed to encourage individuals to innovate, expand alternatives, become more creative, and facilitate the new idea generation.
		Managing continuous improvement	OC4	In building sustainability of culture, it needs to be fostered an orientation toward continuous improvement, flexibility, and productive change among individuals in their work life.
	Market	*Managing competitiveness*	OC6	Managing competitiveness should develop the spirit of competitiveness through fostering competitive capabilities and an aggressive orientation toward exceeding competitors' performance.
		Managing customer service	OC8	In developing the innovation and performance of the health service, it needs to be speeded up an orientation toward serving customers, involving them, and exceeding their expectations.
	Hierarchy	*Managing coordination*	OC12	In developing the culture of coordination and collaboration, it needs to enhance coordination within the organization as well as with external units and managers and sharing information across boundaries.
Knowledge Management (Barbaroux, Attour, and Schenk, 2016; McKeen, Zack, and Singh, 2009; K. M. Wiig 1993; M. Alazmi and M. Zairi, 2003)	Public knowledge	*Creation*	KM1	Staff need to create the factual knowledge through measurement and reading a book to make innovation in the health service.
	Organizational Contextual	*Top management and leadership support*	KM9	Top management and leadership support out program to develop our knowledge for making the health service innovation.
		Organizational structure	KM11	In developing knowledge management of staff, The top management needs to make a simple structure to maintain the innovation.
		Technology infrastructure	KM12	Knowledge management of personnel and health service innovation must be fully supporting by technology infrastructure and ability to innovate.
		Training and education	KM13	In developing the knowledge management and innovation, all personnel of the health service should be educated and trained.
Health Service Innovation (Nolte, 2018; OECD 2015; Moreira, Gherman, and Sousa, 2017; Campbell, et al. 2002)	Stakeholder involvement	*Resources*	IN4	Stakeholders in the public health institution provide their resources to help the health service institution to be innovated in the health service.
	Dedication and Funding	*Funding*	IN6	Local government and all of the stakeholders and local government have committed to funding the health service innovation.
	Staf and infrastructure	*Staff*	IN7	All staff in the health service institution has perceived and skill for the development of health service innovation.
	Communication	*Effective communication*	IN11	All of the health service institution needs to make an effective to communication whether to the leader of local government and community group or stakeholders to enhance the innovative programs in health services.
	Evaluation, monitoring and ability to innovate	*Evaluation*	IN12	In order to know the achievement of health service innovation, the local government should make an evaluation intensively.
		Ability to innovate	IN14	The staff of the health service institution has ability to innovate by empowering their knowledge and skill in the health service innovation programs.
Health Service Performance (Campbell, et al. 2002; Jolley 1999; Braithwaite et al. 2017)	Procedure and mechanisme	*Standard Operating Procedure*	SP5	The health service institution should increase the safety data of patients regularly and appropriately
	Efficient and effective	*Unit cost of health service provision*	SP9	The health service institution needs to consider the unit of cost per occasion of health service.
		Outcomes	SP10	All of the personnel of the health service institution have proportion to work fully for getting the highest rate performance and cost effectiveness.
		Effectiveness	SP11	The health service should provide the effectiveness of tasks and functions of institution.

A. Statistical Results

Before describe the statistical results analysis using SPSS and structural equation modelling (SEM) through AMOS software version 24, we describe firstly about the characteristics of respondents based on demographic statistics. According to the secondary data analysis showed that the total of males respondents 52,2% or 105 participants, and females 47.8% or 96 participants. In this study, the participants predominantly are above 35 years old that are 65% aged 35-50 years old. Looking at the higher educational level based on the secondary data analysis reported approximately 51% were university graduates, and 30% were a master's degree, and the rest of them was undergraduate educational level. Finally, the highest 85% of respondents reported being a civil servant and the 15% was a contract employee status. Based on the demographic of the respondents and the educational status seemed that the respondents' characteristics were highly representative. Beside that, all of the participants are professionals and they were free from the political affiliation and self interest.

Likewise, according to the descriptive statistics of the research variables indicated that the health service innovation and performance and also organizational culture and knowledge management based on the respondents of the health service systems in Sinjai Regency perceived showed that all variables have the average mean were above 3.5 included OC: 3.69; KM: 3.88; IN: 4.03; SP: 3.95. The research data were carefully screened for several characteristics of prerequisite using SEM such like in term of multivariate normality, multicollinearity, and homoscedasticity, and the results indicated there were no violation of assumptions in each variable. According to the EFA analysis by using SPSS version 22 showed the convergent, discriminate and nomological validity as shown in the Table 3.

Table 3: Results analysis of convergent, discriminate and nomological validity

	OC	KM	IN	SP
AVE	0.390	0.393	0.434	0.509
CR	0.814	0.758	0.820	0.805

Note: *AVE:* average variance extracted; *CR:* Composite reliability

As shown in Table 3 the convergent, discriminate and nomological of each variable were confirmed that by using EFA measured has fully supported based on the prerequisite thresholds. It means that the all variables have no violation of assumptions of nomological validity. Beside that, the results also showed that the reliability was also above 0.80 that means all construct have good internal reliability.

The hypothesized model of this study has shown in Figure 2 has indicated that the standardized value of the goodness of fit as shown in the Table 4 has been relevance and suitable based on [45], [46] suggestions. The standardized values of the hypothesized measurement and structural model as indicated in the following Figure 3.

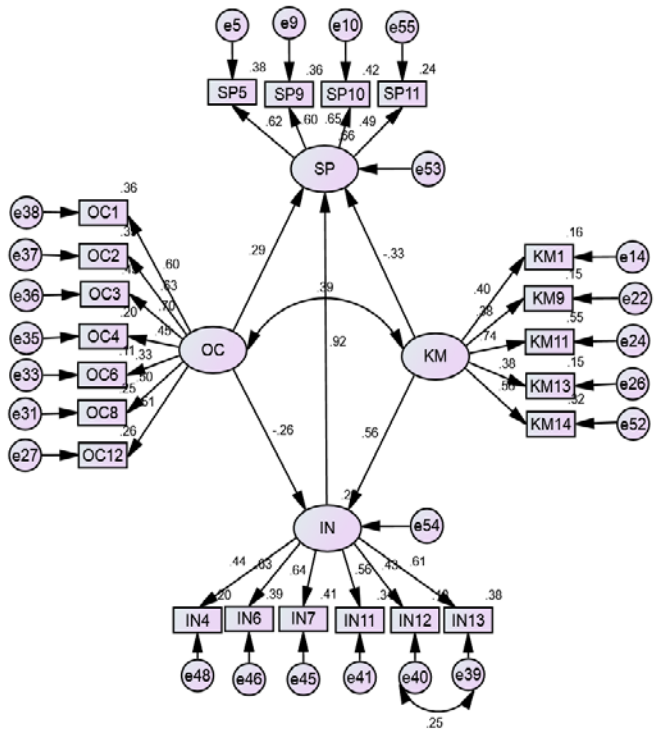

Figure 3: Standardized values of the hypothesis measurement

Based on the Figure 3 can be described that the results of structural equation modelling provides the goodness of fit model to the data research. The Goodness of fit statistics for the hypothesized testing show in the following table:

Table 4: The resulting analysis for Goodness of fit hypothesized measurements and structural model

	Absolute fir measures				Incremental fit Measures		Parsimony fit measure
	X^2	*CMIN/DF*	*GFI*	*RMSEA*	*NFI*	*CFI*	*AGFI*
Criteria	>.05	<5	≥ 0.90	<0.05	≥ 0.90	≥ 0.90	≥ 0.90
Obtained	0.001	1.391	0.901	0.042	0.901	0.903	0.901

Note: χ^2: Chi-square; *DF:* degree of freedom; GFI: Goodness of fit index; RMSEA: Root mean square error of approximation; NFI: Normated fit index; CFI: Comparative fit index; AGFI: Adjusted goodness of fit index

Table 4 shows that the fit indices indicate that the hypothesized structural equation modelling presented the good fit measures to the data. Although the absolute fit measures the likelihood ratio chi square (χ^2=281.015; DF=202; p = .001) was significant at the level of p < .05; and also other fit measures showed that the model was adequate fit to the research data. Meanwhile, the absolute fit measures such as; GFI and RMSEA were fit enough respectively as shown 0.901 and 0.042 mean that the model was a good fit. The incremental fit measures, namely NFI and CFI were achieved 0.901 and 0.903 that indicating the adequate fit model and the parsimony fit measures showed above minimum prerequisite indicating adequate fit i.e. AGFI was 0.901 also achieved the cut off point ≥ 0.90.

A. Hypotheses Measuring

In this study, the researchers have been proposed five hypotheses and they have examined carefully with SEM model using AMOS version 24 for the significance tests that give the basis for taking the conclusion either accepting or rejecting the proposed association between exogenous variables, moderating, and endogenous one. The whole of the results of the hypotheses measurements for the five hypotheses were statistically significant.

Based on Fig. 1, it was predicted that organizational culture will have an effect on the health service innovation in local government. According to the hypothesis testing found that organizational culture has an effect negative and significant of the health service innovation (β = -.257; *p= < .020*) in the level α=0.05. Therefore, the proposed hypothesis was supported that organizational culture did have an effect negative and significant of the health service innovation in local government. And also the organizational culture has an effect on the health service performance in the local government. And finding the results also showed that organizational culture has a positive and significant effect on the health service performance in local government with the path coefficient was achieved (β = .287; *p= < .015*) at the level of α=0.05 in the two tailed measurements. It means that the organizational culture has a positive and significant effect on the health service performance in local government.

Furthermore, it was predicted in this study that knowledge management will effect on the health service innovation in local government. The research findings showed that knowledge management has a positive and significant effect on the health service innovation in the local government with the path coefficient indicate to be achieved (β = .556, *p* = < .000). It means the regression weight for knowledge management in the prediction of health service innovation was significantly different from zero at the 0.001 level (two-tailed). The result indicated that the hypothesis was supported that knowledge management has a positive and significant effect on the health service innovation in local government. The next proposed hypothesis that the knowledge management will have an effect on the health service performance in local government also can be supported based on the hypothesis testing showed the path coefficient achieved (β = -,334; *p* = < .035) at the level of α=0.05 in the two tailed measurements.

Moreover, the hypotheses proposed that health service innovation will have an effect on the health service performance in local government. The results found the health service innovation to have positive and significant effect on the health service performance (β = .917, *p* = < .000). The result confirmed that the hypothesis was supported was significantly different from zero at the 0.001 level (two-tailed).

Based on the whole of the regression estimate of organizational culture and knowledge management have an effect on the health service innovation significantly as a moderating variable, and also they have an effect significantly either direct or indirect effect. The direct effect showed organizational culture and knowledge management have a direct effect on the health service were -0.257 and 0.556. Meanwhile, the indirect effect of organizational culture and knowledge management on the health service performance were -0.236 and 0.510. The regression estimates of each variable will show in the following table.

Table 5: Regression estimates of each constructs

	Estimate	S.E.	C.R.	*P*
IN <--- OC	-.257	.082	-2.326	.020
IN <--- KM	.556	.222	3.427	***
SP <--- IN	.917	.196	5.170	***
SP <--- OC	.287	.097	2.438	.015
SP <--- KM	-.334	.239	-2.105	.035

Note: OC : Organizational Culture; KM: Knowledge Management; IN: Health Service Innovation; SP: Health Service Performance

Table 5 shows that the structural model results the health service innovation has had the strongest effect on the health service performance (β = .917), and followed by the knowledge management effects on the health service innovation (β = .556), and organizational culture effects on the health service performance (β = .287). Next, the organizational culture effects on the health service innovation (β = -. 257), and the knowledge management regression estimate to health service performance (β = -.334). Based on the above regression estimates of latent constructs, so the summary of the hypothesis testing results based on the results of structural analysis describe in the next table:

Table 6: Hypotheses measurements results

Hypotheses	β	*P*	*Label*
H1a: OC → Health Service Innovation	-.257	*P = <.005*	*Supported*
H1b: OC → Health Service Performance	.287	*P = <.001*	*Supported*
H1c: KM → Health Service Innovation	.556	*P = <.001*	*Supported*
H1d: KM → Health Service Performance	-.334	*P = <.005*	*Supported*
H1e: IN → Health Service Performance	.917	*P = <.005*	*Supported*

β = Standardized regression weight, p = Significant level (two tailed)

Table 6 showed that the standardized regression estimates results analysis of constructs indicate that the organizational culture as an exogenous variable have a negative and significant effect toward the health service innovation (β = -.257), meanwhile it has a positive and significant effect on the health service performance in local government (β = .287) in the level of probability *p=<.005* and *p= <.001)* in the two tailed testing. The result also showed that knowledge management has a positive and significant effect on the health service innovation (β = .556) and it has a negative and significant effect on the health service performance (β = -.334). It means that if the health service innovation is decreased one point, it will have an effect to decrease the health service performance approximately 33.4%. The standardized regression estimates also revealed that health service innovation has a positive and significant effect on the health service performance (β = .917). Based on the Table 6 showed that all of the hypotheses in this study were supported

respectively. This study also indicated that the organizational cultures and knowledge management have a high correlation 39.5%.

IV. DISCUSSION

Public organization service innovation has been studied by many researchers and proved that building organizational culture can improve the public service innovation [1], [4], [6], [51], especially in innovative health care system [38], [39]. Beside that, service innovation in public sectors may improve through developing knowledge management [26], [52]–[54]. Moreover, the public service innovation have benefit to enhance the organizational performance [2], [55], [56].

A. Organizational Culture effects on Health Service Innovation and Performance

Basically, health service organization has pursued to give the highest service to the customers by improving their routines performance initiative. So then in order to creating service innovation in the health system and performance need organizational culture [57], organizational culture can reduce the adverse event in the healthcare services [58]. Organizational culture has become the core influencing factors in developing the healthcare system innovation [39]. In this study, we found that the organizational culture has a negative and significant effect on the health service innovation. As clearly shown in this research that the structural model and path coefficient of organizational culture has had an effect negative significantly toward the health service innovation (β = -.257; *p= <.005*. Beside that, organizational culture has positive and significant effect on the performance of health care services in local government (β = .287; p = <.001).

The results finding confirmed that organization culture effects negatively and significant on the health service innovation, means that when the organization is decrease one point, it may be caused the reduce the health service innovation. This finding is also supported by many researchers [6], [43], [48], [59]–[63].

In addition to speeding the improvement of performance of healthcare organization, the organizational culture has play an important role in helping the organization in public sector develop their service performance [4], [7], [58]. In this research found that the healthcare system and hospital will have a significant opportunity for building performance of care service to make the patient satisfaction [64]. Moreover, organizational culture does so reliable that the aspects of culture being testing have related to organizational performance [1]. This research finding is also confirmed by some researchers, for example [1], [10], [60], [65], [66] showed that organizational culture can enhance the health service performance.

B. Knowledge Management on Health Service Innovation and Performance

Knowledge management provides benefits to individual employees, communities, and the organization itself, it also becomes the focus of study for more that a few decades [11]. Knowledge management refers to learning organization should become a central element of achievement to get the innovative production [67]. In profit organization, many researchers have found that knowledge management and organizational culture have relationship in developing the organization service innovation [26], [63]. In this study, we have proposed the hypothesis that knowledge management will have an effect on the health service innovation, and according to the regression estimate based on the SEM analysis, we found the result of path coefficient was β = .556. It proved that the hypothesis was supported based on the level of *p = < .001 or p = < .005*. In this research, we proposed the next hypothesis that the knowledge management will have an effect on the health service performance. And based on the regression estimates through structural analysis indicated knowledge management has a negative and significant effect on the health service performance (β = -.334).

Those above findings reveal that the knowledge management have a positive and significant effect on the health service innovation in local government. In this context confirms that the knowledge management should be provided predominantly in developing the health service innovation. This result also supported by some researchers that have been conducted the study to prove the effect of knowledge management on the health service innovation, for example [9], [36], [59], [68]–[72]. Concretely, knowledge management viewed as a strategy enables an organization to act proactively. In other word, the organization will be acting before the problem occurs) than reactively that acting after a crisis has arisen in the organization [23].

Likewise, knowledge management can be facilitated to develop service innovation and performance within the organization [52], and it becomes the strategy to improve the innovative management into hospital management [71]. Meanwhile, the knowledge management should not be obeyed in maintaining the knowledge worker performance and organizational commitment [24]. In the efforts in promoting and nurturing the organizational capability and performance should provide the knowledge management and learning process within the organization [73]. The findings have been supported by empirically research which have done by some researchers that found the knowledge management has benefits and close relationship with the organizational service performance [3], [26], [28], [29], [45], [72], [73].

C. Health Service Innovation effects on Performance

Organizational innovation becomes the most interesting being studied by many researchers because it can endorse and supporting the organization to achieve higher performance. A qualitative study has been conducted to analyze the organizational innovation in private organization and they found based on systematic analysis showed that it involves some renewal combination dimensions such as willingness to innovate, ability to innovate, and possibility of innovation [74]. Organizational effectiveness is also determined by the leadership role and organizational culture [75]. Therefore, The implementation of innovation in rapid and competitive environment is needed to find the outcomes through technology and process, service and product, and administrative innovation [2]. In this research, we have proposed the fifth hypothesis that the health service innovation will have an effect on the health

service performance in local government. After conducting the statistical analysis by using structural model, we found that the path coefficient was β = .917. According to the standardized regression estimate revealed that the health service innovation has a positive and significant effect on the health service performance in local government at Sinjai Regency, Central Sulawesi Province. Based on the above finding, we argue that the health service innovation should provide by the local government and the whole staff of the Health Institution in the Sinjai Regency to adapt continuously the innovation health services in the health care system. The results of the results above also supported by some researchers [34], [46], [47], [59], [76]. Others empirically researchers have focused on the health service innovation for examples [34], [40], [41], [65] and they that the innovation in the health service closely indicated to improve the healthcare performance system.

V. CONCLUSION

Developing of the health service innovation and performance of health care institution is very crucial in the era of decentralization, because the citizen needs that local government should provide the best service of healthcare system. In the providing the best health service performance, absolutely the local government should pay more attention to the critical role of health service organization such as improving organizational culture of health system involving managing teams, managing the development of others, managing innovation, managing the future, managing competitiveness, managing customer service, and managing the control health care system. Moreover, knowledge management seemed necessary to develop the health service innovation and performance. Knowledge management becomes the main prominent to improve the health service. There are five dimensions should be paid careful attention to the local government and the health service organization such as; creation of the staff health institution toward the public health knowledge, the role of top management and leadership support, organizational structure, training and education of the staff of the health service institution continuously, and making the whole process of knowledge management to be higher based on the procedure and synergize routine.

In this research, we found that there are five hypotheses proposed, and the findings reveals that all of the hypotheses were supported respective. The organizational culture affect the health service innovation ((β = -.257; *p*= < *.020*) in the level α=0.05), and organizational culture affect positive and significant toward the performance of health service system in local government (β = .287; *p*= < *.015*) at the level of α=0.05). Likewise, knowledge management affect the health service innovation (β = .556, *p* = < .000) at the 0.001 level (two-tailed). And also, knowledge management affect the health service institution showed the path coefficient achieved (β = -,334; *p* = < .035) at the level of α=0.05. Finally, the health service innovation to have positive and significant effect on the health service performance (β = .917, *p* = < .000).

Based on those findings, we recommend that developing the health service innovation is the core aspect of speeding to achieve the health service performance. According to the results finding, we suggest that it is important to focus on restoring the health service innovation and performance in local government, because the organizational culture and knowledge management of health system were predominantly dimension to improve the health care system innovation and performance for local government.

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The Effect of Models Problem Based Learning and Cooperation Skill on the Critical Thinking Ability in Grade IV Elementary School Student of MI AL-AZHAR Menganti Kab.Gresik.

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Abstrack: Researches are interested in developing if it is associated with how to solve problems in the learning process, thinking is a cognitive process in the process involving some knowledge manipulation such as connecting the understanding with one another in the cognitive system directed is to find or produce solutions in solving a problem in the learning process. But the facts in the field of students tend to be interested in interacting digitally rather than interacting directly with their surroundings. This study aims to determine the effect of Problem based learning and cooperative skills on the critical thinking skills of fourth grade students at MI AL-AZHAR Menganti Gresik

This research was conducted at MI AL-AZHAR, Kec. Menganti Gresik, class IV, school year 2018-2019. The research sample was class IV with a total of 22 students. In this study using instruments in the form of validation sheets, questionnaires, critical thinking test questions, student observation sheets during lessons and teacher response questionnaires.

The results showed: (1) Based on the analysis with the Pearson bivariate correlation test from the pretest and posttest values using the SPSS 20.00 test it can be concluded that the pretest and posttes values are interrelated because r count> r table. Where r table n = 22 is 0.359 can be concluded r count> r table in the table above shows 0.836> 0.359. (2) Based on the analysis table test Sperman Rank Correlation with a significant level of 0.359> 0.05 or> 5%, while in the test table 4.15 it is known that t table data is 0.514, which means the correlation test is above 0.359 so it can be concluded that there is the effect of cooperative skills on students' critical thinking abilities (3) there is an interaction between problem based learning learning models and cooperative skills towards critical thinking skills in the class IV MI Al-Azhar Menganti is proven by the value of the pretest and the increasing posttest.

Key words: *Problem based learning, cooperation skill, critical thinking*.

1. PRELIMIARY

Based on Republic of Indonesia Law Number 14 of 2005 concerning Teachers and Lecturers Chapter 1 article 1 point (a) Teachers are one part of professional educators whose job is to educate, teach, demonstrate, direct, train, process, and evaluate students in the world of education includes early childhood education from both formal education, basic education, and secondary education.

That is, the education process ends in the formation of attitudes, behaviors, utilization of intelligence or intellectuals, and the utilization of children's skills that should be in accordance with the required competencies. The teacher is a learning driver for students who have a big role in fostering enthusiasm and giving motivation to students to be actively involved in the learning process. In the process of learning activities the teacher must also be able to choose a learning model that will be used as one of the determinants in the success of learning of students. A good learning model will provide satisfactory learning outcomes, because students will be interested in the delivery model used by the teacher.

The process of learning in the world of education can be seen from the formation of attitudes, behaviors, utilization of intelligence or intellectuals, and the utilization of children's skills which should be in line with their competencies. Educators are facilitators of student learning that have a large role in fostering enthusiasm and giving motivation to students to be actively involved when in class while doing teaching and learning activities. When learning activities educators must also be able to determine the appropriate learning model and be applied in the learning process as one of the factors increasing the achievement of teaching and learning goals for the success of learning of students. The learning model is said to be appropriate and successful if during teaching and learning activities students are actively involved, can express ideas that are owned and create an atmosphere of teaching and learning that runs both ways.

One way done by educators to improve critical thinking is to use the appropriate learning model accompanied by good cooperation. students only listen to the material explained by the teacher, students are less active in terms of asking questions and if they answer questions from the average teacher they cannot answer, some of them can answer the answers according to the contents of the book and are memorized while the other students the answer follows another friend. At the time of learning students are less actively involved in the thought process to achieve material completeness, so that this causes learning activities to be less meaningful because they are more motivated to results than processes. Aziz (2012: 39) if it is associated with how to solve problems in the learning process, thinking is a cognitive process in the process involving some knowledge manipulation such as connecting the understanding with one another in the cognitive system directed is to find or produce solutions in solving a problem in the learning process

The learning model is a conceptualized chart that describes the procedure systematically in organizing the learning experiences of students in achieving their learning goals, and its function is to be used as a guide for learning designers and educators. in planning and carrying out the process of teaching and learning activities. (Toeti Soekamto and Udin Saripudin W). The task of the teacher in addition to delivering the material also creates a conducive atmosphere and learning environment and attracts students to be more active in learning and can motivate students to be actively involved in the learning process. So that it is expected that with the right learning design made by the teacher, students will have maximum learning achievement. For this reason educators should have knowledge and be able to apply various learning models so that learning objectives are very diverse and complex. It is not enough for teachers to rely only on one approach or learning model. Capitalizing on the ability to carry out various learning models, educators should have knowledge of good and appropriate learning models to achieve specific learning goals that are tailored to a particular learning environment or group of students and can be actively involved in the teaching and learning process. Because as it should be the learning process is an effort carried out by students, not something that is done to students ..

One effort to improve the ability of students is the ability of teachers to determine the learning model used. The role of educators in active learning is essentially as a facilitator. Facilitators are individuals who play an active role in helping side by side with students to learn and acquire new skills needed to achieve learning goals (Warsono and Harianto, 2014: 20). The success of the learning process is inseparable from the ability of educators to implement various types of learning models that are oriented to improvement involvement of students in achieving learning goals. The application of the learning model basically aims to create active and enjoyable learning conditions. In this regard the selection of learning models is needed because the learning model is a method or technique used by educators in implementing learning processe.

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Based on observations made by researchers during the learning process at MI Tarbiyatul Ulum Menganti on November 16, 2018, students only listened to the material explained by the teacher, students were less active in asking questions and if they answered questions from the average teacher they could not answer, some of them can answer the answer in accordance with the contents of the book and are memorized while the other students answer the answers to other friends. At the time of learning students are less actively involved in the thought process to achieve material completeness, so that this causes learning activities to be less meaningful because they are more motivated to results than processes. Aziz (2012: 39) if it is associated with how to solve problems in the learning process, thinking is a cognitive process in the process involving some knowledge manipulation such as connecting the understanding with one another in the cognitive system directed is to find or produce solutions in solving a problem in the learning process. But the facts in the field of students tend to be interested in interacting digitally rather than interacting directly with their surroundings. This causes students to lack good cooperation skills, this is

evidenced by the lack of indifference to other fellow students, cheating or dishonesty during the exam, lying to cover up their mistakes and violating school rules. These problems can be an example of the low skills of cooperative students. Thus improving the skills of this cooperation can be done through education. Because a teacher is not only required to be able to instill aspects of knowledge only in the learning process but instill good behavior and character by instilling a habit of positive cooperation skills for students. Based on the above problems, to find out the description of the effect of problem-based learning and Cooperation Skills on critical thinking skills in class IV, the researcher conducted a study entitled "The Effect of Problem Based Learning and Collaborative Skills on Class IV Critical Thinking Ability at MI AL-AZHAR Kab. Gresik ".

2. Research Methods

This type of research is development, because The research conducted in this study uses experimental research because experimental research is based on the philosophy of logical positivists which means operating with strict rules regarding logic, truth, laws and predictions (Danum, 2002). This experimental research was identified as a work process that took place in a concise, limited and sorting out problem that would be a benchmark and could be expressed in nominal form. This research was conducted to explain, examine the relationship between variables, determine the causality of variables, and examine theory.

In this study using a quantitative approach, where the work process that takes place in a concise, limited and determine the problem is a part that can be measured and expressed in nominal or numerical form. To provide an explanation of the relationship between the variables studied.

In this study using a Pre-Experimental design with a one-group Pretest-Posttest Design design model, meaning that in this study there was only one class group that had been determined. Data retrieval is done by giving a pretest to a particular group done at the beginning before giving treatment to know the ability of the initial group, then given treatment and posttest to determine the effect after being given treatment to know the students' critical thinking skills. Thus the results obtained by treatment can be known to be more accurate because it can compare with previous conditions before being treated. The design is described as follows

This research belongs to experimental research. Experimental research was conducted to examine whether there is a causal relationship between variables. This study uses a nonequivalent control group design. Sugiyono (2008) suggested that this design was not different from the pretest-posttest group design, only in this design the experimental group and the control group were not chosen randomly. This research was conducted in three stages, namely the preparation, implementation, and completion stages.

Table 2.1 the reseach design

O_1	X	O_2

The location taken in this study was AL-AZHAR MI. The research population was fourth grade students of MI AL-AZHAR with a total number of students of 26 students.

The techniques used to collect data in this study are: (1) Tests. The test includes giving written questions in the form of descriptions to students according to the test indicators consisting of 15 subjective questions. The test was conducted twice, namely at the pretest and posttest stages for the two research classes. This test is used to determine the contribution of the problem based learning model to students' critical thinking skills. (2) Observation. Observations were made to collect data on the achievement of indicators of student cooperation determined by the researcher.

in formal education the role of educators is very important for achieving learning goals. Educators are facilitators to complete the learning process to shape students in a better direction. The main task of an educator is to teach students to be able to learn. Besides the quality of learning, innovative learning models are also needed as a means of supporting the teaching and learning process. Through an innovative learning model it is expected that it will facilitate the learning process that is in accordance with the character and needs of students.

The instrument developed in this study is the Evaluation Sheet (problem solving ability test). Evaluation sheet is given twice namely before being given treatment (pretest) and after being given treatment (posttest). Evaluation sheet is given to students to find out the contribution model of problem based learning in improving problem solving skills in class IV. The evaluation sheet developed is a written test of natural appearance material and artificial appearance. The test is in the form of 15 open questions in the form of a description, so students can explore their ability to solve problems and obtain information from various other references around students. For questions successfully answered by students, scores are given according to the weight of the predetermined questions.

Observation sheet. Observations carried out by observers are used to determine the level of student cooperation through observing student activities in learning in the classroom. The observation sheet that will be developed is a checklist with "yes" or "no" answers according to indicators of student learning motivation including

attention levels, asking questions or responding, persistence, digging information from various sources, and excitement in learning. Assessment consists of 2 criteria, namely score 1 for the answer "no" and score 2 for the answer "yes".

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 hypotheses that have been proposed (Arikunto, 2010, p. 282)

Inferential data 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 hypothesis proposed in this study are: 1) There is the influence of using problem based learning models and cooperative skills on students' critical thinking skills. 2) there is no effect on the use of problem based learning models and cooperative skills on students' critical thinking abilities

3. Result

Problem based learning is one of the learning models used to stimulate high-level thinking of students in situations that are oriented to real-world problems, including in the teaching and learning process. Rusman (2012: 243) suggests that the steps of problem-based learning are as follows:

Phase Indicator of Teacher Roles

1. Student orientation to the problem Explain the purpose of learning, explain the logistics needed, and motivate students to be actively involved in problem solving activities
2. Organizing students to learn Helps students define and organize learning tasks that are related to the problem
3. Guiding experience Encouraging students to gather appropriate information, carrying out experiments to get explanations and problem solving
4. Develop and present the work of helping students in planning and preparing suitable works such as reports.
5. Analyzing and evaluating the problem solving process Helping students to reflect or evaluate their investigations and the processes that have been passed in solving problems.

The results of the study consisted of the results of expert validation, the results of research in the field, and the results of inferential analysis. The following are the results of the validation of learning tools and research instruments used in this study, which have been validated by two experts who are competent in the field of education and learning.

Table 3.1. Results of Validation of Learning Devices and Research Instruments

Results	Mean's of results	Grade	Ket
Silabus	3,28	B / Valid	Can be used with a little revision
RPP	3,38	B / Valid	Can be used with a little revision
Observation Sheet	3,21	B / Valid	Can be used with a little revision
Test of cricital Thinking	3,61	B / Valid	Can be used with a little revision

The results of the validation of the syllabus, RPP, observation sheet and problem-solving ability test in the table show the average feasibility validation of the four learning instruments and research instruments from the validator to get a good category, so it can be concluded that learning devices and research instruments are feasible with a slight revision.

In addition to the results of the validation of learning devices and research instruments from experts, the results of research in the field will also be presented relating to the influence of the ARIAS learning model on learning motivation and problem solving skills. The following is a graph that illustrates the comparison of the results of data analysis of learning motivation and problem solving skills in the experimental group and the control group.

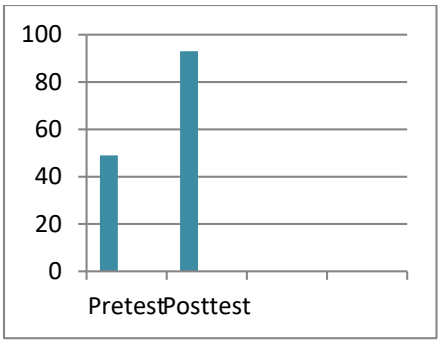

Figure 3.2 Diagram of pretest and posttes tes critical thinking

Based on the graph shows that the results of the students 'critical thinking ability tests that have been carried out by observers in the experimental class have increased, at the pretest the learning motivation was low (21.43%), while at the posttest the students' learning motivation became high (65.52%) . While the results of observation of student learning motivation that has been done by observers in the control class did not experience much improvement, at the pretest the learning motivation was low (22.84%), while at the posttest the students' learning motivation became moderate (46.76%).

The results of the problem solving ability test in the experimental class that were treated using the ARIAS learning model showed an increase in the class average. At the pretest the class average was only 56.24, while in the posttest the average class increased to 77.83. While the results of the problem solving test in the control class that did not get treatment or use conventional learning models showed that there was no significant increase in the class average. At the pretest the class average was only 54.43, while the posttest class average was 63.46.
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. Before the t test is carried out, it must first perform a normality test and homogeneity test. The following are the results of calculations in this study.

Table 3.3 normality test

Variabel	Kelas	Df	Sig.	Deskripsi
Cooperation	Kontrol	28	0,113	Normal
	Eksperimen	28	0,121	Normal
Critical thinking	Kontrol	28	0,200	Normal
	Eksperimen	28	0,155	Normal

Based on the table above shows that the assumption of normality has been fulfilled, it can be seen from the significant level on all variables (learning motivation and problem solving ability) posttest in the control class and experimental class more than 0.05.

Table 3.4 Homenitas Test

Variabel	df 1	df 2	Sig.	Deskripsi
Cooperation	1	55	0,832	Homogen
Critical Thinking	1	55	0,699	Homogen

Based on the table the results of the homogeneity test at the posttest of student learning motivation showed a significance value of 0.832 and the posttest problem solving ability was a significance value of 0.699. Data

requirements are said to be homogeneous, ie if the sig value is more than 0.05, so that the processed data can be stated that the assumption of homogeneity is fulfilled for both the control class and the experimental class.

Tabel 3.5. Uji T - Independent Sample T-Test

Variabel	T	Df	Sig. (2-tailed)	Deskripsi
Cooperation	4,513	55	0,000	Ho rejected
Critical Thinking	5,037	55	0,000	Ho rejected

The results of the analysis in the table show the results of the analysis with the Independent Sample t-test obtained sig 2 tailed for 0,000 <α (0.05) with t count of 4,513 for learning motivation and 5,037 for problem solving skills then t count consulted with t table for one-party test where t table 2.004 (df = 55) because t count> t table, means that the results of the two samples differ significantly. This means that there are significant differences in learning motivation and problem-solving abilities of students in the control class and experimental class at the posttest. Students in the experimental class who use the ARIAS learning model are more motivated in learning and better ability to solve problems than students in the control class who use conventional learning.

Whereas for problem solving ability test data, it can be concluded that the problem solving ability in students who use the ARIAS learning model is significantly higher than the problem solving ability in students who use conventional learning models.

Questionnaire for student responses was given to 20 respondents in the experimental class. This response questionnaire contains 7 statements that must be filled out by the respondent, in which there are four answer choices including SS (Strongly Agree) having a score of 4, S (Agree) having a score of 3, TS (Disagree) having a score of 2, and STS (Strongly Disagree) has a score of 2. Respondents must choose one of the answers provided by cheating. This questionnaire is related to the learning method used. The learning method used is discovery learning method, the learning method is very suitable to be applied to the material properties of light because in this material students prove themselves or make observations directly about the properties of light through practicum that is done so that learning is more memorable and the material will last longer.

This study shows that the results of the questionnaire response analysis of students interested in the application of the discovery method included in the criterion of responding to learning are 26 out of 30 students with a percentage of 86.7%. While those included in the criteria for responding to learning are 4 out of 30 students with a percentage of 13.3%. this can be seen in figures 4.1 and 4.2 which have shown differences in the average learning outcomes and scientific attitudes of students in the experimental class and the control class. The average learning outcomes and scientific attitudes in the experimental class are better with the control class because the experimental class is gives.

4. Discussion

Based on the discussion of the results of the research presented, it can be concluded that there is a positive and significant influence between mind mapping learning methods and literacy movements on students' reading activities in elementary schools. . The results showed that the group of students using the ARIAS learning model (experimental group) were more motivated than the group of students who used the conventional learning model (control group). And there is a positive and significant influence between the ARIAS learning model on students' ability to solve problems. The results showed that groups of students who used the ARIAS learning model (experimental group) had better ability to solve problems compared to groups of students who used conventional learning models (control groups).

Based on these conclusions, the researcher can provide the following suggestions. Based on the results of observations of student learning motivation and the results of problem solving abilities that have been achieved by students using the ARIAS learning model, the learning model can be an alternative learning model that can be applied by teachers to improve student learning motivation and problem solving skills in social studies in elementary school. In this ARIAS learning model students will be actively involved, think creatively and make learning more fun and meaningful. But in applying this learning model, the teacher must adjust the characteristics of the teaching material by reviewing content standards. As well as for other researchers, can conduct another review of the influence of the ARIAS learning model, for example student activities, interests, student creativity, and so forth. Because this study was only reviewed from students' learning motivation and problem-solving ability in social studies learning in fifth grade elementary school students.

In this study there were experimental classes and control classes studied. The experimental class is given treatment by using the discovery method while the control class is not given treatment by using the lecture method. The results of the study and testing of hypothesis testing statistics using SPSS 18 posttest values of learning outcomes obtained the value of Sig (2-tailed) = 0.000 which is smaller than the significant value that is 0.05 then it can be concluded that H0 is rejected and Ha is accepted. Likewise the hypothesis test using SPSS 18 posttest scientific attitudes is obtained by the value of Sig (2-tailed) = 0.000 which is smaller than the significant value that is 0.05 then it can be concluded that H0 is rejected and Ha is accepted. Thus the hypothesis in this study is "There is an influence of the discovery method on the scientific results and attitudes in the class V science class material of the properties of light". With the average value of the experimental class learning outcomes is 73.7 and in the control class is 60.3 while the average value of the scientific attitude of the experimental class is 75.2 and in the control class is 53.7.

This is in accordance with the opinion of Ausebel, that learning is said to be meaningful if the information to be learned by students is arranged in accordance with the cognitive structure of students, so that students can associate new information with the cognitive structure they have. This is also in line with the opinion of Jhon Dewey who said that teachers must encourage students to engage in learning processes or problem-based tasks and help them investigate problems both intellectually and socially.

The ability of cooperation is in this research to be group or social activities in which students must interact with other students. This is in accordance with the opinion of Vygotsky who argues that children's cognitive and language development does not develop in empty social situations. Indeed, humans can compile their knowledge, but mental functions have several social connections, which means that humans can develop or process well if they can develop the potential for social interaction well.

Using the problem based learning model during the teaching and learning process students will get used to facing problems and feel challenged to solve problems both problems in the material in learning and social problems while fostering a sense of cooperation with other students can foster good social solidarity. Children will be accustomed to expressing opinions, discussing and interacting with other students into tears.

The results of the study are in line with the scientific journal written by Anisa Bellah (2015) which included quantitative research on the type of experimental research using the Quasi Experimental Design. The research form Nonequivalent Control Group Design with Pretest-Postest Control Group Design. In this study it can be concluded that the influence of PBL learning models and Cooperation Skills influence learning outcomes in teaching and learning activities. The results of the study prove that the social level of students is needed or increased by 69%, meaning that the social attitudes needed in the teaching and learning process include honest, disciplined, responsible, caring, polite and confident behavior.

5. Conclussion

Using the problem based learning model during the teaching and learning process students will get used to facing problems and feel challenged to solve problems both problems in the material in learning and social problems while fostering a sense of cooperation with other students can foster good social solidarity. Children will be accustomed to expressing opinions, discussing and interacting with other students into tears.

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Based on the results of the research obtained, the suggestions that can be given by the researcher are as follows: (1)Teachers should always pay attention to student characteristics and always involve students in the learning process that relates to the material to be delivered so that students can be more enthusiastic and improve the thinking skills they already have. (2) The teacher should use a learning model that is varied and in accordance with material needs in the learning process. Based on the results of the research that has been done, the problem based learning model needs to be implemented in the classroom so that students in the class can develop the ability to discuss and think critically. (3)The researcher only examines the effect of the problem based learning model and the effectiveness of cooperation on critical thinking skills, so that the next researcher is expected to be able to add or apply other variables with different material.

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THE INFLUENCE MODEL OF DISCOVERY LEARNING BY MAKING USE OF THE ENVIRONMENT AS A SOURCE OF LEARNING TOWARDS A LEARNING OUTCOMES ON THE FOURTH GRADE OF ELEMENTARY SCHOOL

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Abstract: This research aims to improve student learning outcomes through the use of a model of Discovery Learning. Location of research in SDN Pajaran O5 Madiun. The study was a Quasi-Experimental. The population is all fourth-grade students at SDN Pajaran O5 Madiun. The data collection technique using achievement test. The results showed that learners with different initial capabilities have learning outcomes that learned with discovery learning model of learning that are in both categories with a value of 84.62. Implementation of discovery learning model learning significantly influences the learning outcomes of students with grades (sig 0,000 > α = 0.05). It can be concluded that there is a significant effect of using discovery learning model of learning to the learning outcomes of fourth-grade students between before treatment and after treatment.
Keywords: *Model, Discovery Learning, Learning outcomes*

INTRODUCTION

Education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual power of religion, self-control, personality, intelligence, and noble character, and skills necessary for him to have the power of spiritual religious, self-control, personality, intelligence, and noble character, and skills needed him, society, nation, and state (Sanjaya, 2007). Education holds a very important role in preparing for the development of quality human State. Humans will grow and develop as a whole person with their education.

Learning is a process that occurs in a person as a result of efforts done so as to obtain changes in knowledge, skills, new experiences as a result of interaction with the environment. The learning result is a change in behavior on students that can be observed and measured in terms of changes in knowledge, attitudes, and skills. Is a culmination of learning outcomes and learning process (Dimyati, 2013). In learning in school a teacher must create a fun atmosphere for their students, how to choose creative innovation and effective learning. One innovation is effective learning using the learning model, then the model is appropriate learning*Discovery Learning* as a learning resource that can provide more meaningful learning experiences to learners.

Meaningful learning in question is learning not just memorize theories alone but it is expected that learners can understand what she learned and can motivate learners to follow the learning process so the impact on learning outcomes. In addition to the motivation of learning outcomes are also influenced by the ability of early learners because the initial capability has an important role as a consideration in choosing a learning model that will be applied.

Discovery Learning appears at first in Bruner theory according to which the main role of the teacher is to help and encourage his students to find things concepts and ideas and to develop aspects of the exploration and experimentation of knowledge (Kyriazis, Psycharis & Korres, 2009). Discovery Learning is a learning method that encourages learners to ask questions and draw conclusions from the general principles of practical examples of experience (Hosnan, 2014). Model Discovery Learning is a teaching model that governs teaching such a way that learners acquire the knowledge which previously did not already know it was not through a notification, in part or wholly invented itself (Salmiah, 2015). The environment is any condition beyond self-learners and teachers, both physical and non-physical form that is able to mediate so that the message conveyed to students learning optimally.

In general, the environment is defined as the unity of the object space, power, state, and living creatures, including human beings and behavior that affect the survival and welfare of human beings and other living creatures (Musfiqon, 2012).

Utilization of the school environment as a learning resource has several advantages, namely: 1) overcome the boredom in learning. Learning to use the environment as a learning resource will relieve or eliminate boredom learners in the study, because they are directly confronted with the object being studied, 2) provide a fun learning environment for students. In a variant that is used for learning between inside and outside the classroom will provide more atmosphere and fun for students, 3) learners to learn by themselves. Learning outside the classroom can provide opportunities for students to learn more independently, so that learners are not dependent on the teacher, 4) the opportunity to apply the theory. Not only do room narrow class if the facilities and inadequate learning resources in addition to noting the various theories of disciplines. By utilizing the environment, learners can test the theory obtained by direct practice in a real environment, 5) expand the thinking of learners. Using the environment as a learning resource will broaden think the students about the natural, social, environmental and indeed, 6) improving learning achievement of learners will be improved optimally when utilizing learning resources support, including the natural environment, social, and cultural (Sudjana 2014). Good learning outcomes is a process of encouragement, direction, and persistence of behavior. That is, the motivated behavior is behavior that is full of energy, purposeful and long-lasting (Santrock, 2015). This is in line with that proposed by Ormrod (2009) is the result of learning affects cognitive processes. Furthermore, he said that when we were exploring a wide range of cognitive elements in motivation, we will often see that cognition and motivation interact in affecting learning and behavior. Teaching and learning process aimed at developing the potential of learners optimally, allowing learners to achieve the expected goals. Good teacher knowledge about the subject matter, the learners and the learning process as a whole, is to determine the learning outcomes of students (Daryanto, 2013). Furthermore, he said that when we were exploring a wide range of cognitive elements in motivation, we will often see that cognition and motivation interact in affecting learning and behavior. Teaching and learning process aimed at developing the potential of learners optimally, allowing learners to achieve the expected goals. Good teacher knowledge about the subject matter, the learners and the learning process as a whole, is to determine the learning outcomes of students (Daryanto, 2013). Furthermore, he said that when we were exploring a wide range of cognitive elements in motivation, we will often see that cognition and motivation interact in affecting learning and behavior. Teaching and learning process aimed at developing the potential of learners optimally, allowing learners to achieve the expected goals. Good teacher knowledge about the subject matter, the learners and the learning process as a whole, is to determine the learning outcomes of students (Daryanto, 2013). Teaching and learning process aimed at developing the potential of learners optimally, allowing learners to achieve the expected goals. Good teacher knowledge about the subject matter, the learners and the learning process as a whole, is to determine the learning outcomes of students (Daryanto, 2013). Teaching and learning process aimed at developing the potential of learners optimally, allowing learners to achieve the expected goals. Good teacher knowledge about the subject matter, the learners and the learning process as a whole, is to determine the learning outcomes of students (Daryanto, 2013).

Based on early observations, there are still many teachers at SDN Pajaran 05 Madiun who has yet to apply the model of learning in teaching their students, so that the learning process is still running with the monotony and the interest of the students is still very passive, and not draw attention of students in learning in class, then the student learning outcomes by decreasing the value of the previous semester report still below standard. With respect to the above issue, one of the efforts to improve student learning outcomes is by applying a model of learning discovery learning. Teachers can develop a model to teach as an effort to instill good character to the students.

Learning by using learning model discovery learning can be used as an alternative to learning in primary schools in an effort to improve student learning outcomes. However, in applying this learning need to pay close attention to the steps of learning so that the implementation of learning can be done well. Learning implementations would do well if supported by a learning model and teacher in teaching. Therefore, prepare well and matured so that students can be actively involved in learning. In addition, teachers also need to keep the class in order to keep a good condition, so that all students can follow the learning well.

The learning model discovery learning can facilitate students to communicate, workgroups and can put forward his opinion. Reviewed from psychological aspects, the model of learning this discovery learning psychology cognitive assume that learning is a process of change in behavior due to knowledge gained through experience. Learning is not just memorizing some facts, but it is a conscious effort that individual done with its environment by constructing their own knowledge. This discovery learning model is particularly suited to be implemented because the learning process starts from the immediate environment with students that is used as the entrance to study social science.

Based on the explanation above researchers are interested in hosting research titled "Influence Model Of Discovery Learning By Making Use Of The Environment As A Source Of Learning Towards A Learning Outcomes On The Fourth Grade Of Elementary School".

METHOD

The research is a quasi-experimental research (Quasi-experimental) variable in this study is the motivation to

learn and learning outcomes biology learners in the learning process by using model Discovery Learning to use the environment as an experimental class and control class using model Discovery Learning without using the environment. The population in this study were all class groups fourth-grade SDN Pajaran 05 Madiun second semester of academic year 2017/2018. The sampling technique used is purposive sampling with each grade 29 learners. The data in this study were collected through an achievement test.

RESULTS AND DISCUSSION

Research result

Exposure data from learners before and after application of the discovery learning model of learning by utilizing as a source of learning and discovery learning without using the environment as a learning resource, then the results can be seen below:

Table 1. Descriptive Analysis Values Learning Outcomes Learners before and after

statistical	Model discovery learning		Model discovery learning	
	Before	after	Before	after
subject	29	29	29	29
Average	49.52	89.24	51.31	80.69
standard deviation	14.79	6.42	16.14	6.19
Maximum value	76	96	76	96
Minimum value	24	76	28	72

Table 2. Frequency Distribution and categories of Learning Outcomes Learners in the learning model Discovery Learning

interval	Category	Frequency		percentage (%)	
		Before	after	before	After
85-100	Very high	0	23	0	79
65-84	High	4	6	14	21
55-64	enough	7	0	24	0
35-54	Low	15	0	52	0

Table 3. Frequency Distribution and categories of learning outcomes of students in the learning model Discovery Learning

interval	Category	Frequency		percentage (%)	
		Before	after	Before	after
85-100	Very high	0	7	0	24
65-84	High	9	22	31	76
55-64	moderate	3	0	10	0
35-54	Low	12	0	41	0
0-34	Very low	5	0	17	0

Table 4. Distribution of Frequency, and Category N Percentage Gain Score Value of Learning Outcomes of Students Before and After the Implementation of Learning Model Discovery Learning

interval Scores	Model Discovery Learning		Model Discovery Learning		Category
	Frequency	Percentage (%)	Frequency	Percentage (%)	
$0 \leq g < 0.3$	0	0	1	3	Low
$\leq 0.3\ g < 0.7$	4	14	20	69	Moderate
$\leq 0.7\ g < 1.0$	25	86	8	28	High
Average		**0,80**		**0,6**	

Discussion

Learning outcomes through SPSS which shows that there is a significant influence on the study of students between the experimental class and control class. That is because of the application of the discovery model of

learning to use the environment as a source of learners active in the study, search for information or find your own concepts so that students more easily understand the material social science. According to the research conducted by the researchers, the study results in showed the significant effect on the fourth-grade SDN 05 Pajaran discovery learning model of learning by using the environment as a learning resource.

The results of both these treatments indicate that the discovery learning model of learning by using the environment as a source of learning can improve student learning outcomes. Among other reasons: 1) to overcome boredom in learning. Learning to use the environment as a learning resource will relieve or eliminate boredom learners in the study because they are directly confronted with the object being studied; 2) provide a fun learning environment for students. In a variant that is used for learning between inside and outside the classroom will provide more atmosphere and fun for students, expand the thinking of learners. Using the environment as a learning resource will broaden learners think about the natural, social,

Other findings that support this research undertaken by Mudasih in 2018 entitled *comparison of student learning outcomes through media learning video with PowerPoint*, while research conducted by Qomariyah in 2018 entitled *effect of problem-based learning models to improve student learning outcomes*, Both studies shows that as described above, an effective learning model suitable to improve student learning outcomes Elementary School.

Then observations of researchers for conducting research, it appears that the spirit and understanding of the students taught by Discovery Learning learning model are better when compared to students taught using conventional learning models. The difference can be seen from the results of student learning and student activity during the learning process takes place ((Kadri, M, & Rahmawati, 2015).

CONCLUSION

The learning model used discovery learning. Based on the results of this study concluded that students with different initial capabilities have learning outcomes that learned with discovery learning model of learning that are in both categories with a value of 84.62. Implementation of discovery learning model learning significantly influences the learning outcomes of students with grades (sig 0,000 > $\alpha = 0.05$). It can be concluded that there is a significant effect of using discovery learning model of learning to the learning outcomes of fourth-grade students between before treatment and after treatment.

We recommend that teachers implement instructional model Discovery Learning attention to the efficiency of time for each phase in the model of discovery learning in particular, the division of the group to experiment on the data collection phase.

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Development Textbook of Social Sciences Basic Concept Based On Quantum Learning to Increase Student's Cognitive Learning Achievement

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Abstract

The research aimed to develop a textbook of social basic concept based on quantum learning to increase student learning achievement. The development model used four-D models (define, design, develop and disseminate). The research conducted the data from the students (second semester) of the primary education study program of STKIP YAPIS Dompu by using technique pretest-posttest group design. Based on the research, the quality of the textbook was a good category and proper to be used. In terms of content and language validity obtained an average score of 3.68, and presentation and graphic design obtained an average score of 3.87. The practice of the textbook in this research was implemented with a very good category, with a coefficient average of 90.28%. While, in terms of the increase of cognitive learning, experiment class obtained the average score 83 with class classical completeness 96.67%, the result was better than control class which proven by t-test. Independent sample t-test, score of t_{count} *5.080 >* t_{table} *2.001 on df 58 with significance score (2.tailed) more little than score α (0.000 < 0.005). The use of the social science basic concept textbook based quantum learning got a very good response from the students which 97.78% gave positive responses. Based on result and discussion, it concluded that the textbook of social science basic concept based on quantum learning was able to increase the cognitive learning achievement.*

Index terms: *textbook, quantum learning and cognitive study achievement.*

I. INTRODUCTION

The course of social science basic concept is one of the main courses in the study program of primary teacher training. The course aimed to equip the students to have competences and abilities to understand the materials of social studies basic concept (Summatmadja: 2006). Lecture of social studies basic concept are required to increase the abilities of teacher candidate of an elementary teacher in understanding the social studies as principal to instill values, elementary learners. Social studies course directed the student to become a good Indonesian citizen which is democratic, responsible and world citizen loving peace (Kurniyati: 2016). Social studies, besides equipping the students about knowledge of social sciences, it purposes to teach the students to become a good citizen of a nation or global (Astriati: 2009). As teacher candidate, the student will play a significant role in school and their society. Social transformation in teacher education offers possibilities for social change since the system would be able to promote a situation where

future teachers would critically with what exists in society. Social transformative pedagogy stimulates and raises consciousness in learners, allowing them to be active and responsible participants; and for them to recognize oppressive, violent and exploitative conditions (Siguake: 2009). Social science course is much needed as a main element in curriculum because social studies course preparing the young generation to become a good citizen.

The textbook has a significant role in learning activities. The textbook is curriculum conveyer, playing the main role in education to all subjects (Hadar: 2017). The textbook will be important in terms of functional, objective and effective as learning sources which help the educator/learner to capture the whole learning materials. A textbook as one learning source is a mean for transforming materials between educator and learner effectively. Realizing its urgent, the textbook should be provided in each course to help the learner. Lecturer/teacher and students obtain many beneficial by using the textbook; unit structure organized, appropriate content, embraced curriculum and has been designed to be used as means of teaching activity (Medina; 2016). Textbook is class equipment, such as proximity between teacher and students. Learning material could be defined as material which systematically constructed to be used by the teacher and learner in the learning process (Shanon: 2010). It can be concluded textbook is learning materials forming of information, tools, which systematically constructed with particular competence objective that will be mastered by the students in the learning process.

The existences of textbook in a learning activity ease the user to deliver learning materials to the students. Prastowo (2011) clarified the two function of a textbook. Firstly, function for the educator, there are five functions for the educator; (1) the educator could manage the time efficiently, (2) change the role of educator in class, from a teacher, become facilitator, (3) could change the process learning more effective and interactive, (4) as the guidelines for the educator to direct all learning activities and substantiation that should be taught, (5) as an instrument of achievement evaluation. Secondary, function for the learner might have, (1) the textbook materials can be independently learned by the students, (2) the students might learn the material anytime and whenever (4) the students could learn based on each learning speed, (4) the students free to chose the topic that they desire to learn, (6) as the guidelines to direct all learning activity and understand the competence that should be achieved.

The learning process of university level might emphasize forming the knowledge, gaining the skill and attitude of the student. The efforts to achieve the learning target need a mutual relation between the class learning process and the independent learning process. Likewise, Social studies as education program might not provide only social knowledge but also fostering the students to be a citizen who has the responsibility to achieve welfare togetherness in many perspectives. Therefore, the teaching of social studies for university students might not only be fostered to have high order thinking, but also to have high awareness and responsibility for the social welfare of the nation. revealed that awareness of social learning orientation for the teacher candidate might have an impact on a society where they live in. Due to the roles, learning material of social studies should not limit cognition, but also covering the values which attaché for the student with easily and pleasurably presented (Akhan and Artickulac: 2013)

Based on the analysis, the textbooks must be constructed and improved to ease, please and grow students' interest in learning social studies basic concept. The learning convenience and interest could be obtained by the student if the construction of the textbook provides information and material with pleasurably presented, in order to encourage the student are able to construct the condition independent learning. Complying the students' need of the pleasure learning then needed a model of constructing textbook which contains tips, instruction, synergy, and pleasant learning process. Those needs could be obtained on the textbook and learning process which based on quantum learning. Quantum learning is tips, instruction, strategy, and all learning process purpose to sharpen the understanding and memory, by constructing learning as pleasure process and useful (DePorter: 2014).

The philosophies of quantum learning itself are creating learning process such an orchestra with so many interactions in and surround the learning. The interaction which means embraced learning unsure effectively influences the learning style and the motivation. The interaction could change the ability and talent of students or university students which could be beneficial for them or for the people around them. Quantum learning is a learning model which emphasize that learning as a pleasure and meaningful process Turnip and Panjaitan (2014). Quantum model learning might help the students to think practically and easier in understanding concept, so that make easier to communicate the ideas in spoken or written (Adhitama, parmin and sudarmin: 2015). Based on the philosophy and principle of quantum learning, the researcher believed that the learning result by using the teaching book of social basic science concept based on quantum learning in the course of social basic concept will have a significant impact for cognitive achievement. In order to have findings, the researcher outlined the research questions/problems, (1) how the validity of the textbook of social science basic concept based quantum learning? (2) How the implementation of the textbook of social science basic concept based quantum learning? (3) How the effect of the textbook of social science basic concept based quantum learning?

II. RESEARCH METHODOLOGY

This study was research and development (R and D). This research developed five units of the textbook. The researcher conducted the data from the second-semester students of the primary education program of STKIP Yapis Dompu which consist of 15 students for first trials class and 60 for the second trial. Design of the developing book was the 4-D model by Thiagarajan Semmel dan Samuel (1974), which consist of define, design, develop and disseminate. The process of developing in this research was been simplified until the third step (step develop), not until the fourth step (disseminate).The research design was pre-test-posttest group design which conducting experiment class and control class. The instrument of this research was consisting of validation sheet, practice textbook sheet, and effectiveness of textbook sheet. The data were analyzed by descriptive quantitative. The analysis of quantitative result would be described as qualitative.

III. FINDINGS AND DISCUSSION

Research findings are grouped into subheadings: the validity of the textbook, the practice of the textbook, and the effect of the textbook. The judgment of textbook validity was given by two experts who were experts in their discipline. Both observers gave the score by a checklist which was provided in the instrument.

1.1. The validity of textbook

Table 1. Validity content and language of textbook

No	Aspect of judgment	Score		Average
		V1	V2	
A.	**Component of content validity**			
1.	Materials were presented based on standard of KKNI which embraced: The complete of materials, Breadth materials, Depth of materials	4	4	4
2.	The accuracy of materials embraced: The accuracy of fact and concept, Accuracy of illustration	4	4	4
3.	Learning supporting materials embraced: Appropriate of latest knowledge. Latest feature, example and contextual reference	3	4	3.5
4.	Encourage the students to identify, understand, solve problem and apply learning materials	3	4	3.5
5.	Based on concept, theory and empiric fact	4	3	3.5
B.	**Component validity of language**			

1.	Appropriate with the level of students development embraced: Appropriate with the level of thinking development, appropriate with the level development of social emotional.	3	4	3.5
2.	Communication embraced: Understandable of sub-sub massage and paragraph, the relation within chapter, sub-sub chapter, paragraph and sentences.	4	4	4
Total score		**28**	**27**	**26**
Score average				**3.68**
Percentage				**92.86%**
Conclusion: valid with a little revision				

(V1) First validator, (V2) second validator

Table 2. Validity of presentation and graphic

No	Aspect of judgment	Score		Average
		V1	V2	
A.	**Component of presentation**	4	4	4
1.	The technique of presentation embraced: coherent concept, systematically consistent, balance within chapter			
2.	Learning presentation embraced: students centered, develop skill process, variation of presentation	4	4	4
3.	The completeness of presentation embraced: introduction, content part, and summary			
B.	**Component of graphic**			
1.	Appropriate size of textbook with the ISO Standard (A4, A5 and BS), appropriate size with materials content of textbook, design of cover harmonically constructed, unity and consistent.	4	4	4
2.	Cover design embraced: layout, typography of cover, and font	4	4	4
3.	Design of textbook content embraced: represent all content, harmonically layout, complete layout, layout understanding, and content typography of textbook and content illustration.	4	3	3.5
4.	Interesting typography with appropriate color, font, two maximum type, variety (bold, italic, underline) font size 12 until 16, space between 1 until 1.5.	3	4	3.5
5.	Proportional layout, front cover compatible with back cover	4	4	4
Total score		**31**	**31**	**31**
Score average				**3.87**
Percentage				**96.88%**
Conclusion: valid with a little revision				

(V1) First validator, (V2) second validator

Validation of a developed textbook product is needed, as a method to assess the level of validity in terms of the appropriate presentation and the language of developed product. The validity itself is adjusted with the standard of textbook development by national standard of education body (2007) those there four components should be accomplished, which consist of validity of content, language, presentation, and graphics. Those basics are the main device of developing the textbook (Hutama: 2016). Based on the assessment of validity, textbook of social science basic concept based quantum learning could be categorized as a very good/valid.

Data of Table 1 showed the result of textbook analysis in terms of validity of language and content (materials) have a scoring average of 3.68 with the percentage 92.86%. While Table 2 showed the result of textbook analysis in terms of presentation and graphic. The average score of presentation and graphics validity is 3.87 with a percentage of 96.88. Based on the result, the book of social science basic concept based on quantum learning is valid.

1.2. The practice of the textbook

The practice of quantum learning syntax could be known from the data of learning implementation on lesson plan instrument. The implementation of the textbook of social science basic concept was very good implementation. Learning activities were assessed by two observers.

Table 3 Implementation of developed textbook in learning activity based on quantum learning syntax

No	Learning activity	LPI 1		LP2		LP3		Average	category
		P1	P2	P1	P2	P1	P2		
1	Step growing	4	4	4	4	4	4	4	Very good
2	Step experiencing	4	4	4	4	4	3	3.83	Very good
3	Step naming	4	4	4	3	3	4	3.67	Very good
4	Step demonstrating	3	4	4	3	4	4	3.67	Very good
5	Step repeating	4	4	3	4	4	4	3.83	Very good
6	Step celebrating	4	3	4	4	4	4	3.83	Very good
Total score		23	23	23	22	23	23		
Average score		3.83		3.75		3.83			
Reliability		95.83		93.75		95.83			
Reliability average		95.13%							

LPI: lesson plan instrument. P: Observer

Table 3 showed the observation result of both observers for learning activity using social science basic concept textbook based on quantum learning was very good implemented. Based on the data, on the first meeting, implementation average score was 3.83, second meeting average score was 3.75, and the third meeting, the scoring average was 3.83. Reliability coefficient instrument of the learning implementation on the first meeting was 91.67%, the second meeting was 89.58%, and the third meeting was 89.58%. Coefficient average of reliability from all three meetings was 90.28%. If the coefficient reliability ≥ 75%, the instrument could be categorized as very good (Borrich: 1994). Referring to Borrich statement, implementation of learning in this research was very good implemented with the coefficient of 90.28% ≥ 75%. Quantum as a leaning model provides a chance for students to learn based on students' way (Supriyanto: 2016).

Learning by using social science basic concept based quantum learning has principle brought the teacher world to the student's world. By constructing the system, it required to grow the student's self-efficacy. The feeling of self-efficacy is the confidence of human on their ability to train such self function and occurrence around them (Dahar: 2006). There would be a connection between the occurrence surroundings to the individual learning process (Dundar: 2012). The accuracy process very appropriate with the learning step of social science basic concept based quantum learning, because it provided the student some issues in

growing step as encouragement. The phenomenon that students observed in their daily day which is combining with the concept and issue in the textbook.

1.3 The effectively of textbook

The effectively of the textbook becomes the result of learning activity. The effectiveness could be identified form cognitive learning achievement. The achievement of cognitive learning as the impact of using the textbooks of social science basic concept based on quantum learning could be seen on the result of the first trial. The achievement of student's cognitive learning on post-test of the first trial was 86.67% classical class completeness with an average score of 77.5. The result was better than in comparison with the result of pre-test of first trials which classical class completeness just 20% with the average score 51.66. By looking at the data of the first trial, the use of the textbook of social science basic concept based on quantum learning has an impact on the increase of cognitive learning result. In order to prove comprehensively, the textbook should be used in the second trial (large trial). The second trial used pre-post test group design which consists of experiment class and control class. Comparison class was needed to avoid the perception that the increase of cognitive learning outcome is caused by other factors, not the impact of the textbook. Control class was also used quantum learning as a learning model, but using a conventional module. The differences of both treatment class just on the implementation of social science basic concept textbook based quantum learning, not because of the effect of the learning model.

Based on the pre test of control class, classical class completeness on the second trial was 40% with average score 68.67, while the result of pre-test of experiment class was 43.3% with an average score of 68.33. Both pre-test data were normally distributed and homogeny based on normality and homogeneity test. Learning of experiment class and control class allocated each tree meetings. Proving the effects of both classes, post-test must be conducted. Post-test of control class obtained completeness classical class 60% with a scoring average of 72.50. While post-test of experiment class in terms of completeness classical class was 96.67% with average score 83. Observing the result, surely average score and completeness classical class of experiment class better than control class, however to prove furthermore, it needed t-test to seek the significantly by using SPSS 16.0.

Table 4. Post test T-test of experiment and control class

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Hasil belajar	Equal variances assumed	.054	.818	.5.080	58	.000	10.500	2.067	14.638	6.362
	Equal variances not assumed			5.080	57.754	.000	10.500	2.067	14.638	6.362

Based on the result of t-test post-test of control and experiment class, independent sample t-test, the score of t_{count} 5.080 > t_{table} 2.001 on df 58 with significance score (2.tailed) more little than the score α (0.000 < 0.005).

Based on the data, naught hypotheses (Ho) which submitted was rejected, and the alternative hypothesis (Ha) was accepted. Therefore, it could be concluded that the learning result by using the textbook of social science basic concept based on quantum learning was better than the learning result which was not using the textbook of social science basic concept based on quantum learning. In order to prove the effectiveness of the textbook, respond of students was also needed. The use of the developed textbook in the learning got a positive response from the student, which 97.78% of all students gave positive responses. The dominance of students who gave positive responses as the impact of the developed textbook. Quantum learning as basic learning in developed textbook gives the chance for students to learn based on their track, with pleasure process, without any pressure. Quantum learning syntax emphasizes that learning is a pleasure process (Turnip and Panjaitan: 2014). Learning activity running into the level of their receptive ability.

IV. CONCLUSION

Realizing the impact of the textbook of social science basic concept based quantum learning, the researcher suggest to any education stakeholders, especially the teachers and the lectures to use the textbook in order to increase the student's cognitive achievement. Using the textbook of social science basic concept based quantum learning have required the ability and creativeness of the teacher to find certain and latest issues as part of the quantum step of learning in order to create pleasure learning so as to able to increase the cognitive learning achievement.

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Development Of Teaching Materials Folktale Nationalism To Form Attitude Primary School Students

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The background of this research by folklore which is a heritage of knowledge noble values in society. Therefore, very precise serve as resource nationalism in shaping attitudes of students especially for primary school children.The purpose of this research to develop teaching materials folklore nationalism in shaping attitudes of primary school students. The approach in this study is a development approach that develops teaching materials that follow the design nonequivalent control grub 4-D design models. The subjects were Elementary School fourth grade students Pajagalan I Sumenep. Includes data analysis techniques, analysis of the validity of teaching materials, teaching materials practicality analysis (keterlaksanaan learning materials, the response of students and teachers), Analysis of the Effectiveness of Learning (test kempampuan attitudes, normality test, homogeneity and test the effectiveness of the use of teaching materials). The data were obtained as follows: the results of the validation test is very valid teaching materials average value obtained > 0.80 with a little revision. Results analisisi keeftifan through t-test for the control group and the experimental pretest t = 3.670> table = 1.670. There are differences to the Traffic nationalism Elementary School fourth grade students Pajagalan I Sumenep.

Keywords: *Subjects, Folklore, Attitude Nationalism.*

INTRODUCTION

Indonesia is a nation that has a diverse customs, religion, race, and ethnicity. One area that has a wealth of contributions in the world of education that needs to be preserved is folklore.Folklore is one of the works that are born by the people who still hold on the values of traditional culture.According Nur'aini (2008: 27) folklore is the story that developed in the community and handed down from generation to generation through verbal. Folklore also stories relating to the circumstances or evidence of relics. Additionally, Ratna (2014: 604) folklore is the whole story that emerged as a result of interaction between individuals, between groups in society.Teaching materials folklore itself as one of the innovations for students in cultivating an attitude. Folklore usually consists of myths and fairy tales, often described as of human behavior where this story gives meaning and value to the lives of elementary school students.

Based on observations known folklore materials is severely limited in primary schools Pajagalan I Sumenep, so students are less familiar with the folklore. Students are more viscous know folklore outside of the love story of the people themselves. And if we know the folklore in Indonesia many great lesson to be learned. Folklore scattered in different places and not all well documented. Whereas folklore is one source of the rich oral traditions that need to be uncovered, excavated and preserved as a cultural label. Teachers deliver learning with lecture and only using makeshift materials as a source of teaching material.In addition, teachers are still experiencing difficulties in determining appropriate teaching materials to submit items of folklore.Based on the observations that have been made, is now increasingly folklore reduced demand and impressed increasingly disappeared from public life it itself, particularly society. Very disappointing if people are unaware of folklore originating from its own country. This happens because folklore had rarely if ever again told by the parents to their children or teacher to his students. These circumstances need to be considered by the fourth-grade teacher in order to create change in the learning activities in order to attract the attention of students in shaping the attitude of nationalism in the lives of students.

Based on these problems, the needed teaching materials to facilitate students in learning to stimulate students' nationalism. as described by Prastowo (2013: 17) explains that the teaching material is any material (whether information, tools and text systematically arranged and showing the figure of a whole of competences which students will as well be used in the learning process. Meanwhile, Lestari (2013 : 2-3) in principle,

teaching materials prepared on the necessary learning needs of students packed in units of a specific and systematic activities based on the curriculum, teaching materials are learning materials used in classroom learning activities for the achievement of learning goals , Fourth grade primary school students in the learning process rather listen to folklore than to listen to the teacher's explanations that are not attractive. In folklore students prefer to listen to fairy tales that are legendary, From the description, it can be developed materials to form attitudes folklore nationalism fourth grade primary school students. The use of teaching materials in learning folklore Madura is expected to provide a new atmosphere for the students so that learning more interesting and fun. In addition, teaching materials folklore Madura is also expected to improve student learning outcomes.

This study aimed to describe the validity of teaching materials folklore to shape the attitudes of primary school students nationalism, describing the practicality of teaching materials in shaping attitudes folklore nationalism primary school students, and to describe the effectiveness of teaching materials in shaping attitudes folklore nationalism elementary school students.

METHOD

This research will examine about the development of teaching materials in shaping attitudes folklore nationalism elementary school students. This type of research in this study is the kind of research development. Research & development (R & D) is a research method that is used to produce a certain product to test the effectiveness of these products (Sugiyono 2016: 297). Development of teaching materials Madura folklore in this study using a model of development Thiagarajan, Semmel, and Semmel. Thiagarajan models (1974, p. 5) consists of four phases, known as 4-D models (Four D models). The fourth stage is (1) the definition (define), (2) design (design), (3) development (develop), and (4) the spread (disseminate). In doing so, the researchers only use three phases, namely the definition (define), design (design), development (develop), so that the teaching materials developed are only used at the school were tested without disseminated to other schools. This is because beyond the authority of researchers to distribute products that have been developed by researchers. But researchers only give the option of teaching materials that can be used in primary schools. 4-D model of development chosen for the stages clear, coherent, and in accordance with the needs of the development of teaching materials forming folklore in nationalistic attitudes of primary school students, this model as a companion book curriculum, 2013. This is because beyond the authority of researchers to distribute products that have been developed by researchers. But researchers only give the option of teaching materials that can be used in primary schools. 4-D model of development chosen for the stages clear, coherent, and in accordance with the needs of the development of teaching materials forming folklore in nationalistic attitudes of primary school students, this model as a companion book curriculum, 2013. This is because beyond the authority of researchers to distribute products that have been developed by researchers. But researchers only give the option of teaching materials that can be used in primary schools. 4-D model of development chosen for the stages clear, coherent, and in accordance with the needs of the development of teaching materials forming folklore in nationalistic attitudes of primary school students, this model as a companion book curriculum, 2013.

RESULTS AND DISCUSSION

Validation of learning implementation plan implementation, prior to field trials and research instruments developed product should be assessed or dibvalidasi by experts. Rate validation is performed by two validators who are experts in their fields. The objective of the stage is as feasible to prove that the instrument used. The results of the validation assesment of the implementation of learning which is validated by a validator seen in Table 4.1 as follows:

table 4.1
Assessment Validation RPP

No.	Indicators / Aspect validated	appraisal		Average	Category
		V1	V2		
1	RPP identity (name of school, learning eye, and half the class time allocation	3	3	3	Well
2	Clarity of learning objectives formulation	3	3	3	Well
	Average	**3.0**	**3.0**	**3.0**	**Well**

(Source: attachment 4)

Based on table 4.1 it can be seen that the average results of recent research by two validators RPP is 3.0 to match the scale of Likert Crete "Good" artimya lesson plan is feasible suggestions and feedback by the validator on RPP made still less specific, step on core activities learning and adapted to the standard stages of the process, and as well as the allocation of instructional time should be given time allocation

table 4.2

Validation Feasibility Assessment Material

No.	Aspects validated	appraisal		Average	Category
		V1	V2		
1	KD material linkages with the duties and illustrations	3	3	3	Very good
2	The accuracy of the material facts and concepts, principles, theories of learning civics by formulating it precisely to avoid misconceptions students	4	3	3.5	Very good
3	Completeness is developed according to folklore	3	4	3.5	Well
Average		**3.33**	**3.50**	**3.33**	**Very good**

(Source: Appendix 5)

Based on Table 4.2 it can be seen that the average results of recent research in validasi feasibility of the material is 3.3 with two validators assessment criteria of each indicator is very "very good" this shows that there material this on teaching materials folklore has been worth it tested in the field.

table 4.3

Validate Eligibility Assessment Presentation Components

No.	Aspects validated	appraisal		Average	Category
		V1	V2		
1	Grievance concept, presentation of material in teaching materials in accordance with a simple flow leading to a complex groove, so that students can follow it properly	4	4	4	Very good
2	Developing Capabilities nationalism behavior in shaping attitudes of students	4	4	3	Well
3	The closing section which lists library, a subject index, glossary of terms (glossary) and petunujuk performing tasks	3	2	2.5	
	Average	**3.75**	**3.25**	**3.55**	**Very good**

(Source: Annex 6)

Based on Table 4.3 it can be seen that the average assessment is 3.55 material feasibility validation criteria Linkret scale validator assessment was "good", indicating that the material in teaching materials folklore has been worth it tested in the field with minimal revision.

table 4.4

Validation Feasibility Assessment Language

No.	Aspects validated	appraisal		Average	Category
		V1	V2		
1	The material in the book of teaching is presented with the correct language and easy to understand.	4	4	3.5	Very good
2	Keruntuttan language used in each composition according to the student's ability.	4	3	3.5	Very good
	Average	**4**	**3.5**	**3.54**	**Very good**

(Source: Appendix 7)

Based on Table 4.4 it can be seen that the average language assessment results validation is 3,54 criteria Linkret scale is a validator votes "very good", indicating that language teaching materials folklore is feasible tested in the field

table 4.5

Validation Feasibility Assessment kegrafikan

No.	Aspects validated	appraisal		Average	Category
		V1	V2		

1	In accordance with ISO standards, with the use A4 size (210x297mm), A5 (148x210mm) and B5 (176x210mm) with tolerance anatar size 0-22mm	4	3	3.5	Very good
2	The use of the font in the folklore of teaching materials to be read by students	3	3	3.0	Very good
3	Illustration Revealing the meaning of objects, illustrations with text, coloring illustration	3	4	3.5	
	Average	**3.5**	**3.5**	**3.60**	**Very good**

(Source: Attachment 8)

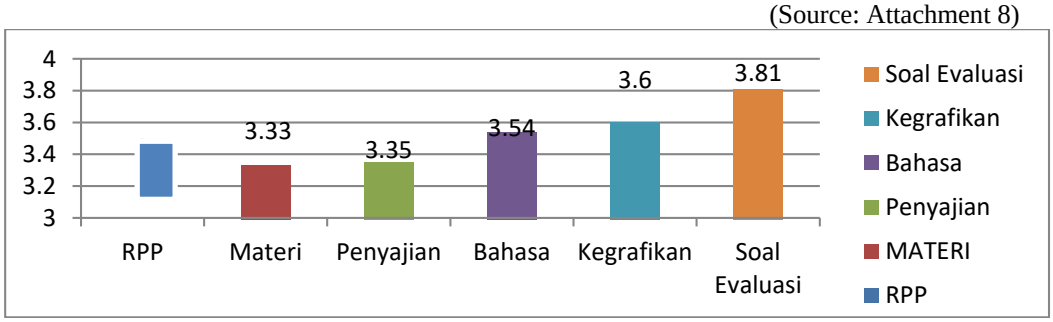

Figure 4.1 Diagram Validation Results Research Instruments Research and Teaching Material

In the diagram above menejelaskan about the instruments and materials ajaryang validated by expert. RPP validation value of 3.00 (good), Materials 3.33 (very good), Presentation of 3.35 (very good), English 3.54 (Very Good), Kegrafikan 3.6 (very good), the evaluation questions 3, 81 (excellent). So for the overall value of the validation results are assessed by validator experts including criteria very well.

table 4.6
Results of research keterlaksanaan lesson plan
(Practicality teaching materials)

No.	**aspects Rating**	**Meeting 1**		**meeting 2**		**meeting 3**	
		O1	O2	O1	O2	O1	O2
1	Initial activity						
	1. Delivering destination	4	3	3	3	4	3
2	Core activities						
3	Cover						
4	Observers Atmosphere Class						
	Average	**3.55**	**3.33**	**3.55**	**3.00**	**4.00**	**3.60**

Ket. O1 = Observer 1, O2 = 2 (Source Attachment 9)

Based on the above table it can be seen that the average observer ratings observation results in the fourth grade learning accomplished in accordance with the opinion (Riduan., 2013: 41) as very strong.

table 4.7
Response Percentage Students

No.	Question	Response Student Class IV-A	
		Iya	Not
Average		93%	7%

(Source Attachment 10)

Based on table 4.7 in mind that all of the students answer questions that views literacy teaching materials indigenous culture is interesting. Of the 10 questions answered by the average student teaching material students' responses to folklore 93%, so in accordance with the criteria of students according to (Riduwan, 2013: 41) as very good and practical and fit for use.

table 4.8
Test Result Data Validitasi attitude Ability Test

No.	r count	r table	Information
1	.690	0,349	valid

2	.639	0,349	valid
3	0.731	0,349	valid

(Source Attachment 11)

Through the SPSS 24 statistical calculations, evaluation sheets attitude capability consists of 10 questions were submitted to 35 sisswa shows the overall item is valid, because t is greater than t table. Thus the 10 items on the evaluation sheet test. The ability to use as decent attitude measurement tool capability attitudes.

table 4.9
The reliability analysis Ability Test Questions Item student attitudes
Reliability Statistics

Cronbach's Alpha	N of Items
, 707	5

(Source Attachment 12)

The otherwise normal if the value of Cronbach's Alpha greater than 0.60. Thus, the data in Table 4.9 can be declared reliable or stable.

Results attitude abilities done by mengkuru ability students' attitudes through the pretest and posttest to the control and experimental classes. Results pretest and posttest control group and the experiment can be seen in Table 4:10

table 4.10
The reliability analysis Ability Test Item Attitude Problem

No.	**Class IV-A (Control)**		**Class IV-B (Experiment)**	
1	69	71	62	70
2	47	62	62	80
3	56	69	75	87
4	43	62	61	79
Average	**60**	**74**	**63**	**85**

(Source Attachment 13)

At 4:13 table can know the results of the control and experimental class pretest still not in accordance with the KKM is 70. The average value of pretest class IV-A 60 and the average value of pretest class IV-B 63. As for the average grade classroom posttest results IV-B experienced an increase of 85 over the KKM. However, for class IV-A as kels still control more than KKM is the average value of 74.

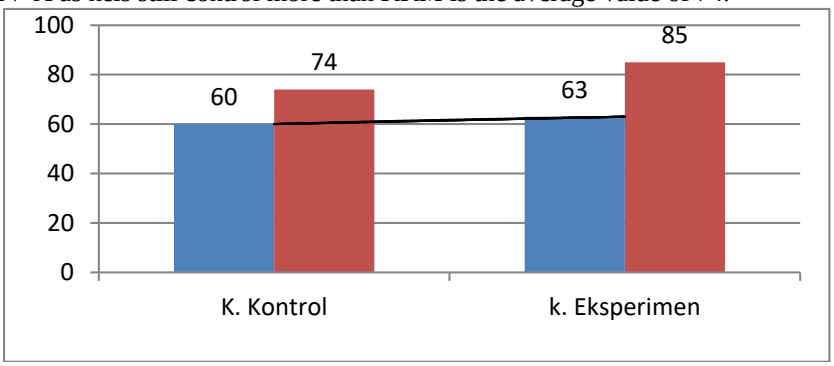

Figure 4.2 Diagram average pretest and posttest experimental class and control

In Figure 4.2 it can be seen an increase in the value difference between the students' ability attitude class IV-A and IV-B.

table 4.11
Normality Test One Sample Kolmogorov-Smirnov Test

Class	variables	Asymp. Sig. (2-tailed)
Control	Ability Attitude (pretest)	0109
	Ability Attitude (posttest)	0141
Experiment	Ability Attitude (pretest)	0.131
	Ability Attitude (posttest)	0.187

(Source Attachment 12)

In this case the researchers used SPSS 24 with technical One Sample Kolmogorov-Smirnov Test with significance rate of 0.05. Normality Test results can be seen in the table above 4.11. based on the above table shows the value signitikansi posttest control group 0.109 and 0.141. Then to the value of the experimental class

pretest signitifikasi postess 0.131 and 0.187. Thus, the data above can be considered normal for more than the level signitifikasi 0.05.

table 4.12
Homogeneity test

	Statistic levene	DF1	DF2	Sig
Prettest	1,182	1	62	.281
posttest	2.582	1	62	0,113

(Source Attachment 13)

From 4:12 table shows the significant value of 0.281 pretest and posttest sgnifikansi value of 0.113. With each variable Accordingly higher than 5%, or 0.05. So based on these data the variance between the two groups is assumed to be homogeneous.

Test for normality and homogeneity test is a prerequisite test for determining the data used is tesdistribusi normal and homogeneous. After the data is otherwise normal and homogeneous, then the data can be used to perform hiptesis test or t-test as follows

a. Ha = there is influence of the use of folklore against nationalism Elementary School fourth grade students Pajagalan I Sumenep theme of the beauty of the diversity of my country.
b. H0 = there is no influence resource use folklore to nationalism Elementary School fourth grade students the beauty of diversity Pajagalan first theme country.

Both hypotheses were tested by t-test statistical analysis, to make decisions by comparing ttable (0.05) with t as follows.

a. If t is greater than t*table* (T > ttabel) then the null hypothesis (Ho), which was rejected and the alternative hypothesis (Ha) is accepted.
b. If t is less than t*table* (T < ttabel) then the null hypothesis (Ho) filed accepted and alternative hypothesis (Ha) is rejected.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pretest	Equal variances assumed	1,182	0,281	0,685	62	0,496	2,188	3,195	-4,198	8,573
	Equal variances not assumed			0,685	60,956	0,496	2,188	3,195	-4,2	8,575
Posttest	Equal variances assumed	2,582	0,113	3,67	62	0,001	10,781	2,938	4,909	16,654
	Equal variances not assumed			3,67	58,751	0,001	10,781	2,938	4,902	16,66

(Source Attachment 14)

According to the table 4:13 knowable at posttets value t = 3.670 with a precision of 0.05 and df = 62, then a large table = 1.670. If t> t table so Ha is received at the level of 5%. From these data can be written t = 3.670> table = 1.670, so Ha is received. It can be concluded that there are significant resource use folklore to the attitude nasioanalisme Elementary School fourth grade students Pajagalan I Sumenep.

DISCUSSION

Penilaian validation of teaching materials is determined by the 4 components in accordance with BSNP, namely the feasibility of component material / content, presentation components, kemponen linguistic, and komponene kegarfikan. The fourth component is assessed by validator competent in their field. Validity for very valid material component with the criteria of <0.83 or with a value of 88. Components of the presentation materials can be categorized as very valid with a value of 0.88. Components of language teaching materials can be categorized as very valid with a value of 0.88. Then kegrafikaan components can be categorized as very valid with a value of 0.93.

Practicality teaching materials folklore refers to opini Akbar (2013, p. 37) after validating the validator then dilkuakan field tests of objects that students with learning and knowing keterlaksanan student response after the use of teaching materials folklore.Thus the material practicality aje folklore implementation aspect of the learning process and the students' responses as very strong. That's because the learning process implementation level reached 93% and the percentage of students' responses after the use of teaching materialsfolklore reached 95%.

Effectiveness of Learning (test kempampuan attitudes, normality test, homogeneity and test the effectiveness of the use of teaching materials). The data were obtained as follows: the results of the validation test is very valid teaching materials average value obtained> 0.80 with a little revision. Results analisisi keeftifan through t-test for the control group and the experimental pretestt = 3.670> table = 1.670,, There are differences to the Traffic nationalism Elementary School fourth grade students Pajagalan I Sumenep.

CONCLUSION

Based on the results of the validation test conducted by two validators that validate the contents of component materials or get the value of 0.88. Components presenting teaching materials can be categorized as very valid with a value of 0.89. Components of language teaching materials can be categorized as very valid with a value of 0.88. Then graphics components can be categorized as very valid with a value of 0.99. Thus the value of materials otherwise very valid folklore with a few minor revisions.

Subjects folklore theme of the beauty of diversity developed country otherwise practical and can be used for elementary school fourth graders. Based on the analysis implentation level learning process during the three meetings was 93% and the percentage of students' responses after the use of teaching materials folklore in the form of a questionnaire given to students at the end of the third meeting of up to 95% with very strong criteria.

Based on the results of the t test for the data pretest control group and the experimental value of t = 0.401 <table = 1.668, so there was no significant difference for the data pretest. Then the t-test value of t = 5.767> table = 1.668. Based on the results of the analysis can be inferred resource of folklore theme of the beauty of the diversity of my country, is effective to improve the ability of nationalism Elementary School fourth grade students Pajagalan I Sumenep.

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Measuring Level Of Readability Samba Paria's People's Story For Elementary School

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Abstract

The purpose of this research is to measure the readability of discourse and to ensure that it is written on the book cover that this reading book is intended by elementary school age children. The reading level of the folklore is using the Fry legibility Formula. The research uses quantitative descriptive methods. The Data is the text of the People's Story discourse Samba Paria. Based on the calculations with the Fry readability Formula is obtained the average result of 132 syllables and 8.5 sentences, when depicted on the Fry chart and drawn straight line will see the meeting point of crosses the vertical lines (syllables) and rows Horizontal (sentence) that shows the position in the rank 5, the legibility rank should be estimated as a discourse with the level, legibility of rank 4 namely (5-1), 5, and 6 (5+1) or 4, 5, and 6. The conclusion of this research is based on the calculation of the Fry legibility Formula, the discourse of the People's Story of Samba Paria for levels 4, 5, and 6, this result is as stated on the storybook cover.

Keyword: *Legibility level, folklore, Formula of Fry readability*

INTRODUCTION

Folklore is one form of folkloric. Folklore itself is a part of the culture of a collective spread and handed down hereditary among any kind of collective traditionally in different versions, both in the form of oral as well as examples of which are accompanied by gestures or tools Danandjaja's Reminder Helper (1997, p. 2). Folklore is inherited hereditary from one generation to the next in a particular society Endraswara (2010, p. 3). The existence of folklore is a cultural phenomenon that is universal in the life of society. Indonesia is a country rich in diversity has a variety of folklore that is regarded as a collection (co-owned). Many of the benefits we will get by listening to folklore. One of them, we will gain valuable experience from the story, through the events that his characters. The folklore contains a moral message that is useful for its readers. The message (order) in the story is sometimes expressed directly but is sometimes expressed indirectly through the behavior of his characters.

Folklore in each region differs and has its own characteristic describing the cultural condition of the society. The folklore itself is good reading for children, in addition to introducing other cultures outside the region, as well as each folklore has a positive message told by the author, however not all folklore are given on All ages of readers. One folk story that is interesting to talk about is the folklore of Samba Paria, from West Sulawesi. Seen in terms of content, the story revolves about the life of a beautiful girl who lives only two with her sister because their parents died from the ruthlessness of the ruling king. Where in the folklore plot contains many positive moral messages such as the importance of living one another, be patient, be thoughtful, ingenuity and toughness. The stories that are presented also use language that is easy to understand and not boring when to read. In addition, the traits of the various characters teach the child to understand the meaning of the diversity of nature possessed by each human being. At the end of the folklore of Samba Paria, the cruel king was killed by the "white" figure who was considered to be acting in an unintentional way and ended his ruthless power, so the people again lived a calm and happy life.

Readings attract children of folklore, affecting children when read, because in the story many stories of the behavior or nature of the characters that can be imitated or conceptualized by children, especially if the character "white" that the child liked to do Not good deeds, even for good, still the concept of good deeds is not an example of justified behavior. It can bring an unkind impact to the child who reads if their level of understanding does not match what is read. After reading this Samba Paria folklore, researchers consider the need for measurement of book legibility, although in the book cover has been written this book is reading for levels 4, 5, and 6. However, it does not necessarily mean that this book is appropriate for the level stated, it is necessary to have further measurements so that the message written on the book can actually be understood by the child with the appropriate level.

The importance of preparing folklore that will be the child's reading must be adjusted with the age of the child, and really pay attention to its readability. It is aimed at no other so that the author's message can be understood by the reader and give a good impact as learning after reading. The level of readability is very main in the effort to make the child understand about the text content of the discourse or the story presented.

Readability is a term in the field of reading teaching that pays attention to the level of difficulty of the material being read by one person. To estimate the legibility of reading materials, many people use various legibility formulas. Estimates about the level of reading ability are especially useful for parents or teachers in selecting appropriate readings for the child's level.

According to Harjasujana and Mulyati (1996, p. 106) High text readability is relatively easy for readers than low text legibility. High readability appears on the score of reading high comprehension. Low text legibility appears on low reading scores. In connection with that, Klare (1984, p. 726) states that text that has good legibility will affect the reader in increasing the interest of learning and memory, increasing the speed and efficiency of reading, even able to maintain reading habits.

Readability levels are usually expressed in the form of class ratings. Therefore, after measuring the readability of discourse, people will be able to know the fit of the reading material for a specific class rating, such as three, four, seven, nine ranks, etc. To measure the readability level of discourse can be done with various formulas, one of them is with graph Fry. The research uses Formula Fry formulas since the formula is relatively simple and easy to use.

Graph Fry Formula has been tested and more trustworthy or has high reliability to measure readability according to the reader's class compared to other formula or formula. Moreover, this formula is not time-consuming in analyzing the long discourse because it only requires serious words that have been considered representative so as to facilitate the researchers to analyze the various discourse contained in the reading book.

This paper is expected to be useful for readers in selecting readings that are appropriate to the age of the child, so knowing also how to measure the level of readability, message or educational values contained in the story can be conveyed by the reader Among the children at the elementary school level. Before measuring the legibility of Samba Paria folklore, researchers need to determine the concept of the foundation or analysis guidelines. The concept is the concept of legibility and the way it is curbed.

LITERATURE REVIEW AND FOUNDATION THEORY

In relation to this writing, the author conducted a review of the literature on the study titled "Reading Analysis of discourse books Electronic Language School of SMP," by Sitti Natasya Isabela in 2014. In the S. N Isabela Research It is mentioned that the diversity of teaching materials resources used by teachers in Bahasa Indonesia learning, especially with regard to BSE books (electronic school book) which is examined in the readability of discourse material description, reading, instruction And instruments about middle school level by counting using Fry chart, Raygor chart, and Klose test. The results of the research showed that the readability of discourse material description, reading the text, instruction on, and the problem of BSE the first high school level on average is suitable for use for the level of each class and discourse Be well understood by students.

This article takes the object of one of the folklore from West Sulawesi with a foundation of a theory similar to the study "reading an analysis of the discourse of electronic School in Bahasa Indonesia High school level". The different thing about both of these writings is the determination of object analysis and this time this researcher only uses graph Fry as a tool of its measure. However, S. N Isabela's research remains beneficial to give direction and insight to this writing.

Definition Of Legibility

Readability is the interpreting language of the readability. The form Readability is a derived word formed by the basic form of readable, meaning 'readable'. The "legibility" of the conflict in the form of "readability" contains a matter of what is mentioned in its basic form. Therefore, "legibility" can be defined as a matter of whether or not a certain reading material is read by its readers. Readability also

questioned the level of difficulty or the level of ease of a specific ingredient for a particular reader's ranking (Finn, 1993; Basuki and Martutik,2003). In this case, readability (readability) is a measure of what a reading is for a particular reader to see and the terms of the level/ease.

To estimate the legibility of reading materials, commonly used various legibility formulas. The estimates of the reading ability level are especially useful for teachers who have a concern for the method of giving a reading assignment or for the selection of books and other reading materials that are worth reading.

Readability levels are usually expressed in the form of class ratings. Therefore, after doing the readability measurement of a discourse, the teacher will be able to know the match of the reading material for the rank of a particular class, such as rank six, rank four, rank ten. In addition, until now the factors affecting readability are still always the object of research of experts. Attention to the problem started since centuries ago. Klare in 1963 explained once about the efforts of Talmudists in the year 900 which determines the difficulty level of discourse based on the frequency criteria of the words used (Harjasujana and Mulyati, 1997).

Readability Background

According to Klare (1963), previous studies showed an association with readability. Gray and Leary Identify 289 factors affecting readability, 20 factors of which are expressed significantly (Harjasujana and Mulyati, 1997).

Today there are some legibility formulas that are commonly used to estimate the difficulty level of discourse. The former legibility formulas are complex and require the wearer to have the accuracy of calculating various variables. The latter research proves that there are two factors that affect legibility, namely (a) long-short sentences, and (b) the level of word difficulty. In general, the longer the sentence and the longer the words then the reading material is increasingly difficult. Conversely, if the sentence and he said short-short then the discourse is classified as easy discourse.

These mature legibility formulas are often used to measure the legibility of discourse, seemingly tendencies to the two benchmarks. The length of the sentence and the difficulty of the word are the two main factors that lubricated the readability measuring instruments. The legibility formulas refer to both benchmarks, such as the readability formula made by Space, Dale & Chall, Gunning, Fry, Raygor, Flesh, Klos.

Definition Of Folklore

Suripan Sadi Hutomo (1991) According to the folk story Suripan is a story that is passed down gradually from the old generation to the new generation orally. Folklore can be interpreted as a manifestation of the expression of a culture that exists in the community through the speech that has a direct relationship with various aspects of culture and social value arrangement of the community itself.

Types Of Folklore

As for the kinds of folklore, namely (a), fairy tales are old literary forms that tell about a remarkable occurrence that is full of delusion (fiction) and is considered not really happening. The function of Dongen is to convey the moral (educating) and comforting (b) Legend is the story of the people's prose that is considered really happening by those who have the story. Therefore, legend is often used as a collective "history" (c) myth in the Dictionary of the Indonesian Language (KBBI) myth is interpreted as a nation story of the ancient Gods and Heroes, containing an interpretation of the origins of the universe, People, and the nation has a profound meaning expressed in occult ways.

The myth/mite is the folklore that tells a story that is set in the past, (d) The sense of fable is a story that tells the life of animals that behave like human beings. Fable is a fictional fiction or fantasy story, (e) Hikayat is a form of old Malay literary work containing stories, statutes, genealogical pedigree, biographic, religious, historical, or a combination of Existing qualities. Read to entertain, raise the spirit of soul and soul.
As for the intrinsic element in folklore is (a) the theme, a staple of the thought of being the soul and base of a story, (b) plot/Plot, is a series of events that are created and meticulously woven to form a story in relation Cause of consequences. Basically, the plot is differentiated into forward and backward threads, (c) Setting/Background of the story, a picture of the atmosphere, place, and time of the background of the story includes: Time of day, noon, year... and so on); Place (at home, in the park, in the office etc); Atmosphere (quiet, sad, rowdy, etc.), (d) the determination, covering the creation, determination, image/image (ordinary in the form of a description of nature or character perpetrator), (e) Point of view, is how to view the author when telling a story, (f) style Author's language (g) the mandate, usually the underlying idea of the story, and contains the message and advice that the author/author would like to convey to the reader.

Use Of Fry Legibility Formula: Fry Chart

In his book module, Kisyani Laksono (2014, p. 4.12) explains that many experts acknowledge that the formula Fry is a suitable measurement method used to determine the level of legibility of discourse without involving its readers. In addition, Fry can also determine the feasibility of discourse for a particular class level seen by the angle of reading. By so choosing Fry as a method of measurement readability discourse to see the harmony with the reader can be seen as the right choice.

The Formula of Fry readability is derived from the author Edward Fry. According to Harjasujana and Mulyati (1997, p. 123), This Formula bases its study on two main factors, namely long-short words and difficulty level of words marked by the number (many of the least) syllables that make up every word in the discourse The.

The accuracy of discourse readings with graph Fry is determined by the precise calculations of the number of syllables, words, and sentences in the discourse. To be more accurate in determining the number of syllables, words, and sentences, each of them will be described as follows:

A. Syllable

In the raw grammar of Bahasa Indonesia, It is said that the syllable is the word spoken in one breath and is generally composed of several phonemes (Alwi, DKK, 2003, p. 55). For example, the word "Come" is pronounced with a breath of Da-and-Tang. Therefore, the word "Come" consists of two syllables. An Indonesian syllable always has a vocal. The syllable is a sequential vocal consonant (KV), such as the syllable in-on "he", which is flanked by two consonants (KVK) like the syllables per-on "go". In addition, unisex syllables consonants consonant vocal consonant (kkvk), for example, Prak-in "practice". For example, the syllable consonant vocal consonant (KKVKK), e.g. trans-on "transmigration". In addition to containing one vocal, a syllable exists that contains two double vocals that are commonly called Diphgs. The dipping is symbolized by AI, AU, and Oi. An example of dipping AI on the word "clever", or au on the word "island", Oi on the word "Amboi". The Dipbarrel element is inseparable because it is a unity spoken in one breath. The word "Saudara", for example, contains three syllables, namely 1) Sau-, which is the syllable "au" 2)-Da-, and 3)-Ra

B. Word

The word is a series of letters that are enclosed in two spaces and have meaning. According to Bloomfield (Chaer, 1994, p. 163), The word is the smallest free unit (a minimal free form). If a language is being reviewed, the word definition is morpheme or a combination of morpheme, which is considered to be the smallest unit that can be deposited as a free form. Or with other defecation, as a unit of language that can stand alone, occurs from a single morpheme (e.g. glass, towel, delight) or a combination of a morpheme (immigrants, makers, omnipotent). In addition, forms such as "restaurant, bathroom, subjects", also included words. Such words are called compound words. Such compounds in analyzing the readability of discourse with the Fry chart are counted two words because the analyzing with this graph only sees the structure of the text discourse visually (Harjasujana and Yeti Mulyati, 1997, p. 109). In addition, it is also said that the word, in this case, is a group of emblems whose right left is barring. For example "Ali, FKIP, 2003," Each is considered three words.

C. Sentence

The traditional grammar in the book Chair (1994, p. 240) speaks around the sentence that a sentence is an orderly wording that contains a complete thought. In the Latin text a sentence is a word or a set of words beginning with a capital letter and ending the intonation of the final trailing period (.), exclamation marks (!), and question marks (?) that can convey the mind as a whole. In the form of a sentence pronounced in a sound up and down gently interrupted by a pause that concludes with the final intonation followed by sound or other phonological processes (Alwi, DKK, 2003, p. 311). Each sentence has constituent elements. The combination of the elements of the sentence will form a meaningful sentence. The elements of sentences include the subject (S), predicate (P), Object (O), description (K), and complement (Pel).

Here are the measures of discourse readability measurement according to the procedure of using Formula Fry.

Step (1)

Choose a piece that is representative of the discourse to be measured by the level of readability by taking 100 words from the reading. That is meant by the word, in this case, is a group of symbols on the left and right barrier. Thus, the following emblems, such as Budi, IKIP, 1999, =, are each regarded as a word. The meaning of "representative" in selecting a piece of discourse is the selection of sample discourse that really reflects the reading text. Discourse interspersed with images, emptiness pages, tables, formulas containing many numbers, and others is seen as not representative to be used as samples of discourse.

Step (2)

Calculate the number of sentences from one hundred words to the nearest tithe. That is, if the word that belongs to the count of 100 words (sample discourse) does not fall at the end of the sentence, then the sentence count is not always intact, but instead the remaining tone. The rest is certainly a number of words that are part of a string of words that make up a whole sentence. Because the necessity of sampling the discourse on the number of 100 words, then the rest of the word that belongs to the count of one hundred is calculated in the form of decimal (tithe).

Step (3)

Calculate the number of syllables from the sample discourse that 100 said. Some of the consequences of a word limitation (as described in step (1)) above include numbers and abbreviations as words, for numbers and abbreviations, each emblem is accounted for as a word, then for numbers and abbreviations, each symbol Counts as one syllable. For example, 135 consists of three syllables, IDENTITY consists of three syllables.

Step (4)

Watch the Fry chart. The Perpendicular column shows the number of sentences per hundred words and the flat row indicates the number of syllables per hundred words. The data we get in step (2), i.e. the average number of sentences and the data we get in step (3), that is, the number of syllables we Plotkin into the chart to find the theme point. Meeting between vertical lines (number of syllables) and rows

Horizontal (number of sentences) shows the class levels of readers who are thought to be able to read the chosen discourse. If the crosses of the vertical and horizontal lines are in the dark areas or shaded areas then the discourse is declared unlegitimate. Therefore have to choose another discourse and repeat the same step as we have explained earlier.

Step (5)

This readability level is approximate. Irregularities may occur, either up or down. Therefore, the readability rank of discourse should be augmented by one level and reduced by one level. For example, when the meeting point of the cross vertical line for the syllabic and horizontal line data for the sentence amount data is in Region 6 then the legibility rating of the discourse measured should be estimated as a discourse with The legibility level is suitable for rating 5 namely (6-1), 6, and 7 (6 + 1). In other words, the discourse is suitable for grades 5, 6, and 7.

If you use this formula to measure the readability of Indonesian discourse, instructions on the use of graph Fry still need to be added one more step, namely multiplying the calculated result of the syllables with the number 0.6. This figure is derived from the research results of Harjasujana and Yeti Mulyati which have been evidence that the comparison between the number of English syllables and the number of Indonesian syllables was 6:10 (6 syllables are roughly equal to 10 tribes Indonesian words).

Thus the graph Fry can be used again according to the prevailing provisions. Important Notes on Fry chart:

1. To measure the legibility of a book, it should be done three attempts with the selection of different samples. Gauges should take three choices of sample discourse, the discourse from the beginning of the book, the middle part of the book, and from the end of the book. (Harjasujana, 1997 p. 132-137)
2. Chart Fry is a study of English discourse. In fact, the English structure differs considerably from the Indonesian language, especially in terms of the tribe he said.
   Based on the fact, there will never be a discourse in Bahasa Indonesia that is suitable for the rank of the class in the Fry chart. Because the theme point must be in the shaded area. Therefore, plus one more step is to multiply the number of syllables by numbers 0.6 (Harjasujana, 1997 p. 123)

In addition, the English handbook also has a discourse which amounts to fewer than a hundred words. Harjasujana and Mulyati (1997, p. 124) stated that the steps to be performed in analyzing the discourse whose words are less than a hundred words are as follows:

Step 1. Calculate the number of words in discourse and round it to the nearest number of tens.

Step 2. Calculate the number of syllables and sentences that exist in the discourse.

Step 3. Sum up the number of sentences and syllables with numbers that are in the conversion list.

Conversion list for Fry chart:

If in the number of words in the discourse	**Sum up the number of syllables and sentences with the following numbers**
30	3,3
40	3,5
50	2
60	1,67
70	1,43
80	1,25
90	1,10

Harjasujana dan Mulyati, (1997, p. 125)

For example; There is a discourse found the amount of his said 34 fruit, rounded up to 30 pieces. The number of sentences is 2 sentence. The number of syllables has 60 syllables. The conversion rate multiplication number of sentences and syllables for the amount of 30 is 3.3. Thus the number of sentences is 2x3, 3 = 6.6 While the number of syllables is 60x3, 3 = 198. In measuring the reading level of a book, after the gauge takes steps in the graph Fry instructions, then calculate the average result. The Data of the average result is what will be the basis for determining the readability level of the discourse. For example, the parable below is derived from the calculation of the readability measurement of the discourse of the three samples (the beginning, middle, and end of the book) as follows:

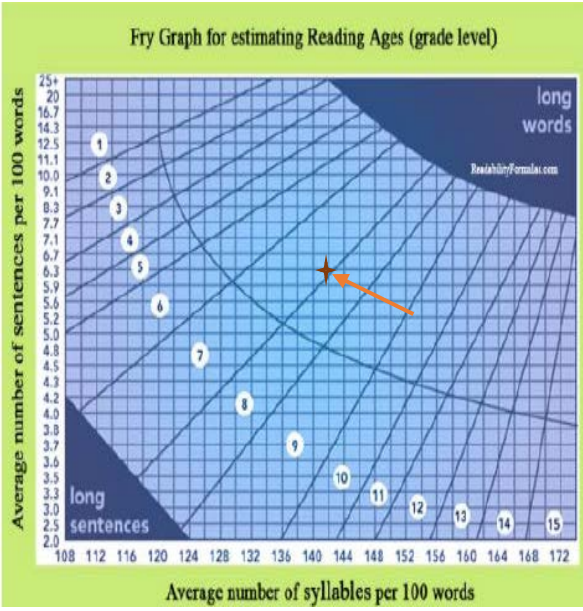
Table 1

Number of syllables and sentence numbers in books

Sample Discourse	Number of syllables	Sentence count
Part I (early)	124	6,6
Part II (center)	141	5,5
Part III (late)	158	6,8
Amount	423	18,9
Average	141	6,3

If the average number is linked into the Fry chart, it turns out that the intersection of the two data will fall in Region 7. That is, the reading level of the relevant book is suitable for ranks 6, 7, and 8.

Below is the form of Harjasujana Fry graph (1997, p. 12)



RESEARCH METHODS

The research method used is a quantitative descriptive method. This method aims to present the data objectively according to the results of the data analysis found in the plot book of Samba Paria by Suyono Suyatno. This research is a literature study, which is oriented towards textbooks. The book that will be examined by the reading Wacananya is the book of the folklore of Samba Paria by Suyono Suyatno, folklore from West Sulawesi, issue of the Ministry of Education and Culture language agency.

The data used in this study is the data of discourse found in the people's Storybook Samba Paria. In the book, the object of this study consists of 48 effective page sheet. With the number of pages, researchers can select 3 parts of the page sheet (the beginning, middle, and end) that will represent the legibility of a book. The technique used in the study is the read-record technique with the data analysis technique done in a descriptive manner after following the steps of how to measure the Formula Fry chart as follows:

1. Choose a piece of discourse that is representative of 100 words.
2. Calculate the average number of sentences.
3. Counting the number of syllables.
4. Multiply the number of syllables by numbers 0.6.
5. Determine the readability level of discourse by reducing the path and adding one level of the actual size.
6. Dance the intersection of the intersecting data (2) and (3) in the chart, and take the conclusion of the deduction.

RESULTS AND DISCUSSION

The results of the research Data are derived from samples of the storybook Discourse, where the samples were taken are the beginning of the book, the middle part, and the final part of the book.

The Data taken from the Book of Samba Paria folklore, researchers took 3 samples, namely:

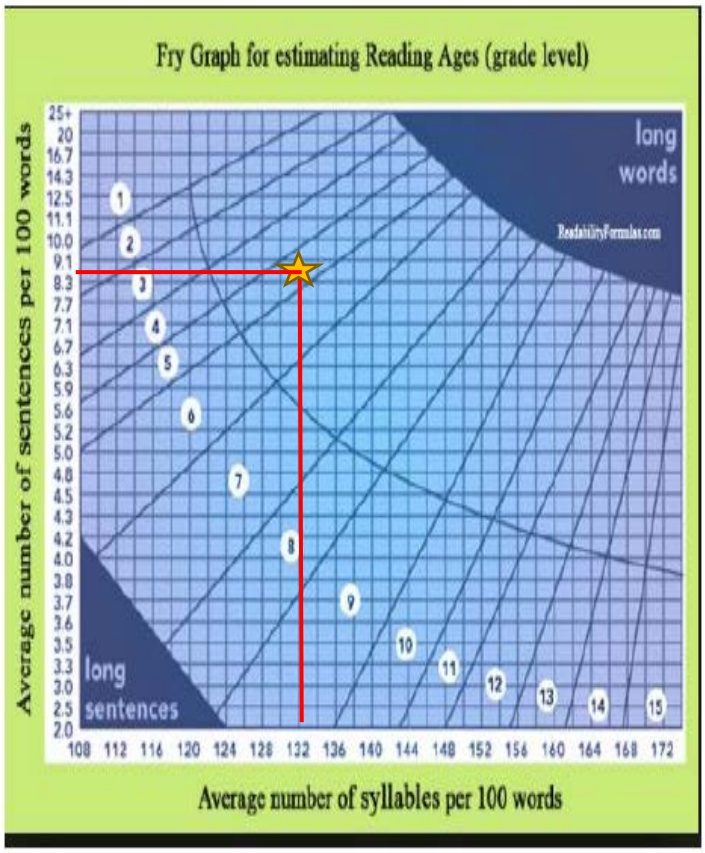
1. The first sample on page 1 is taken 100 words of the text. In 100 words taken on page 1, there are 8 sentences, with a number of syllables as many as 208 syllables, hence the following calculation:
   - Sample (page 1) 100 words
   - Sentence count = 8 sentences
   - Number of syllables
     208 x 0.6 = 125 syllable
2. The second sample on page 25 is taken 100 words of the text. In 100 words taken on page 25, there are 9 sentences with the rest of the word 5 words (the exact number of 100 words), with a total of 9 words if it comes to the next point (complete one sentence). The number of syllables obtained as many as 232 syllables (in 100 words), they are counted as follows:
   - Sample (page 25) 100 words
   - A number of sentences:
     $9+\frac{5}{9}$= 9,6 sentences
   - A number of syllables:
     232 0,6 = 139 syllables
3. The third sample on page 39 is taken 100 words from the discourse of the book. In 100 words taken on page 39, there are 7 sentences with the remaining 18 words (the correct number of 100 words), with a total of 22 words if it comes to the next point (complete one sentence). The number of syllables obtained as many as 220 syllables (in 100 words), they are counted as follows:
   - Sample (page 39) 100 words
   - A number of sentences:
   - $7 + \frac{18}{22}$ = 7,8 sentences
   - A number of syllables:
   - 220 x 0,6 = 132 syllables

Please also note that when calculating the number of words and syllables, the researcher does not calculate the word manually (counting with the eyes and fingers) as it can certainly be exhausting and does not cover any possible errors or Inaccuracy amounts, researchers perform word counting and syllables using help in the Word Cont application, which can be accessed at www.wordcount.com.

If the result of the calculated data is placed in the table, it will be seen as follows:

Discourse samples (100 words)	Number of syllables	Sentence count
Part I	125	8,0
Part II	139	9,6
Part III	132	7,8
Amount	396	25,4
Average	132	8,5

Known in the table, the calculation data obtained when it is linked into the Fry chart, it will appear as follows:



If we look at the top of the graph we encounter a row of numbers, such as 108, 112, 116, 120. The figures show the data of the number of syllables per hundred words, i.e. the number of words from the sample discourse that is used as a sample readability measurement discourse. The consideration of the syllables counting on the graph is a reflection of difficult words, which in the formula is one of the two main factors that are the foundation for the intended readability formula. While the figures are listed on the left side of the graph, namely numbers 25.0, 20, 18.7, 14.3 and so on shows the average number of sentences per hundred words. This is the defining factor of this legibility formula, which is the long-short sentence factor. In the results of the data that has been calculated through the steps Fry formula that is further recorded on the Fry chart shows that the folklore of Samba Paria shows the average number of sentences in the number of 8.5 sentences and 132 syllables, so that when Drawn straight line, will look at the meeting point of the vertical cross lines for the syllables and horizontal lines for the sentence indicating the position at level 5, because legibility is approximate, then the readability rank of discourse measured It should be estimated as a discourse with a suitable legibility rate for Rank 4 namely (5-1), 5, and 6 (5 + 1). In other words, the discourse is suitable for grades 4, 5, and 6.

The numbers are lined up in the middle of the chart and are between the insulation lines of the graph indicating the approximate reading rank of the discourse being measured. The number 1 shows the rank 1, meaning that the discourse is suitable for readers with a reading level 1 (Grade 1 elementary school); Number 2 for reading rank 2, number 3 for reading rank 3, and so on until university.

The shaded area on the chart is located in the upper right corner and in the lower left corner of the graph is an invalid region. That is, when the readability measurement of discourse falls on the area, the discourse is not good because it has no reading rank for any rank. Such discourse should not be used and replaced with other discourse.

Thus, if based on the steps of calculation of the Fry formula, the story of the Samba Paria folklore by Suyono Suyatno is a reading that is destined for children with ranks 4, 5 and 6.

CONCLUSION

Through the calculation of Formula Fry received the average result of 132 syllables (the counting of syllables on the chart is a reflection of difficult words) and the average sentence number of 8.5 sentences (which is the embodiment of Formula determining factor This readability, namely the short length factor of the sentence.), so that when drawn straight line will see the meeting point of the cross vertical row for the syllable and horizontal line for the sentence indicating the position in the rank 5, because Readability is approximate, so the readability rating of the measured discourse should be estimated as a discourse with the legibility level for Rank 4 namely (5-1), 5, and 6 (5 + 1). This means that based on the Formula Fry, the discourse of People's story Samba Paria by Suyono Suyatno issue of the Ministry of Education and Culture language agency is suitable for the ranks of grades 4, 5, and 6. This results in accordance with the cover of the storybook, wherein the cover is written "readings for children of elementary school level 4, 5, and 6".

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Defining Mobile Quality Attributes Using Quality Function Deployment

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Abstract- Mobile app stores business model has made mobile apps available to millions of people anytime, anywhere. Developers develop apps that are available to users in short periods of time. Mobile application are downloaded in their billions. Most of these apps fail. Quality of the mobile applications is the major factor. Users can now use an app and give feedback by way of rating and leaving comments. Negative comments affect the success of the mobile application. It is important for developers to act on the issues. This paper aims to define mobile quality attributes that are important based on analyzing users' reviews to understand the quality demanded. ISO/IEC 25010 is the current standard to measure the quality of mobile applications. Applying this standard as leverage we determined a relationship between what the customer quality demands are and the tool at hand to fulfil them using Quality Function Deployment. This should assist developers in prioritizing user requirements and their resources for mobile applications which should get to the market quickly.

Index Terms- Mobile app, Quality Function Deployment, quality attributes , app store.

I. Introduction

Mobile applications are so prevalent in our society that Apple store slogan "there is an app for that" best describes [1] the growth. In 2019 Google Playstore has 2.1 million apps followed by Apple Store at 1.8 million according to Statistica com. This growth can be attributed to the availability of smart device, ability of third parties to develop software and customers that are connected and on the go who need apps to improve their lives. Billions of apps are downloaded each year from these stores. A new business model has risen where development and distribution of mobile software is centralized [2]. Crowdsourcing has enable app stores to avoid the costs associated with development and marketing the app products, while providing a large variety of apps to their users at little or no risk. Quality of such a large number of applications is a challenge to guarantee with large numbers of users and developers scattered all over the world. In order to ensure quality apps the app stores have set up policy and publishing guidelines [3] that must be followed by all developers. Additionally the platform provides users with opportunity to give feedback for which developers are expected to act upon.

These paper proposes a way of measuring quality of mobile applications using customer requirements mined from app store reviews against a standard quality ISO 25010 through Quality Function Deployment.(QFD). QFD is a product development tool that focuses on translating customer requirements into design requirements that software engineers can [4] understand and implement. The customer requirement are captured from the mining users' reviews which are comments left in the app stores by users of a particular application. Review mining can be done manually or automatically. Negative reviews affect the users' view of is quality leading to less downloads and loss of revenue [5]. Other than increasing downloads, mining reviews and acting on the requests, can increase the rating of such mobile applications[6] [7] in the future. It assists in the maintenance and evolution of the app through crowdsourcing of the reviews.

The quality of mobile software conformance to specification and ability to meet the user needs can be view in three dimensions as proposed by [3] . These are the end user of the software product, the mobile environment where the software will execute and the regulations of the mobile app markets. The user needs are important in the perception of quality to a product. Their experience and overall satisfaction with the product plays a big role in determining the quality factors of a mobile software product. The mobile environment is different from ordinary software environment. There are constraints the device and constraints on network technology. Phones have smaller screens, limited power etc, while network technology like signal power, interoperability of different technologies affects the use of an application. The ability of a mobile application to adopt to these constraints will determine its quality. Mobile applications are now available in application markets like Google Playstore and IOS store. This app markets have regulations that have to be met in order for application to be hosted by them. They provide a source for software quality of the mobile software application.

This paper proposes a way of defining the most important quality attributes of mobile applications based on customer requirements mined from app stores and a standard quality tool that is at hand to fulfil them. Using QFD, we will prioritize quality attributes to help developers use their limited resources of software development more efficiently.

II. LITERATURE REVIEW

2.1 Mobile Software Quality

Quality of mobile application is critical to its success in a very competitive market of app stores. Information, communication and leisure are some of the activities supported by mobile applications [8]. He continues to say that the user acceptance of a mobile software product depends on the users need and context and the perceived experience (Quality of experience) from using the product. He concluded that factors affecting QoE are, application interface design, application performance, phone features, battery efficiency, user routine, cost of application and connectivity we well as user's lifestyle.

In a qualitative survey of mobile software developers by [9], user experience that was seen as most relevant was for an app to be enjoyable, engaging, satisfying and helpful. They view the users of mobile applications to be different from those of desktop application. The mobile app users are fast and immediate response to their interactions. Information is expected to be available immediately in easy steps and interaction with other built in facilities like Bluetooth, GPS, Wi-Fi continue. Quality of mobile software as perceived by users is different from the technical quality [10]. This is both for internal and external quality of the mobile software. Mobile software applications quality can be seen as how the users performs and experiences the app under the constraints of the mobile application environment. Mobile software quality (both internal and external) is critical, user perceptions and expectations of an app are key in its economic success.

According to [11]. The lifespan of mobile applications is short. They are used for limited functionality. They add that complex functionalities in the software has to interface with to telephony, cameras, locations and other features unique to mobile devices. Usability issues can be raised by small screen displays, limited data input methods, context of use (mobile users that re affected by geographical and meteorological conditions), and connectivity that can change with location.. Battery and memory is still more.limited in mobile applications that software[12] . A mobile app needs to be transferable to many different platforms and their processing power is till limited.

Mobile application development process should not just be a variation of classical processes but will require techniques, methods and policies that address the new challenges it brings [13]. The development is happening in new unpredictable an unconventional settings and scenarios. It is difficult to predict what will work in terms of innovation customer satisfaction and return on investment.

The need to develop mobile software faster, users that are impatient and demanding and the constraints of the mobile environment, demand that developers prioritize user needs and put their limited resources where the will most effective.

2.2 Quality Function Deployment in software engineering

The use of QFD in software engineering is not a not new concept. In the mid-nineties the researchers [14][15] where looking in way of incorporating QFD in software development process. They referred to it as Software QFD and attempted to capture user requirements and associating with the Total Quality Management to rank their importance. Anang and others [16] apply QFD in Acceptance Driven Development (ATTD) to develop software that met user requirements and was maintainable. Test driven development is an approach of developing software, advocates for loosely couple codes for easy testability and maintainability.

Mobile software model is proposed by [17] by analyzing the published guidelines on quality by software quality mobile app store and ranking them. QFD is used to associate the demanded quality from app stores by the use of a quality standard.

III. METHODOLOGY

The QFD to be used in this paper is in assisting the developers know which quality attributes matter most to the user. This is by gathering the user requirements that have been mined from user reviews. This will based on paper by [5] that mined user reviews from 20 popular app in Apple store. They manually analyzed 6390 reviews across 15 deferent categories. They found the most common complaints were as shown in Table 1.

Table 1: Customer Quality characteristics

Complaint type	**Rank**	**Median (%)**
Functional Error	1	26.68
Feature request	2	15.13
App crashing	3	10.51
Network problem	4	7.39
Interface design	5	3.44
Feature removal	6	2.73
Hidden cost	7	1.54
Compatibility	8	1.39
Privacy and Ethical	9	1.19
Unresponsive app	10	0.73
Uninteresting content	11	0.29
Resource heavy	12	0.28
Not specific		**13.25**

The twelve identified quality issues from mobile app users will be used as the customer requirements for our QFD. We hope to be able to associate these requirements with the current standard in place to measure them. The standard for this research will be ISO/IEC 25010, which is the current standard for quality for all software including mobile applications.

ISO/IEC 25010 is built from the ISO/IEC 25000 series of standards know as SQuaRE (System and Software Quality Requirements and Evaluation) in [18]. The standard is comprised of two models, the quality in use model and product quality model. The quality in use model has five quality characteristics which are further subdivided into sub characteristics. The product quality model comprises of eight characteristics that are further sub divided into sub characteristics.

Table 2: ISO/IEC 25010 software product characteristics

Product quality characteristics	Product quality sub-attributes
Functional Suitability	Functional completeness, Functional correctness, functional appropriateness
Performance efficiency	Time behaviour, resource utilization, Capacity
Compatibility	Co-existence, Interoperability
Usability	Appropriateness recognisability, learnability, operability, User error protection , user interface aesthetics, accessibility
Reliability	Maturity, availability, fault tolerance and recoverability
Security	Confidentiality, integrity, Non-repudiation, Authenticity, accountability
Maintainability	Modularity, reusability, analysability, modifiability, testability
Portability	Adaptability, Installability, replaceability

Table 3: ISO/IEC 25010 Quality in use characteristics

Quality in use characteristics	Quality in use sub-characteristics
Effectiveness	
Efficiency	
Satisfaction	Usefulness, Trust, Pleasure
Freedom from risk	Economic risk mitigation, Health and safety risk mitigation, environmental mitigation
Context coverage	Context completeness, flexibility

It is now possible to do a quantitative relationship between what the customers require from a mobile application and the ISO/IEC 25010 quality characteristics as outlined. We can then rank the relationship to provide us with the most important quality attributes to a mobile application customer. The methodology as outline by [3] is implemented in five steps as explained in the next section.

IV. RESULTS AND DISCUSSION

There are five major steps in implementing the QFD to ensure the quality requested by users is translated in the important quality characteristics of the final product.

Step 1. Customer Quality requirements: in this quality requirements of the customer are captured. This is done through analyzing customer reviews from apps stores. Twelve quality issues are reported as shown in table 1.. They are classified as "Customer Quality requirements" (CQR) which in table 1 are the complaint type

Step 2. Rating the importance of the customer quality attribute which is done by calculating the frequency of complaints or requests on particular quality attribute. This is captured by the paper written by [5]. There are 12 user complaints that are captured in Table 1.

Step 3. Standard quality: this describes the quality in terms of attributes that can be measured by a known standard. In this QFD the quality standard is provided by the ISO/IEC 25010 that sets standards for all types of software including mobile application software. Developers can use the thirteen quality characteristics and 42 quality sub-characteristics to measure the quality of the final product.

Step 4.Quality relationship matrix: A matrix is developed to determine the relationship between the customer quality requirement (CQR) and the quality standard (SQR). It measures the relationship between what the customer wants and standards available to ensure they get it. In QFD, a relationship value (RV) is calculated. The methodology define the relationships as strong that is assigned the value 9, moderate that is assigned the value 3 and weak that is assigned the value 1. Where there is no relationship no value is given. The relationship matrix is shown in table 3 and table 4.

Table 3: Relationship Matrix for software quality product standard

		Functional suitability			Performance Efficiency			Compatibility		Usability						Reliability				Security					Portability					Mainatainability		
Customer quality characteristic	Importance	Functional completeness	Functional Correctness	Functional Appropriateness	Time Behaviour	Resource Utilization	Capacity	Co-existence	Interoperability	Appropriateness recognisability	Learnability	Operability	User Error protection	User Interface Aesthetics	Accessibility	Maturity	Availability	Fault Tolerance	Recoverability	Confidentiality	Integrity	Non-repudiation	Authenticity	Accountability	Modularity	Reusability	Analyzability	Modifiability	Testability	Adaptability	installability	Replaceability
Functional Error	26.68	Θ	β	Θ				α		Θ			Θ	α					β	Θ										Θ	α	
Feature request	15.13	β	Θ	Θ																												
App crashing	10.51	α	α	α	Θ	Θ	β		Θ		α	Θ	β	α				β	β										Θ	Θ	α	
Network problem	7.39				Θ	β			α													Θ	α	α								
Interface design	3.44									β	β	β	β	β	Θ	Θ																
Feature removal	2.73	Θ	Θ	β	α	α	α	Θ	α	Θ	α	α	Θ	α	α																	Θ
Hidden cost	1.54																			Θ	β	α	Θ	β								
Compatibility	1.39	Θ	Θ	Θ	Θ	Θ	β	β	β	Θ								Θ								α		α	α	α	α	
Privacy and Ethical	1.19													Θ					β	β	β	β	β	β								
Unresponsive app	0.73	β	β	β	β	β	β	Θ	Θ	Θ	α	Θ	Θ	α	α		α	α	Θ								α			Θ	Θ	α
Uninteresting cont	0.29	α	α	β																												
Resource heavy	0.28					β	β	Θ	Θ									α	Θ					α	α		Θ			Θ	Θ	
Absolute weight		**229.1**	**315.24**	**173.86**	**67.17**	**114.03**	**118.92**	**50.41**	**57.19**	**125.55**	**44.93**	**67.41**	**215.97**	**75.18**	**13.73**	**10.32**	**0.73**	**99.77**	**348.45**	**95.37**	**24.57**	**34.42**	**22.72**	**32.24**	**0.28**	**1.39**	**0.84**	**1.39**	**32.92**	**115.99**	**41.61**	**8.92**
Relative Weight		**9.01**	**12.4**	**6.84**	**2.26**	**4.48**	**4.68**	**1.98**	**2.25**	**4.94**	**1.76**	**2.65**	**8.5**	**2.96**	**0.5**	**0.4**	**0**	**3.9**	**13.71**	**3.7**	**0.95**	**1.35**	**0.089**	**1.26**	**0**	**0**	**0**	**0**	**1.29**	**6.1**	**1.63**	**0.35**

β-represents 9 Θ-represents 3 α-represents 1

Table 4: Relationship matrix for quality is use standard

				Satisfaction			Freedon from risk			Context coverage	
Customer quality characteristic	**Importance**	Effectiveness	Efficiency	Usefulness	Trust	Pleasure	Economic risk mitigation	Health and safety risk mitigation	Environmental mitigation	Context completeness	Flexibility
Functional Error	26.68	β	Θ	β	Θ	β	α	α	α	Θ	Θ
Feature request	15.13	β	α	β		β				Θ	Θ
App crashing	10.51	β	β	β	β	β	α			Θ	Θ
Network problem	7.39	Θ	β	Θ		Θ	α	α	α	β	β
Interface design	3.44	Θ	β	β	Θ	β		α		Θ	Θ
Feature removal	2.73	β	Θ	β	Θ	Θ				Θ	α
Hidden cost	1.54			α	β		β				
Compatibility	1.39	Θ	β	Θ		Θ				Θ	Θ
Privacy and Ethical	1.19				β	Θ	Θ				
Unresponsive app	0.73	β	β	Θ	β	Θ	β			β	β
Uninteresting content	0.29			β	Θ	β				β	Θ
Resource heavy	0.28	Θ	β	Θ		Θ			β	β	Θ
Absolute weight		**539.52**	**323.38**	**557.74**	**225.15**	**545.02**	**68.58**	**37.51**	**36.59**	**257.85**	**252.39**
Relative weight		**18.9**	**11.37**	**19.61**	**7.91**	**19.16**	**2.41**	**1.31**	**1.28**	**9.06**	**8.87**

β-represents 9 Θ-represents 3 α-represents 1

Step 5: Standard Quality characteristic weight by importance. The association between the customer quality requirements and the standard quality to fulfil them can be calculated. First we calculate the Standard Quality Characteristic (SQR), which is given by the sum of multiplying the relationship value (RV) with the customer quality relative weight (CQRW).

$$SQW=\sum_{SQ=1}^{n}(RV*CQRW)$$

Afterward we calculate the standard quality relative weight (SQRW). This indicates the weight of the standard quality characteristics relative to other standard characteristics. This is then multiplied by 100.

$$SQRW=\frac{SQW}{\sum_{SQ=1}^{n}(SQW)}$$

The computed values for the standard quality characteristic and the standard quality relative weight are contained in Table nnn for the software product characteristics and in Table mm for the quality in use characteristics.

Ranking of quality characteristic is done to show the most important quality attributes as demanded by users. They are ranked from the most important to the least importance to make it easy to see what the users want at a glance. Figure 1 shows the software quality characteristics while figure 2 shows the quality in use quality characteristics.

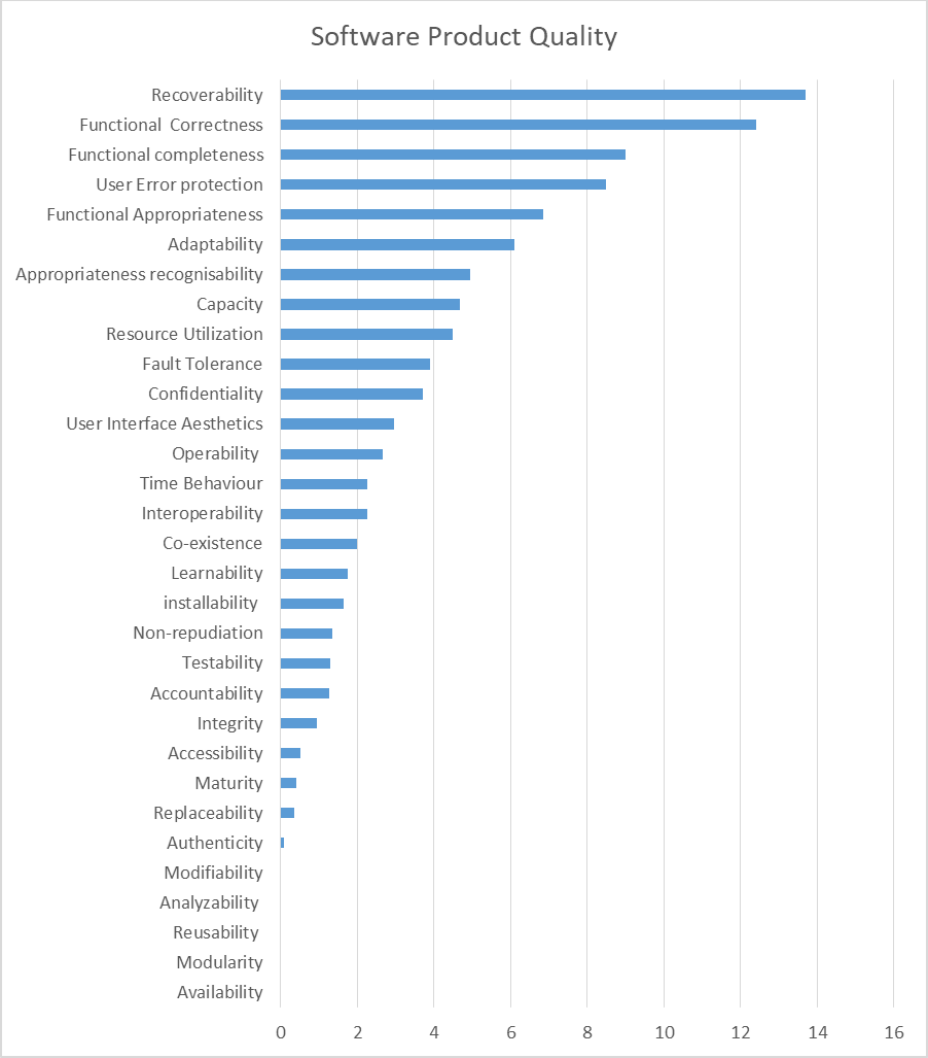

Figure 1: Ranking of quality attributes in software product standard

The software quality characteristics that customers demand apps have recoverability, functional correctness and completeness, user error protection and functional appropriateness as the most important quality attribute. Next tier of importance is adaptability, appropriateness recognizability, capacity, resource utilization, fault tolerance and confidentiality. Quality attributes of portability and maintainability are least important to users.

Figure 2: Ranking of quality attributes in quality of use standard

Quality in use characteristic are more important to users of mobile applications that software product quality characteristics in general. Customers demand mobile apps that are foremost useful, pleasurable to use and effective. Freedom from risk are the least important issues to mobile app users.

V. CONCLUSION

In identifying the most important quality characteristics of mobile applications, functional suitability, usability and reliability are the most prioritized in the software product. Mobile app give least importance to portability and maintainability. In measuring the quality of the product while in use users prioritized usefulness, pleasure and effective. Least priority was freedom from risk. In developing software for mobile users, developers can use this knowledge in prioritizing resources when developing apps. Considering most mobile applications are developed quickly and updated frequently, this knowledge can help developers avoid negative reviews that affect the success of the mobile app in app markets.

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Comparative Study on Different Queuing Models to Reduce Waiting Time in Brahmaso Clinic

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***Abstract*—**The Brahmaso Humanitarian Aid Organization (BHAO) is the most popular philanthropic organization in Myanmar. It provides various kinds of aids for human including healthcare service with free of charge. It stands only on donation from public. Total of sixteen units for health problems are provided. The purpose of this paper is to perform a comparative study for reduction of total patients' waiting time in the clinic by considering for different departments of clinic such as patient's registration and pre-checkup department, consultation department, and treatment and pharmacy department under the general diseases unit using different queuing models. Different parameters such as arrival rate, service rate, utilization factor, average number of patient in the system, average number of patient in the queue, average waiting time in the system, and average waiting time in the queue are analyzed and compared for different multiserver queuing models. Actually, waiting on a queue is usually unpleasant for everyone, but reduction in waiting time requires planning and extra expenditures. This paper is an attempt to compare the parameters of queuing theory in a local clinic and the calculations performed in this paper is based upon the actual observed data collected from Brahmaso Humanitarian Aid Organization charity special clinic for 14 days which is located in Mandalay city, Myanmar. The required data and information are collected from "pamphlets", "direct observation", "daily and monthly records", "yearly reviewed report" and "interviews". Multiple servers M/M/2 to M/M/3 and M/M/4 to M/M/5 queuing models have been considered in order to reduce waiting time and also analyze and compare queuing parameters and performance measures of the system.

***Index Terms*—** arrival rate, service rate, waiting time, queuing theory, multiserver queuing model, general disease.

I. Introduction

The Brahmaso Humanitarian Aid Organization was established in 1998 with five working plans, namely, funeral services, health, natural disaster relief, donations of blood, liver and kidney and education. Total of sixteen units for health problems are provided under health care clinic and the main unit is general disease (internal medicine) unit in which relatively very high numbers of patients were taken treatment there. Therefore, this study mainly focused to reduce the waiting times for general disease unit. The health care clinic is opened from 8 a.m. to 12 noon only on Wednesday and weekends. A large number of patients' traffic can be seen from early morning to the noon in front of the clinic on those days. Queuing theory deals with one of the most unpleasant experiences of life, called waiting. Queuing is quite common in many fields, for example, in traffic management, in a supermarket, at a petrol station, at the banks, at health care centers etc. [1]. Therefore, to reduce the waiting times of arriving patients is a major challenge for all services all over the world, particularly in the developing countries [2]. Nowadays all the organizations are focusing to customers in particularly the health care organizations have advanced and progressed [3].

According to the survey results, the clinic of BHAO is opened 13 days or 14 days per month and average numbers of 4300 patients are taking treatments on these days and hence round about 330 patients are served per day. Again, according to their reviewed records, the patients from 92.85% of townships in Mandalay region, 52.94% of all states and regions, and 20.90% of townships in the whole country were received treatment at BHAO charity special clinic.

Although the operation of the clinic is started at 8 a.m., but the patients and their attendants arrive to clinic round about at 6 a.m. in the morning to queue for service. There is only one registration department for all patients and every patient makes a patient registration book. Then nurses examine for required pre-checkup for consultation such as body temperature and blood pressure of each patient. Then the staffs from registration department were classified according to diseases and guided the patients where they must continue to receive consultation and treatment.

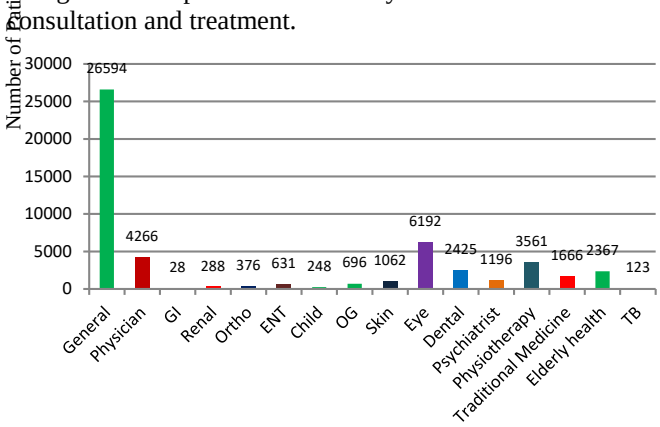

Fig. 1. Comparison of the number of patients according to types of diseases from April 2018 to March 2019.

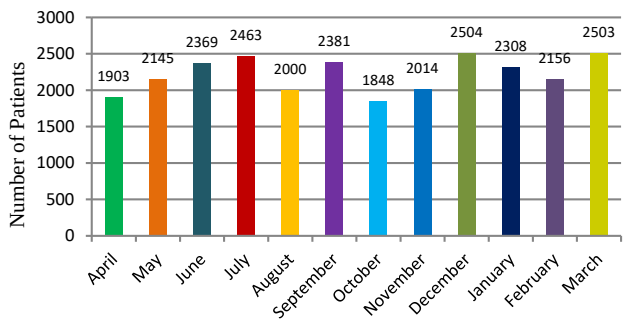

Fig. 2. The number of general disease patients monthly from April 2018 to March 2019.

By analyzing the patients and diseases records, the numbers of general disease patients were very high compared with other diseases. Therefore, in this paper the waiting times for patients from that unit were specifically considered to reduce.

There are 46 physicians, 40 senior and junior general specialists, 38 senior and junior nurses, 20 medical skill workers, 100 volunteers and 36 staffs in the clinic. Most of the physicians and specialists are in-service from General Hospital (Mandalay) and some have already retired from government servants and working as honourable professors. All these physicians and specialists came alternately to the clinic voluntarily.

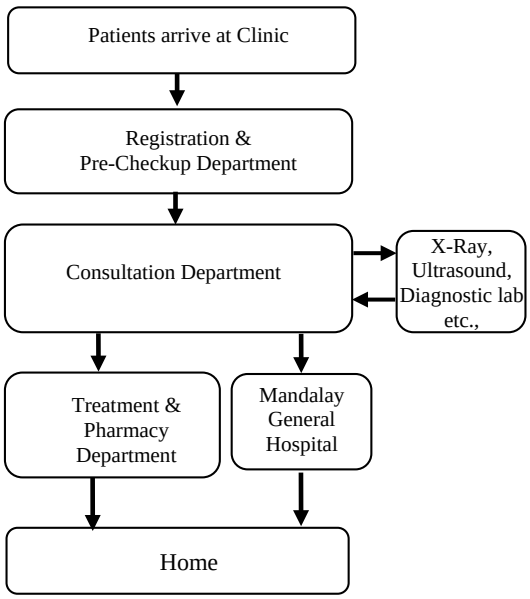

Fig. 3. The flow chart of BHAO charity special clinic

There are total of four servers in consultation department for general disease and consulted by physicians and specialists alternately. If the patients are needed to check by X-ray, ultrasound, and other diagnostic tests, they checked in respective department and resubmitted the results back to physicians and specialists. Then specialists examined the tested results and determined the type of diseases. Sometime the patients were necessary to operate surgery urgently, in this case they advised to go to Mandalay General Hospital for operation and treatment. Otherwise, they give instruction to take treatment and pharmacy in treatment and pharmacy department in the clinic. The patients were needed to wait (queue) in three departments in general diseases unit, namely, registration and pre-checkup department, consultation department, and treatment and pharmacy department. The waiting time for consultation department and treatment and pharmacy department are needed to reduce. Therefore we considered by increasing servers there. The waiting time for registration and pre-checkup department was also considered to get the totals waiting time for the whole system (clinic). Multiserver queuing models were used in all three departments.

II. Materials and Method

Although a lot of contribution and application of queuing theory in the field of health care are found in the literature, considerable challenges and difficulties are still remained to reduce waiting time in health care centers. Queuing theory is a mathematical approach to the study of waiting lines. In the BHAO charity special clinic, multiserver queuing model M/M/3 is used at registration and pre-checkup department, M/M/4 and M/M/2 are used in consultation department and pharmacy and treatment department respectively. In this paper, we considered multiple servers M/M/5 instead of M/M/4 in consultation department and M/M/3 in the place of M/M/2 in treatment and pharmacy department in order to analyze queuing parameters, and performance measures of the system to reduce waiting time. The descriptions of the queuing models that we used in this research are presented as follows:

A. Multichannel Queuing System

The multichannel queuing model is known in the Kendall's notation as the M/M/c model, where M/M represents the Poisson probability distribution of arrivals and departures and the positive integer c is the number of parallel servers in the system [4]. Exponentially distributed random variables are denoted by M, meaning Markovain or memoryless [1]. This is commonly used to analyze the queuing problem. In this paper, we considered single queue line served by multiple servers and this type of queuing model can also be seen at a bank teller or many airline tickets counters [5].

Most of the queuing models are assumed the probability distribution of the arrival time and the service time as an exponential distribution and the number of arriving patients per unit of time follows Poisson distribution. The exponential distribution incorporates the assumption that the service time is independent on the time spent in the queue and the Poisson distribution involves a "memoryless" waiting time until the arrival of the next customer (patients) respectively [6].

Consider the Probabilistic queuing model (M/M/4: FCFS, Priority) for multiservers with queuing discipline First Come First Serve and priority (Buddhist religious servants, old-aged patients and patients who need the service immediately for many reasons are priority) queuing system in which arriving customers is following Poisson's process with arrival rate λ and the service process is exponential distribution with service rate μ [7].

Traffic intensity (ρ) is the known values in a calculation of performance measure of the system. For multichannel queuing

system, the traffic intensity can be obtained as $\rho = \frac{\lambda}{c\mu}$, the larger the value of λ, the longer the queue will be. If the arrival rate of patients in the system were more than service rate. i.e., $\lambda > \mu$ and hence $\rho > 1$, then the queue length was increased.

For multiservers queuing model, the probability that the system should be idle,

$$P_0 = \left[\sum_{n=0}^{c-1} \frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^n + \frac{1}{c!}\left(\frac{\lambda}{\mu}\right)^c \frac{c\mu}{c\mu - \lambda}\right]^{-1}. \quad (1)$$

The average number of patients in the system,

$$L_s = \frac{\lambda\mu\left(\frac{\lambda}{\mu}\right)^c}{(c-1)!\,(c\mu-\lambda)^2} P_0 + \frac{\lambda}{\mu}. \quad (2)$$

The average number of patients waiting in the queue,

$$L_q = L_s - \text{average number being served}$$

$$= L_s - c\left(\frac{\lambda}{c\mu}\right)$$

$$= \frac{\lambda\mu\left(\frac{\lambda}{\mu}\right)^c}{(c-1)!\,(c\mu-\lambda)^2} P_0. \quad (3)$$

Average waiting time a customer spends in the system,

$$W_s = \frac{L_s}{\lambda}. \quad (4)$$

Average waiting time of a customer in the queue,

$$W_q = \frac{L_q}{\lambda}. \quad (5)$$

Traffic intensity for multiserver, $\rho = \frac{\lambda}{c\mu}$.

The probability of not queuing on the arrival $= 1 - \rho$.

B. Model Parameters in Queuing Theory

To characterize a queuing system we have to identify the probabilistic properties of the arrival time, service times and service disciplines. The parameters that we have to determine to analyze the different queuing models are described in following table.

TABLE I. PARAMETERS AND THEIR DEFINITIONS IN QUEUING MODELS

Parameter	Definition
n	Number of patients in the clinic
c	Number of parallel servers.
λ	The arrivals rate in the clinic.
μ	The service rate in the clinic
$c\mu$	Serving rate when $c > 1$ in a system
ρ	Traffic intensity
P_0	Steady state probability of all idle servers in the clinic.
P_n	Steady state probability exactly n patients in the clinic.
W_q	Average waiting time a patient spends in the queue
W_s	Expected time a patient spends in the system
L_q	Average number of patients in the queue
L_s	Expected number of patients in the system

III. RESULTS AND DISCUSSION

Multiserver queuing models can be applied to treat the condition in which there are several servers in parallel and each patient in the waiting line can be served by more than one service. Each service facility is prepared to deliver the same type of service [5]. In the Brahmaso clinic, three different multi servers queuing models have been used to serve at three different departments, namely, three servers at registration and pre-checkup department for all patients, four servers and two servers for consultation department, and treatment and pharmacy department respectively for general disease patients. Observed data shows total of 4480 patients were arrived at registration and pre-checkup department in 14 days with arrival rate $\lambda = 1.3333/min$, service rate $\mu = 0.5211/min$ and number of servers $c = 3$. Therefore traffic intensity $\rho = 0.8529$. This reveals that the service system was adequate at registration and pre-checkup department. After passing registration and pre-checkup department, they continued respective departments to get the consultation and treatment according to their types of diseases. The study for this case is on the basis of actual observed data collection in 14 days of service for 2503 patients from general diseases unit.

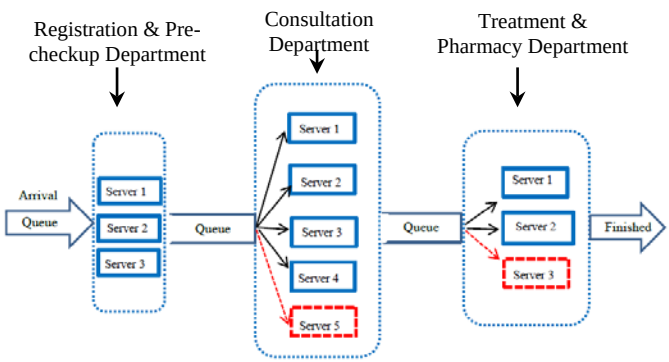

Fig. 4. Single queues with multiserver queuing model at BHAO clinic.

A. Multiserver Queuing Models for Consultation Department

Now we consider four parallel servers of the same services with single queuing line in consultation department. We focused the arrival time as well as the time service began and ended for 2503 general disease patients in the BHAO charity special clinic. A total of 14 days were used for the data collection at consultation department. Based actual observed collected data;

The total waiting time of 2503 patients for 14 days = 3480 minutes.

Total service time of 2503 patients for 14 days = 12515 minutes.

Using the model parameters for the multiserver queuing model, the arrival rate,

$$\lambda = \frac{\text{Total number of patients}}{\text{Total waiting time}}.$$

$$= \frac{2503}{3480}.$$

$$\lambda = 0.7193/min.$$

The service rate,

$$\mu = \frac{\text{Total number of patients}}{\text{Total service time}}.$$

$$= \frac{2503}{12515}.$$

$$= 0.2/min$$

Using the model parameters for the multiserver M/M/4 queuing model with arrival rate, $\lambda = 0.7193/\text{min}$, service rate, $\mu = 0.2/\text{min}$, and the number of servers $c = 4$, the probability that the system should be idle, (1) becomes

$$P_0 = \left[\frac{1}{0!}\left(\frac{\lambda}{\mu}\right)^0 + \frac{1}{1!}\left(\frac{\lambda}{\mu}\right)^1 + \frac{1}{2!}\left(\frac{\lambda}{\mu}\right)^2 + \frac{1}{3!}\left(\frac{\lambda}{\mu}\right)^3 + \frac{1}{4!}\left(\frac{\lambda}{\mu}\right)^4 \frac{4\mu}{4\mu - \lambda}\right]^{-1}$$

$$= [1 + 3.5965 + 6.4674 + 7.7533 + 6.9712(9.9133)]^{-1}$$

$$= 0.01137.$$

From (2),

$$L_s = \frac{0.1439(3.5965)^4}{3!\,(0.8 - 0.7193)^2}(0.01137) + 3.5965$$

$$= 10.6022 \approx 11 \text{ patients.}$$

From (3),

$$L_q = \frac{0.1439(3.5965)^4}{3!\,(0.8 - 0.7193)^2}(0.01137)$$

$$= 7.0057 \approx 7 \text{ patients.}$$

From (4),

$$W_s = \frac{L_s}{\lambda} = \frac{10.6022}{0.7193} = 14.7396 \text{ minutes.}$$

From (5),

$$W_q = \frac{L_q}{\lambda} = \frac{7.0057}{0.7193} = 9.7396 \text{ minutes.}$$

Traffic intensity,

$$\rho = \frac{\lambda}{c\mu} = \frac{0.7193}{4 \times 0.2} = 0.8991\,.$$

The probability of not queuing on the arrival,

$$= 1 - \rho = 1 - 0.8991 = 0.1009.$$

The traffic intensity $\rho = 0.8991$ of consultation depart-ment with multiserver queuing model M/M/4 shows the probability of queuing on arrival process. This represents the inadequate service system of the clinic. In this situation, we considered to reduce the waiting time for patients by increasing one more servers in that department (ie., M/M/5 queuing model).

Using the model parameters for the multiserver queuing model M/M/5 with the same arrival rate, $\lambda = 0.7193/\text{min}$, service rate, $\mu = 0.2/\text{min}$, and the number of servers $c = 5$, the average values for P_0, L_s, L_q, W_s, W_q can be obtained with the same formulas as follows:

$P_0 = 0.0229.$

$L_s = 4.6452 \approx 5$ patients.

$L_q = 1.0487 \approx 2$ patients.

$W_s = 6.4579$ minutes.

$W_q = 1.4579$ minutes.

$\rho = 0.7193.$

$1 - \rho = 1 - 0.7193 = 0.2807.$

B. Multiserver Queuing Models for Treatment and Pharmacy Department

Again, the parameters of the two parallel servers of the same services in treatment and pharmacy department were considered. The arrival rate, $\lambda = 0.9571/\text{min}$, service rate, $\mu = 0.49/\text{min}$, and the number of servers $c = 2$, and the total number of 3215 patients for 14 days were used. By applying the same formulas of as above, we obtained the following average values;

$L_s = 42.2888 \approx 43$ patients

$L_q = 40.3356 \approx 41$ patients

$W_s = 44.1844$ minutes.

$W_q = 42.1435$ minutes.

$\rho = 0.9766.$

$1 - \rho = 1 - 0.9766 = 0.0234.$

Then we assumed for the multiserver queuing model M/M/3 by increasing one more servers in that department with the same arrival rate λ, service rate μ, and the number of servers $c = 3$, the average values of parameters become,

$L_s = 2.7421 \approx 3$ patients.

$L_q = 0.7889 \approx 1$ patients

$W_s = 2.865$ minutes.

$W_q = 0.8242$ minute.

$\rho = 0.6511.$

$1 - \rho = 0.3489.$

Finally, we compared the results that obtained by increasing one more servers at consultation department, and treatment and pharmacy department to reduce the waiting times for patients. The comparison of the results can be seen following table.

TABLE II. COMPARING THE RESULTS OF MULTISERVER QUEUING MODELS

Comparison	**Multiserver M/M/3 at registration dept.**	**Comparison of total results by increasing a server at consultation dept.**		**Comparison of total results by increasing a server at treatment and pharmacy dept.**	
		M/M/4	***M/M/5***	***M/M/2***	***M/M/3***
Traffic intensity	0.8529	0.8991	0.7193	0.9766	0.6511
Expected number of patients in the system (L_s)	7 patients	11 patients	5 patients	43 patients	3 patients

Average number of patients in the queue (L_q)	4 patients	7 patients	2 patient	41 patients	1 patients
Expected time a patient spends in the system (W_s)	5.1158 minutes	14.7396 minutes	6.4579 minutes	44.1844 minutes	2.865 minutes
average waiting time of patients in the queue (W_q)	3.1968 minutes	9.7396 minutes	1.4579 minutes	42.1435 minutes	0.8242 minutes
The probability of new patient Arrival	0.1471	0.1009	0.2807	0.0234	0.3489

The comparison of the waiting times in the system and the waiting time in the queue before and after increasing server can be seen in Fig. 5.

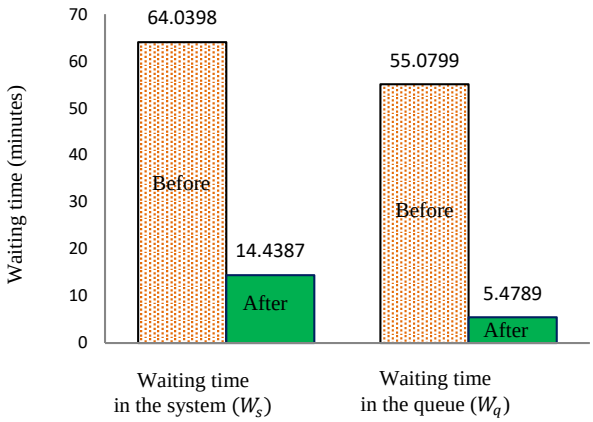

Fig. 5. Comparison of waiting times before and after increasing server

Total waiting time at the clinic for the general disease patients can be reduce from 64 minutes to 15 minutes by increasing one more server at consultation department, and treatment and pharmacy department of BHAO charity special clinic.

From the above comparison analysis it has been observed that waiting time of patients could be reduced by using multiple servers M/M/5 rather than M/M/4 server queuing model. The average number of patients in the queue is also less. The multiserver queuing model M/M/5 can be reduced 20% of traffic intensity from M/M/4 queuing model. The waiting times and the numbers of patients in the system have also been dramatically reduced in M/M/5 queuing model. On the other hand, the probability of new patients arrival in M/M/5 is higher than M/M/4.

IV. Conclusion and Recommendation

In this paper, the queuing characteristics at the Brahmaso Humanitarian Aid Organization charity special clinic are analyzed using multiserver queuing models in three departments under general diseases unit. The total waiting time for general disease patients in BHAO clinic was reduced and discussed comparatively increasing multiserver queuing models M/M/2 to M/M/3 and M/M/4 to M/M/5. According to the calculation results, it was obviously seen that the waiting time in the system has been reduced by increasing a server to queuing models M/M/4 and M/M/2. Therefore an increase in server of multiserver queuing system increases the efficiency of the clinic and reducing time compared to the original multiserver queuing systems.

As we have already mentioned in the introduction of this paper, the patients from 92.85% of townships in Mandalay region and other states and regions in the whole country came to the Brahmaso Humanitarian Aid Organization charity special clinic to take medical consultation and treatment. Most of the patients are deprived and in this situation, the management team of BHAO should be considered the patients' difficulties such as transportation and accommoda- tion charges. We recommend that one of the best ways to help and solve their difficulties is to provide the sufficient servers to reduce the waiting time for the patients. It has been observed that waiting time of patients could be reduced significantly by increasing a server to multiple servers M/M/4 and M/M/2 at consultation department and treatment and pharmacy department.

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An Assessment of Radiological Hazard Levels in Vegetables and Condiments Obtained from Ile-Ife Main Market, Ile-Ife, Nigeria

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Abstract- This study evaluated the radiological hazard levels of the naturally occurring radionuclides in samples of commonly consumed vegetable and condiment samples collected from Ile-Ife main market. Gamma Ray Spectrometer was used to profile ^{238}U, ^{232}Th, and ^{40}K levels in the samples. Activity Concentrations, Radium equivalent activity concentration index (Ra_{eq}), Absorbed Gamma Dose Rate (D_R), External Hazard Index (H_{ex}), Internal Hazard Index (H_{in}), Excess Lifetime Cancer Risk (ELCR) and Annual Effective Dose Equivalent (AEDE) were subsequently evaluated. In the vegetables, the range for the activity concentrations were 78.93 to 118.18 Bq/kg for ^{40}K, 44.04 to 62.87 Bq/kg for ^{238}U, while for ^{232}Th, the range was 4.45 to 6.92 Bq/kg. In condiment samples, ^{40}K ranged between 59.68 and 72.83 Bq/kg, ^{238}U had a range of 33.33 to 40.91 Bq/kg, while ^{232}Th was found within the range 3.42 to 4.26 Bq/kg. Although the ELCR calculated indicated higher values of 100 to 200 folds compared to acceptable value of 2.9 x 10^{-3} stipulated by UNSCEAR the values of D_R, Ra_{eq}, H_{ex} and H_{in} were significantly lower ($P \leq 0.05$) than or matched well with the permissible values indicating consumption safety for those who do not rely heavily on the consumption of the items investigated.

Index Terms- Radiological hazards, Vegetables, Condiments, Activity concentrations, Excess Life Time Cancer Risk, Ile-Ife

I. Introduction

A condiment is a dried seed, fruit, root, bark, or vegetative substance primarily used for flavouring, colouring or preserving food (by killing or preventing the growth of harmful bacteria) and can sometimes be used to hide other flavours (Ononugbo *et al*., 2016), while vegetables are a large group of plant parts (leaves, fruits, roots, and so on) usually consumed as food. Condiments are excellent sources of antioxidants, whereas several important minerals, dietary fibres and vitamins are often derived from vegetables (Anas and Yusuf, 2017).

Natural background radiation can originate from terrestrial and extraterrestrial sources. Sources of terrestrial radiation are radioactive nuclides from environmental materials including soils, building materials, water, rocks and atmosphere, while outer space as primary cosmic rays is responsible for extraterrestrial radiation (Mason and Moore, 1982; Faure, 1986; Me'nager *et al*. 1993; Rudnick and Gao, 2003).

Apparently, radionuclides detected in plants are originally contained in soils from where they get translocated via the root system to different plant parts or transported either by direct fallout of radionuclides and resuspension of contaminated soils followed by deposition on plant leaves or soils within the vicinity of the plant (Noordijk *et al*., 1992). Sometimes, man-made radionuclides contaminate the food chains as a result of fallout from nuclear weapons tests in the atmosphere or from routine and accidental releases of nuclear wastes (IAEA, 1989). As the spatial distribution of radionuclides varies with respect to the parent soils from region to region (Keser, *et al*., 2013), so also their uptake by plants varies from place to place even among similar cultivars (Pendo and Leonid, 2017). Thus, an assessment of radionuclides concentration and distribution in frequently consumed food items is of particular interest in order to have clear and reliable pieces of information about the potential hazard of radiation exposure that could result from incorporating such items into our dietary requirements (Pendo and Leonid, 2017).

In the past, people suffered avoidable health hazards because of little or improper knowledge on the effect of ionizing radiation from various sources in the environment. Knowledge about the need to protect humans from excessive radioactive sources can positively and apparently enhance their safety and better well being (Banzi *et* al., 2000).

According to Jibiri *et al*. (2007), to make sure that all people have access to sufficient, nutritionally adequate and safe food is one of the three cardinal goals of the United Nations for sustainable food security. Thus, in the present work, levels of ^{238}U, ^{232}Th, and ^{40}K in samples of garden egg leaf, water leaf, bitter leaf, pumpkin leaf, amaranth, cayenne pepper, Scotch bonnet, curry, nutmeg and thyme collected from Ile-Ife main market were determined. This was done with a view to establishing the radiological hazards that could be associated with consistent incorporation of the sampled materials as part of human diets.

II. MATERIALS AND METHODS

Sample Collection and Sample Pre-treatment

Five condiment samples (cayenne pepper, Scotch bonnet, curry, nutmeg and thyme) and five types of fresh vegetables (Garden egg leaf, Water leaf, Bitter leaf, Pumpkin leaf and Amaranth) used in this study were obtained from Ile-Ife central market, Osun state, Nigeria. Each vegetable sample was properly rinsed with distilled water to remove radionuclide bearing particulates that might have been deposited on their outer surfaces. The vegetables were further sliced in a way similar to how they are normally prepared for human consumption, placed in properly labelled crucible dishes and dried to a constant weight in the laboratory using the Gallenkamp oven at a temperature of 60^0C. Similarly, each of the condiment samples was dried to a constant weight to ensure that all the samples were similarly pretreated.

Sample Preparation for Gamma Ray Spectroscopy Analysis

To ensure homogeneity, the dried samples were crushed and pulverized to fine powder using agate mortar and pestle. Each of the pulverized samples was weighed by the use of an electronic balance and placed in a labelled container and reweighed. The samples were kept in air tight plastic containers which had been washed thoroughly with soap and rinsed with distilled water and incubated for a period of 28 days in order to attain secular equilibrium between parents and progenies radionuclides. Gamma ray analysis was carried out by counting each sample for 10 hours using a Caesium Iodide (CsI) scintillation detector. The gamma ray spectrometric analysis was carried out using a 1 inch by 1 inch Cesium Iodide (CsI) detector enclosed in a thick lead shield at the Biological Trace Element Research Laboratory, Department of Physics, Obafemi Awolowo University, Ile-Ife, Nigeria.

Activity Calculation

The activity (A) in Bq/kg of the radionuclides in the samples was calculated after decay correction using the expression:

$$C\ (Bq/kg) = \frac{C_n}{\in_{P_\gamma M_s}} \quad [1]$$

where C is the activity concentration of the radionuclide in the sample given in Bq kg^{-1}, C_n is the count rate under the corresponding peak, $\in$ is the detector efficiency at the specific γ-ray energy, $P\gamma$ is the absolute transition probability of the specific c-ray, and M_s is the mass (kg) of the sample.

Determination of Radiological Hazard Index

***Radium equivalent activity concentration index* (Ra_{eq})**

Radium equivalent (Ra_{eq}) index in Bq/kg is a widely used radiological hazard index tool. It is a convinient index to compare the specific activities of samples containning different concentrations of ^{238}U,^{232}Th and ^{40}K (Beretka and Matthew,1995; Ravinsankar *et al.,* 2014). For the present study, Ra_{eq} was calculated using the formula:

$$Ra_{eq} = A_U + 1.43A_{Th} + 0.077A_K \quad [2]$$

where A_U, A_{Th} and A_K are the specific activity concentrations of ^{238}U, ^{232}Th and ^{40}K in Bq/kg respectively.

The Absorbed Gamma Dose Rate

The input of natural radionuclides to the absorbed dose rate in air (D_R) at average height of one meter above the surface of ground depends on the natural specific activity concentration of ^{238}U, ^{232}Th and ^{40}K. This was estimated using the formular given by Kurnaz *et al.* (2007) and Ravinsankar *et al*. (2014):

$$D_R\ (nGyh^{-1}) = 0.43A_U + 0.666A_{Th} + 0.042A_K \quad [3]$$

where A_{Ra}, A_{Th} and A_K are the specific activity concentrations (in Bq kg^{-1}) of Ra, Th and K, respectively.

Annual Effective Dose Rate or Equivalent (AEDR or AEDE)

Annual estimated average effective dose equivalent is calculated using a conversion factor of 0.7 $SvGy^{-1}$, which is used to convert the absorbed rate to human effective dose equivalent. The annual effective dose rate was determined using the relationship:

$$AEDR = D \times T \times F \quad [4]$$

where D is the calculated dose rate (in $nGyh^{-1}$), T is the outdoor occupancy time (0.2 x 24 h x 365.25 d ≈ 1753 hy^{-1}), F is the conversion factor (0.7 x 10^{-6} $SvGy^{-1}$).

Excess Lifetime Cancer Risk (ELCR)

Excess lifetime cancer risk (ELCR) is calculated using the following equation.

$$ELCR = AEDE \times DL \times RF \quad [5]$$

where AEDE is the Annual Equivalent Dose Equivalent, DL is the average duration of life (estimated to 54 years), and RF is the Risk Factor (Sv^{-1}), i.e. fatal cancer risk per Sievert. For stochastic effects, ICRP uses RF as 0.05 for public (Taskin *et a*l., 2009).

External Hazard Index (H_{ex})

Radiation exposure due to ^{226}Ra, ^{232}Th and ^{40}K may be external. This hazard, defined in terms of external hazard index or outdoor radiation hazard index and denoted by H_{ex}, can be calculated using the equation:

$$H_{ex} = C_{Ra/}370 + C_{Th}/259 + C_K/4810 \quad [6]$$

(Beretka and Mathew, 1985)

where C_{Ra}, C_{Th} and C_K are activity concentrations of ^{226}Ra, ^{232}Th and ^{40}K, respectively in Bq/kg. The value of this index should be less than 1 $mSvy^{-1}$ in order for the radiation hazard to be considered acceptable to the public (Beretka and Mathew, 1985).

Internal Hazard Index (H_{in})

The internal hazard index (H_{in}) is a measure of the internal exposure to carcinogenic radon and according to Beretka and Mathew (1985) can be evaluated using the formula:

$$H_{in} = C_{Ru}/185 + C_{Th}/259 + C_K/4810 \quad [7]$$

where C_{Ra}, C_{Th} and C_K are activity concentrations (in Bq/kg) of ^{226}Ra, ^{232}Th and ^{40}K, respectively.

The value of this index should be less than 1 $mSvy^{-1}$ in order for the radiation hazard to have negligible hazardous effects to the respiratory and other internal organs of the public (Beretka and Mathew, 1985).

III. RESULTS AND DISCUSSION

Activity Concentrations

Tables 1 and 2 summarize the activity concentrations (in Bq/kg) of the radionuclides ^{40}K, ^{238}U and ^{232}Th in the vegetable and condiment samples, respectively. The activity concentrations in vegetable samples ranged from 78.93 ± 0.91 to 118.18 ± 6.20 for ^{40}K, 44.04 ± 0.44 to 62.87 ± 4.32 for ^{238}U, and 4.45 ± 0.39 to 6.92 ± 1.52 for ^{232}Th. The overall mean activity levels for ^{40}K, ^{238}U and ^{232}Th in vegetable samples were 92.97 ± 15.04, 51.93 ± 7.37 and 5.35 ± 0.95, respectively. These value were higher than the 0.6-2.6, 24, 35 recommended as the permissible levels by the Jordan, USA, and UNSCEAR (2000) respectively, but lower than the 61-72 acceptable value of India (Pendo and Leonid, 2017). Total activity concentrations ($^{40}K + ^{238}U + ^{232}Th$) in the vegetables indicated the order: Water leaf (127.42) < Bitter leaf (140.24) < Garden egg leaf (141.67) < Amaranth (153.95) < Pumpkin leaf (243.97). In all the cases, water leaf had the least activity concentrations, while pumpkin leaf had the highest. This observation probably suggests that apart from the geological formations and compositions of the soil on which a given plant grows, plant species might have some notable roles to play in the amount of radionuclides that could get translocated into the plant system. Thus, it is considered a paramount health safety measure to consume vegetables with more activity concentrations less regularly than those with less activity concentrations.

Similarly, the radionuclide activity concentrations due to ^{40}K, ^{238}U and ^{232}Th in the condiments respectively ranged from 59.68 ± 4.48 to 72.83 ± 2.63, 33.33 ± 3.30 to 40.91 ± 1.82 and 3.42 ± 1.09 to 4.26 ± 0.58 with Curry and Scotch bonnet having the lowest and highest values respectively in all the cases. Their respective mean values were 66.54 ± 6.44, 37.13 ± 3.26 and 3.85 ± 0.35. These values were lower than either the 400 or 698 – 1439 Bg/kg maximum acceptable levels stipulated by UNSCEAR (2000) or Jordan, respectively. Apart from the 61-72 India allowable value, the levels of ^{238}U in the condiments, with a mean value of 37.13 ± 3.26, were significantly higher than the 0.6-2.6 Bq/kg (Jordan), 24 Bq/kg (USA) or 35 Bq/kg (UNSCEAR, 2000) values. For ^{232}Th, the values were significantly higher ($p \leq 0.05$) than the Jordan permissible levels (0.7 – 3.4 Bq/kg), but much lower than the values 18 and 30 Bq/kg recommended by UNSCEAR (2000). Total activity concentration values indicated that curry had the least radionuclide concentrations (96.43 Bq/kg), while Scotch bonnet had the highest value (118.00 Bq/kg). The implication is that using Curry as food seasoning agent ensures less exposure to radionuclides than other condiments investigated in this study.

These results were higher than those (400, 35 and 30 for ^{40}K, ^{238}U and ^{232}Th respectively) obtained by Pendo and Leonid (2017). Compared with the UNSCEAR (2000) permissible value of 35 Bq/kg, the activities of ^{238}U in the vegetable and condiment samples were found to be higher than the world average value, while the activities of ^{232}Th and ^{40}K were found to be lower than their respective world permissible values of 30 and 400 Bq/kg.

According to Qabas *et al*. (2014), high values of radionuclides in plant samples could be due to geographical and geological factors. Thus, the same reason could be partly responsible for the activities of ^{238}U detected in the present study. However, the uptake of radionuclides by vegetables and condiments from the soil into plants is a complex combination of interwoven factors including plant species, soil conditions, the concentration of radionuclides in soil, bioavailability of the radionuclides in soil and the types and quantity of agrochemicals, such as phosphate fertilizers, used (Ferdous *et al*., 2013).

The calculated radium equivalent (Ra_{eq}), absorbed dose rate (D_R), annual effective dose equivalent (AEDE), effective life cancer risk (ELCR), external hazard (H_{ex}) and internal hazard (H_{in}) indices are presented in Table 3. The Ra_{eq} for vegetable and condiment samples varied from 56.48 - 81.87 $Bqkg^{-1}$ (mean = 66.74 Bq kg^{-1}), and 42.82 - 50.91 Bq kg^{-1} (average = 47.77 Bq kg^{-1}), respectively. These values were far below the allowable limit (370 Bq kg^{-1}) recommended by the International Atomic Energy Agency (IAEA, 1989). The absorbed dose rates in the present study indicated that the dose rate due to ^{238}U in the vegetable samples varied from 25.22 to 36.61 $nGyh^{-1}$ (mean = 29.80 $nGyh^{-1}$) and in the condiment samples, the absorbed dose rate ranged between 19.12 and 23.49 with an average value 21.33 Bg/kg, these values when compared to the world average value of 55 $nGyh^{-1}$ (IAEA, 1989) were lower.

The value of annual effective dose equivalent (AEDE) was observed to fall within the permissible limit of 0.48. The possible human carcinogenic effect was carried out by estimating the likelihood of cancer occurrence in a population of individuals for a specific lifetime from projected intakes (and exposures). The calculated values of the excess lifetime cancer risk (ELCR) in the vegetable samples ranged between 0.43×10^{-3} and 0.62×10^{-3} with an average value 0.52×10^{-3} and in the condiment samples, the effective life cancer risk varied from 0.32×10^{-3} to 0.40×10^{-3} with a mean value of 0.36×10^{-3}. When compared with the recommended safe limit of 2.9×10^{-3} by the United Nations Scientific Committee on the Effect of Atomic Radiation (2000), it could be inferred that the ELCR values would not lead to respiratory diseases, such as asthma, cancer and external diseases, such as erythema, skin cancer and cataracts.

In the case of vegetable samples, the H_{ex} values obtained (Table 3) were 0.19 to 0.27 with an average value 0.27, while the values were 0.14 to 0.17 with a mean value 0.16 for condiments. The calculated H_{ex} values for all samples were below unity, which implied that their consumption would not pose radioactive related harm to the populations of the consumers. The H_{in} values for vegetable samples (Table 3) were 0.34 to 0.49 with an average value 0.40, and for the condiment samples, the values were 0.26 to 0.32 having a mean value 0.29. The calculated H_{in} values for all samples were significantly below unity at $P \leq 0.05$ confidence level.

IV. CONCLUSION

The radionuclide activity concentrations of ^{40}K, ^{238}U, ^{232}Th in both the vegetable and condiment samples frequently consumed in Ile-Ife and its environs were determined in this study. Except for the activity concentrations of ^{238}U, which were higher than the permissible levels probably as a result of the geographical and geological factors, the values obtained for ^{40}K and ^{232}Th were found to be lower than the permissible values. The activity concentrations, gamma absorbed dose rates (D_R), radium equivalent activity (Ra_{eq}), annual effective dose equivalent, effective life cancer risk and hazard indices (H_{ex} and H_{in})

indicated good level of consumption safety when compared with the world permissible values.

Table 1: Activity Concentration of Radionuclides in Vegetables (Bq/kg) Samples

Sample	^{40}K	^{238}U	^{232}Th	Total activity concentrations
Garden egg leaf	85.97±2.49	50.27±2.46	5.43±0.91	141.67±5.86
Water leaf	78.93±0.91	44.04±0.44	4.45±0.39	127.42±1.74
Bitter leaf	88.20±2.91	47.25±1.74	4.79±0.40	140.24±5.05
Pumpkin leaf	118.18±6.20	62.87±4.32	6.92±1.52	243.97±12.04
Amaranth	93.55±3.71	55.22±2.83	5.18±0.76	153.95±7.3
Mean ± s.d.	92.97±15.04	51.93±7.37	5.35±0.95	161.45 ± 23.36
Range	78.93-118.18	44.04 – 62.87	4.45 - 6.92	127.42 – 243.97
India	-	61-72	-	
Jordan	698-1439	0.6-2.6	0.7-3.4	
USA	-	24	18	
UNSCEAR (2000) *	400	35	30	

*UNSCEAR (2000) Acceptable Value

Table 2: Activity Concentration of Radionuclides in Condiment Samples (Bq/kg)

Sample	^{40}K	^{238}U	^{232}Th	Total activity concentrations
Cayenne pepper	72.30 ± 2.73	39.44 ± 2.19	4.13 ± 0.68	111.74
Scotch Bonnet	72.83 ± 2.63	40.91 ± 1.82	4.26 ± 0.58	118.00
Curry	59.68 ± 4.48	33.33 ± 3.30	3.42 ± 1.09	96.43
Nut meg	67.98 ± 3.43	37.72 ± 2.55	3.86 ± 0.86	109.56
Thyme	59.89 ± 4.46	34.27 ± 3.16	3.60 ± 0.99	97.76
Mean ± s.d.	66.54 ± 6.44	37.13 ± 3.26	3.85 ± 0.35	106 ± 9.31
Range	59.68-72.83	33.33 - 40.91	3.42 - 4.26	96.43 – 118.00
India	-	61-72	-	
Jordan	698-1439	0.6-2.6	0.7-3.4	
USA	-	24	18	
UNSCEAR, 2000*	400	35	30	

(Pendo and Leonid, 2017) *UNSCEAR (2000) Acceptable Value

Table 3: Radiological Hazard Values for Vegetables and Condiments

Sample	Ra_{eq}	D_R ($nGyh^{-1}$)	AEDE	ELCR	H_{ex}	H_{in}
Garden egg leaf	64.65	28.84	0.18	0.49	0.21	0.39
Water leaf	56.48	25.22	0.15	0.43	0.19	0.34
Bitter leaf	60.89	27.21	0.17	0.46	0.20	0.37
Pumpkin leaf	81.87	36.61	0.22	0.62	0.27	0.49
Amaranth	69.83	31.12	0.19	0.53	0.23	0.42
Mean ± s.d.	66.74±9.78	29.80±4.38	0.18±0.03	0.52±0.07	0.27±0.03	0.40±0.06
Cayenne pepper	50.91	22.75	0.14	0.38	0.17	0.31
Scotch Bonnet	52.61	23.49	0.14	0.40	0.17	0.32
Curry	42.82	19.12	0.12	0.32	0.14	0.26
Nut meg	48.47	21.65	0.13	0.37	0.16	0.29
Thyme	44.03	19.65	0.12	0.33	0.15	0.26
Mean ± s.d.	47.77±4.25	21.33±1.90	0.13±0.01	0.36±0.03	0.16±0.01	0.29±0.03
UNSCEAR (2000)*	370	55 $nGyh^{-1}$	0.48	2.9×10^{-3}	≤ 1	≤ 1

*UNSCEAR (2000) Acceptable Value

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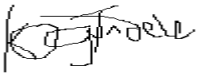
COVERING LETTER

Dear Editor,

This paper titled "An Assessment of Radiological Hazard Levels in Vegetables and Condiments Obtained from Ile-Ife Main Market, Ile-Ife, Nigeria" on behalf of all the authors declare this

work is an original paper that has not been published anywhere neither is it considered for publication anywhere also. The authors declare there is no conflict of interest as regards this manuscript and as such gives copyright permission to the journal of radiological protection for publication of this manuscript in your reputable journal.



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The Effect of *Treffinger* Learning Model On Critical Thinking Ability And Student Learning Outcomes

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ABSTRACT

This study aims to determine the effect of *Treffinger* learning models on the ability to think critically and student learning outcomes. This research is an experimental research, the research design used is *Quasi Experimental Research*. The experimental class that uses treatment using the *Treffinger* learning model, one class only uses conventional learning models. Data from research results obtained from the results of students' critical thinking skills at the *pretest* in the experimental class are the same as the control class, this is indicated by the value $\boldsymbol{t_{hitung}}$(0.891)> (1.7138) whereas for the critical thinking skills in the *posttest* there were differences in the experimental class and the control class with values $\boldsymbol{t_{hitung}}$(0,852)) > $\boldsymbol{t_{tabel}}$ (1.7138), and the research data obtained by student learning outcomes at the *pretest* in the experimental class is the same as the control class, this is indicated by the value $\boldsymbol{t_{hitung}}$(0.891)> (1.7138) while for the learning outcomes in the *posttest* there were differences in the experimental class and the control class with values $\boldsymbol{t_{hitung}}$(0,852)) > $\boldsymbol{t_{tabel}}$ (1.7138)) So there is the influence of the *Treffinger* learning model on critical thinking skills and fourth grade learning outcomes in the sub-themes of my national culture diversity in Muhammadiyah 24 Ketintang Elementary School Surabaya.

Keywords: Critical thinking ability, learning outcomes, learning model, *treffinger*.

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I. INTRODUCTION

The learning curriculum in Indonesia in recent years, especially in the 2013 curriculum introduces thematic learning models, namely learning models that emphasize student involvement in the learning process actively. Thematic learning is based on the 2013 curriculum which was first used starting in the 2013/2014 school year (Poerwati and Amri: 2013, 282).

Social studies learning for elementary school in Indonesia by reference to the 2013 curriculum has used integrative thematic learning with the aim that every citizen has a deeper knowledge and understanding of his knowledge and understanding of a religious community that is religious, honest, democratic, creative and analytical so that they can contribute to development of social and cultural life (Suhanadji: 2018, 18).

Learning that can achieve the expected goals has a number of things that are emphasized such as learning must be qualified, learning methods must be in accordance with the theme, learning must be able to improve critical thinking and learning must improve student learning outcomes. However, in reality there are still some obstacles, namely, learning is still teacher-centered, learning cannot be centered on critical thinking, learning still cannot be centered on improving student learning outcomes, and learning is still monotonous and boring, besides the learning model used by some teachers still use the direct learning model. The role of the learning model is very important to make it easier for students to understand the material to be taught if the model used is appropriate and appropriate.

To achieve learning success, the role of the teacher in the learning process is very supportive and the application of the learning model that is used and can be oriented towards improving student learning outcomes both in terms of students' critical thinking abilities and able to make students excited and not bored in receiving learning. The application of the right learning model basically aims to create learning conditions for students more active and have creative thinking, in this study the suitable learning model is the *Treffinger* learning model, especially if it is associated with the ability of critical thinking students.

The *Treffinger* learning model is a learning model that was first recognized by Donald J. Treffinger in 1980, and a figure as president at the *Center of Creative Learning, IncSarasota*, Florida, and developed this learning model as a form to develop the creativity of Ifana and Dwi (2015: .31).

The *Treffinger* learning model also has the definition that a learning strategy developed from a creative learning model that has the nature of mental development and prioritizes aspects of the Sunata process, 2008.15 (Shoimin, 2014, p.219). And most importantly, according to Treffinger (1985), the basis for developing this model is that viewed from the development of the era which is increasingly changing, so to overcome these problems, we need a way that can provide the right solution by paying attention to the facts in the environment. around then provide solutions or ideas that can provide solutions to these problems Huda (2013, p.318).

In addition to the learning model, it is also associated with students' critical thinking skills. Critical thinking according to Mustaji (2012) is anything that has a related reason by giving emphasis in making decisions about what to believe or not.

Above is a series of critical thinking for students so that they will have many benefits and advantages that students get by being trained early on related to critical thinking skills. The ability to think critically will encourage an attitude of self-confidence that arises in students, because they have been trained to express their arguments in the classroom so that when interacting outside the classroom it will be easier for them to get along with their surroundings. Whereas for learning outcomes proposed by Sudjana (2011, p.22) that all abilities possessed by students after being given some learning experience either in the form of tests in writing or in an unwritten form

Researchers conducted observations at Muhammadiyah 24 Ketintang Elementary School Surabaya school to find out whether there was any influence between the *Treffinger* learning model on critical thinking skills and student learning outcomes. In this school there were still some obstacles in the learning process. One of them is the teacher still uses the direct learning model so that it causes students to be passive, lack critical and creative thinking. This is supported by data on learning outcomes of fourth grade students showing the low grade IV elementary school learning outcomes seen in the results of the final semester exam learning outcomes have not reached a score above KKM, which is 70. Of the 20 students only 8 students (40%) score above KKM the remaining 12 (60%) students are still below the KKM.

In enhancing students' critical thinking and learning capacity, it is necessary to have the right social studies learning model to be used in learning to hone thinking skills in *high order*

*thinking skill*s or commonly called HOTS (Nasution, 2011, p.23). The accuracy in choosing the learning model used determines students in critical thinking and learning outcomes. Of the many existing learning models, the *Treffinger* learning model will be very suitable to be used to train students in critical thinking so that they can improve their learning outcomes in the given sub-themes.

Like the learning model that was studied by Venorica in 2015, which states why the learning model is important especially the *Treffinger* learning model, because the inaccuracy of giving the learning model by the teacher will have a fatal impact from the learning because it will cause students to fail in achieving learning goals due to mental conditions children become depressed especially for social studies subjects, especially for the theme of cultural diversity. In this sub-theme students are required to be able to identify various kinds of social, economic, and various ethnic cultures in the provinces throughout Indonesia. For that, students need to understand and think critically to get to know more about the various tribes in Indonesia. One way to deal with it right according to researchers is to apply the *Treffinger* learning model to be able to encourage students to be able to think more critically and creatively.

According to Anderson and Karthwohl (2015, p. 50), cognitive results are divided into six, namely: remembering, understanding, applying, analyzing, evaluating, and creating. This is an achievement that must be met in assessing student learning outcomes.

The characteristics of the *Treffinger* learning model are touching or taking part when used and when it will end. The touch in question is explained in the components contained in the treefinger learning model which includes three aspects, namely: 1) understanding the response, in this case students are given the opportunity to first identify the existing problems and their solutions. 2) generating ideas, teachers guide students to come up with ideas and ideas to solve problems. 3) preparing the action, the teacher helps students collect the appropriate information and checks the solutions students have obtained. So that in essence this learning model can be used to foster student creativity directly, this learning strategy developed from a creative learning model that is *developmental* and prioritizes processes, helps master the process and is finally able to solve problems.

Thus the *Treffinger* learning model is expected to be suitable for use in this study with its characteristics that this learning model is more directed at critical thinking skills characterized by the level of the basic elements of learning that are more complex and emphasize the use of meaningful ways in the learning process, so can improve student learning outcomes. In addition, the *Treffinger* learning model is *developmental* (development) which prioritizes the process and most importantly is given a problem and then guided in discussions and finally can provide a solution to the problems they get or observe.

Based on this background, the formulation of the problem in this study is whether there is an influence of the *Treffinger* learning model on the critical thinking skills of fourth grade students of Muhammadiyah 24 Ketintang Elementary School Surabaya.

II. METHODS

The type of research used in this study is a type of experimental research. The type of quantitative research that will be applied aims to measure the influence of independent variables namely *treffinger* learning model and the dependent variable is the ability to think critically. The form of design in this study uses *Quasi Experimental Research* ...

Quasi Experimental Research Design. It can be described as follows.

Table 1. Research design

Category	***Pre-test***	**Variable** **Treatment**	***Post-test***
Experiment	O1	X	O2
Control	O3	-	O4

Source: (Sugiyono, 2016:76)

Information:
O1 : *Pretest* results in the control group
O2 : *Posttest* results in the experimental group
O3 : *Pretest* results in the control group
O4 : *Posttest* results in the experimental group
X : Treatment

In the experimental group the learning was done using the *Treffinger* learning model while the control group used a conventional learning model.

In this study the research subjects were fourth grade students of SD 24 Muhammadiyah and fourth grade students of Muhammadiyah 24 Ketintang Elementary School. The research sample used was 20 students for the control class and 20 for the experimental class. The timing of the research is carried out approximately between January and February 2019 in the odd semester 2018/2019 academic year.

The research instruments to be carried out in this study are two: 1. Test sheets, in this test sheet containing questions about mastery of the material and critical thinking skills and student learning outcomes, the test sheet in this test is in the form of essays with 5 questions. Questions were given to the experimental class which received treatment and control classes that were not treated. 2. This observation sheet aims to determine the extent of the influence of the *Treffinger* learning model on critical abilities and student learning outcomes. The observations that will be carried out are the researcher acting as a beginner teacher in class IV, then the class teacher or peer researcher observes the implementation of the *Treffinger* learning model when used when the learning model takes place.

The techniques used to collect data by researchers are two: 1. Observation techniques, aiming to observe the teacher in carrying out the use of digital literacy when learning takes place in the experimental class and 2. The test technique aims to measure or know the progress of students during learning, there are two implementations in this test technique, namely the implementation of the *pre-test* and *post-test*.

Furthermore, after data collection techniques, data analysis techniques will be carried out using a quantitative approach to data presented in the form of numbers. The analytical technique of data used in relation to the quantitative approach is the calculation of answers to problem formulation and hypothesis presentation, which are held in two stages: 1 Data analysis is divided into first, validity and reliability tests. 2. Analysis of the results data are normality test and hypothesis test.

III. RESULTS AND DISCUSSION

The results of the study consisted of the results of expert validation, the results of research in the field, and the results of inferential analysis. The following are the results of the

learning device validation and research instruments used in this study, which have been validated by experts, the following are the results of validated data.

Table 1. Results of Validation of Learning Devices and Research Instruments

Validation Results	Average of Validation Score	Category	Information
RPP	3,54	SB / Valid	Can be used with a little revision
LKPD	3,42	B / Valid	Can be used with a little revision
Learning Material	3,5	B / Valid	Can be used with a little revision
Critical Thinking Ability Test and learning outcomes	3,35	B / Valid	Can be used with a little revision

Validation results related to RPP syllabus, LKPD, learning material, and critical thinking ability tests in the table show the average feasibility validation of the four learning devices and research instruments from the validator to get a good category, so it can be concluded that the learning device is feasible to use with a slight revision.

Next below is the percentage of the comparison of Pre-test and Post-test scores

Value Results of Pre-test and Post-test on students' critical thinking skills

Score	1380	2295
Score Average	55,2	80

Source: processed data

For the results of the observation analysis students' critical thinking skills of experimental class students showed that for the *pretest* results the average presentation was 55.2% with the category of moderate critical thinking ability and for the *posttest* results the presentation average was 80% with the category of critical thinking ability very high. For the results of observational analysis of students the experimental class student learning outcomes showed that for the *pretest* results the average presentation was 55.2% with the category of moderate critical thinking ability and for the *posttest* results the average presentation of 80% with the category of critical thinking ability was very high. Based on the results of the analysis of observing the critical thinking skills of the control class students for *pretest* and *posttest* in the control class and the experimental class there was an influence on the use of the *Treffinger* learning model because there were very significant differences.

Value Results of Pre-test and Post-test on learning outcomes

Total	**1380**	**2295**
Score Average	**55,2**	**80**

Source: processed data

The results of student learning outcomes in the control class showed that for the *pretest* results the average presentation was 55.2% with the less active category and for the *posttest* results the average presentation was 80% with the moderately active category. Based on the results of the analysis of learning outcomes for the control class for *pretest* and *posttest* only at the stage of being less active and quite active. In this case it has not shown good results.

From the table above, it can be seen that the comparison between the average *pre-test* value and the *post-test* value is higher *post-test* value.

Furthermore, the translation related to the normality test of data acquisition of creative thinking skills and collaboration of students, researchers used the *SPSS 21.00* program with the *kolmogorov-smirnov* technique at a significant level of 0.05. The selection of the *Kolmogorov-Smirnov* test because this technique can test in large or small quantities, besides that, the data in this study are interval scale or ratio.

The results of the normality test that has been processed are in table 4.13

Table 4.13
Normality Test Results

Variant	Class	Sig-
Critical Thinking Ability (Pretest)	Experiment	0,083
Critical Thinking Ability (*Postest*)		0,170
Critical Thinking Ability (Pretest)	Control	0,083
Critical Thinking Ability (*Postest*)		0,200
Learning outcome (*Pretest*)	Experiment	0,083
Learning outcome (*Posttest*)		0,170
Learning outcome (*Pretest*)	Control	0,083
Learning outcome (*Posttest*)		0,200

Source: processed data

Normality test data based on table 4.13 above obtained that, the results of the significance level of the ability to think critically and the learning outcomes of students in the experimental class and control class more than 5% or 0.05. So based on the acquisition, it can be concluded that the analysis requirements test has been determined because all data that has been obtained is normally distributed.

The homogeneity test carried out in this study aims to determine the similarity of the sample section. In the homogeneity test, researchers used the *SPSS 21.00* program with a *one way ANOVA test* technique at a significant level of 0.05. The homogeneity test results can be seen below.

Table 4.14
Homogeneity Test Results

Variable	Levene Statistic	df1	df2	Sig.
Critical Thinking Ability (*Pretest*)	1,000[a]	1	48	1,000
Critical Thinking Ability (*Posttest*)	1,194[a]	1	48	0,662
Learning Outcome (*Pretest*)	1,000[a]	1	48	1,000
Learning Outcome (*Posttest*)	1,194[a]	1	48	0,662

Source: processed data

IV. DISCUSSION

Based on the acquisition of homogeneity test data each variable gets more than 5%. Then it was concluded that the samples of the two homogeneous variants (HO were rejected) and the test requirements analysis were fulfilled. Interpretation of the results of hypothesis testing data, the hypothesis of this study is "there is a significant effect of *Treffinger* learning model on critical thinking skills and learning outcomes of fourth grade students of Muhammadiyah 24 Ketintang Elementary School Surabaya". The results of these hypotheses are tested from the results of the research data that has been conducted. This can be seen from the average score of the experiment class and control *posttest*.

The results of the research in class IV T were greater than the average score in class IV K. The average of the IV T grade students was 85.4 and the average of the K class students was 80. The *Independent Sample T-Test* test results about the influence *Treffinger* learning model of students' critical thinking skills, data on critical thinking skills and student learning outcomes for the test (*pretest*) of 0.851 in the control class and in the experimental class of 0.891 while, when the student learning outcomes (*pretest*) amounted to 0.851 in the control class and in experimental class of 0.891. Because the two classes that have been tested have a significance value of 5 0.05 with df.38 at the 0.05 significance level. Because the significance level is 5 0.05 then H_O is rejected and H_a is accepted it can be concluded that the data on students' critical thinking abilities are stated to be normally distributed in each group.

This shows that there are differences in critical thinking skills and student learning outcomes in the experimental class and in the control class at the time (*posttest*) because in the experimental class there is treatment that is using the *Treffinger* model during learning and in the control class there is no treatment (treatment) given. Based on the results obtained, it can be concluded that the thinking ability of students who use the terffinger learning model is significantly higher than the students' thinking ability using conventional learning.

V. CONCLUSSION

Based on the results of the discussion described above, it can be concluded that there is an influence of the use of the *Treffinger* learning model on students 'critical thinking abilities. The results of students' critical thinking skills after being given treatment are obtained *posttest* with the results t_{hitung} (0,891) $>$ t_{tabel} (1.7138) with df. 23 at the 0.05 significance level. The results of student learning outcomes after the treatment, obtained *posttest* with results t_{hitung} (0,891) $>$ t_{tabel} (1.7138) with df. 23 at a significance level of 0.05, it can be concluded that the use of the *Treffinger* learning model influences critical thinking skills and learning outcomes of fourth grade students in the sub-theme of cultural diversity of my nation in elementary school.

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The Impact of Technological Advancement On Entrepreneurship in an Organization.

A Case Study of Airtel Mobile Company in Nigeria

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Abstract- The research focuses on finding the impact of advanced technology on entrepreneurship in an organization. The research found that there is a powerful relationship between technological advancement and entrepreneurship in an organization as newer technology enhance the flow of creative ideas in the organization. The research also finds it important to ensure the participation of the employees for effective idea generation. In most cases, organizations are reluctant to increase the participation or do not apply the latest technologies available in the market. In order to conduct the research, a sample of 30 respondents from Airtel, Nigeria was drawn in simple random sampling method. The respondents were provided a 6-question questionnaire to conduct this primary quantitative research.

Index Terms- Entrepreneurship, Technological advancement, idea generation, Employee participation, Under-developed economy

I. Introduction

Technological advancement has huge implications for underdeveloped countries as they create newer opportunities for people and make life easier (Awogbenle, and Iwuamadi, 2016). Entrepreneurship in an organization is the notion that promotes new ideas, views, and methods in an organization that decreases the effort needed while increasing output (Hjorth, 2014). Technological advancement also enables new ideas in an organization like new methods to decrease cost, new business expansion ideas like Uber, Airbnb, the creation of a new business model to increase competitive advantage like ebay's online auction. In an underdeveloped country like Nigeria, the need for newer business ideas is required to enhance the economy, create jobs and simplify life further (Garcia-Morales, Llorens-Montes, Fand Verdú-Jover, 2016). Telecommunication organizations like Airtel can enhance their activities in Nigeria by introducing newer methods like dedicated Sim cards for internet, mobile transaction service, 4G network etc. that will enhance the services, bring new ideas within the organization and create new job opportunities by assigning resources for the development of those ideas. It is important to consider the impact of technological advancement on entrepreneurship in an organization as organizations might not see the value of promoting the notion of entrepreneurship in an organization (Dobrev, and Barnett, 2015).

As a result, the study focuses on the topic to identify the current condition of technological advancement in an organization, the perception towards entrepreneurship in an organization and how technology can impact entrepreneurship so that newer and better business ideas are developed. This way, not only the organization will be beneficial, but also the economy will get an idea boost.

II. Aim and Objectives

The aim of the study is to find out the impact of technological advancement on entrepreneurship in an organization.

The research objectives include:

To find out the current condition of technological advancement in organizations

To find out how technology advancement promotes the notion entrepreneurship in an organization

To investigate the requirements of technological advancement and entrepreneurship in an organization

III. Literature Review

(Zahra, Wright, and Abdelgawad, 2014) identifies technological advancement as a service agent that utilizes and upgrades the previous technology to provide a better utility with a lower level of resource input. (Roberts, 2012) further elaborates that the latest technology has a big impact and implication for the society and newer industry might get built based on technology. (Reed, 2016) Illustrated various platform businesses that not only lessened the need for resources but also ensured that the need of the society is met by creating a link between buyers and sellers. (Hoselitz, 2017) on the other hand, talks about the downside of technology as the youth are getting too much attracted to it that productivity is getting hampered as they spend an unusual amount of time surfing the internet.

Entrepreneurship, as defined by (Kilby, 2016), is about the creation of a new business entity to serve the society. (Ogunsola, and Aboyade, 2015) thinks that the concept of entrepreneurship should be utilized in developing and underdeveloped economies further as there is a scarcity of job and entrepreneurship creates new ideas in an organization. (Marton, and Singh, 2013) on the other hand, emphasizes new business ideas through entrepreneurship as entrepreneurs have been providing the society with different resource saving ideas to serve the need efficiently. However (Rai, and Kumar, 2015) talks about selecting entrepreneurship idea carefully as it, most of the times fail due to the lack of proper understanding of the market or utilization of resources.

(Khalil, 2013) thinks that technological advancement in an economy has a huge implication on entrepreneurial development in an organization as newer technology enables people to provide new kind of ideas or enhance the current business model. (Akubue, 2013) also identifies the implication on telecommunication sector as it enables the entrepreneurs to develop newer and highly segmented products like sim cards dedicated to internet only. (Stewart, 2012) further puts the impact of technological advancement on entrepreneurship in an organization in underdeveloped and developing economies where different tools like apps, artificial intelligence, automatic transaction methods etc. attract the customers while opening new doors for the entrepreneurs. Even though most of the arguments are in favor of the positive impact of technological advancement on entrepreneurship development (Sharma, 2013) identifies the drawbacks such as misleading information, misuse of technology for wrong purposes and slow adaptation process. (Wells, 2015) on the other hand, sees the opportunity as organizations can connect to customers and fix the problem of misleading information and adapt to technology by getting aware of it by implementing change management system. (Arogundade, 2016) also thinks that the usage of technology for wrong purposes can be battled by implementing some control mechanism and setting legal boundaries and punishing those who breach the rules for harm. According to (Abimbola, and Agboola, 2012) the greatest implication of technology is on relationship building as new entrepreneurs get a chance to understand the customers, reply to their quarries and gain feedback to further develop the business and have strong building base of the business.

IV. Conceptual Framework

Here, some independent variables have been identified to have an impact on the dependent variable, entrepreneurship development.

Communication: technological advancement seems to have enhanced the way organizations communicate with customers which includes chat bot, messages, apps etc.

User experience: user experience has enhanced as entrepreneurs are implementing artificial intelligence, virtual reality, social media ads etc. in the business (Quadrini, 2015).

Newer technology: Newer technologies are opening new ways for entrepreneurs like the introduction of 4G technology, sim card dedicated to internet etc.

Online selling: online selling not only saving time and energy of the customers, but it also helps the entrepreneurs to have a flexible business model and an opportunity of quick service delivery (Awogbenle, and Iwuamadi, 2016).

V. Methodology

The research contains primary data and implements quantitative analysis technique. The primary data will be collected using the survey technique containing a questionnaire which will be distributed to the respondents. The research includes regression and correlation analysis. A set of 6-question questionnaire was distributed among the respondents to gather the data.

Primary data has been selected as it ensures updated information related to the latest technology is gathered as the technological environment is dynamic and new technology makes the previous one obsolete. Further, with the implementation of newer technology, new entrepreneurial opportunities show up and primary data will reveal the implication of technology in this case. Quantitative research method has been applied as the data collected will be numeric in nature. For descriptive research like this, quantitative method is most suitable as insight is not required, only the data should be analyzed and presented properly. The regression and correlation analysis has been done in order to analyze the strength and degree of relationship between the variables.

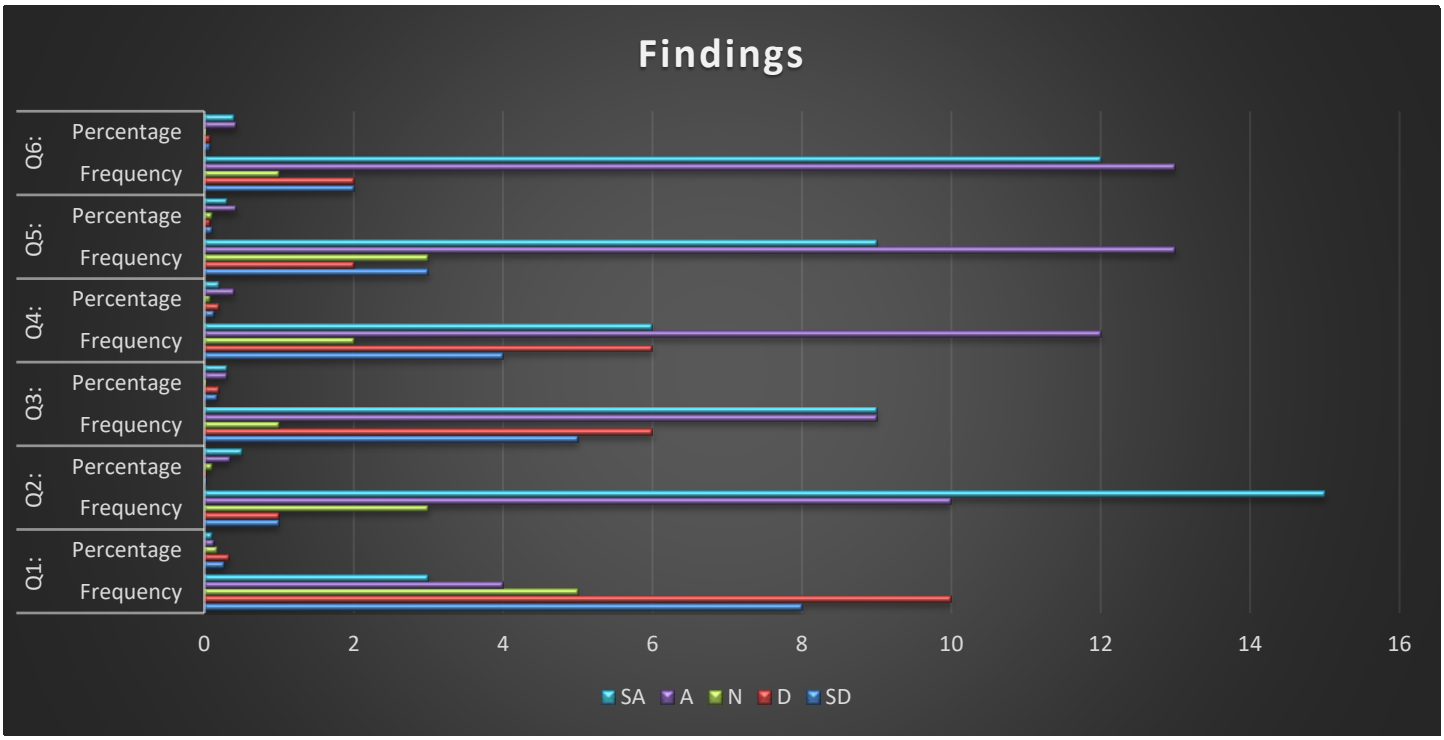
The sampling technique chosen is simple random sampling from probability sampling and the sample size is 30. The sampling frame was Airtel Nigeria's employee data and the researcher selected the sample from Abuja's Airtel offices which contained the employees of Airtel.

The simple random sampling has been selected as it removes biasness, is easier to implement and cost efficient as a probability sampling technique. The sampling technique reduces the time and due to the size of the sample, the implementation and conduction of the research become easier.

VI. Data Anlysis

	Questions		SD	D	N	A	SA	Total
Research Objective 1	Q1: Do you agree that the organization implements all the latest technology available to enhance user experience?	Frequency	8	10	5	4	3	30
		Percentage	27%	33%	17%	13%	10%	100%
	Q2: Do you agree that there are some technological tools implemented in other countries which, if implemented could enhance efficiency like quick communication?	Frequency	1	1	3	10	15	30
		Percentage	3%	3%	10%	34%	50%	100%
Research Objective 2	Q3: Do you agree that technological advancement allows employees to provide	Frequency	5	6	1	9	9	30
		Percentage	17%	20%	3%	30%	30%	100%

	ideas that can enhance efficiency?							
	Q4: Do you agree that the organization supports entrepreneurship by implementing the ideas of the employees?	Frequency	4	6	2	12	6	30
		Percentage	13%	20%	7%	40%	20%	100%
Research Objective 3	Q5: Do you agree that IT infrastructure should be powerful in order to support the latest technologies like online selling?	Frequency	3	2	3	13	9	30
		Percentage	10%	7%	10%	43%	30%	100%
	Q6: Do you agree that organizations should promote employee participation in order to implement newer technological ideas?	Frequency	2	2	1	13	12	30
		Percentage	7%	7%	3%	43%	40%	100%



VII. Result and Discussion

The responses for the first question was 60% in favor of disagreeing and 23% in favor of agreeing which is negative. As a result, the organization should implement some latest technology to enhance user experience. For the second question, 6% disagreed while 84% agreed which gives a positive result. So other countries are implementing some sort of technologies that should be applied in Nigeria too. For the third question, 37% disagreed while 60% agreed which is a positive result. So technological advancement allows the flow of newer business ideas in the organization.

For the fourth question, 33% disagreed while 60% agreed which is a positive impact. So, organizations support the views of the employees. For the fifth question, 17% disagreed while 73% agreed which is positive. So, IT infrastructure should be powerful to backup the implementation of advanced technology. In the sixth and final question, 14% disagreed while 83% agreed on to give a positive result. So, organizations have to enhance employee participation to get newer technological ideas. Overall, the research shows a positive impact of advanced technology on entrepreneurship in an organization.

VIII. Conclusion

The research attempted to find the impact of technological advancement on entrepreneurship in an organization from the perspective of Nigeria in the light of Airtel. Through the research, it has been evident that proper technological advancement not only increases efficiency but also promotes the idea of entrepreneurship in an organization where the employees provide creative ideas to

enhance business operation. In this regard, organizations are also required to implement a participative tool so that employees can share their creative ideas with the organization to make the operation better. Different tools like communication, user experience, online selling and development of updated technologies seem to have an impact on the entrepreneurship development.

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I3 Bot: Empowering Small and Medium Scale Enterprises with Machine Learning

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Abstract: The incessant need to furnish better interfaces between people and computer engendered in intelligent systems with prime emphasis on User Interface, basic software engineering principles and simplified yet powerful data analytics for the Business.
In this race, Small and Medium Scale Enterprises fell behind due to lack of human, technical and financial resources.
The i3 bot application solution presented in the paper provides adaptive response by learning from real time user interaction and provides a minimalistic interface [3] thus permitting humans interact with the system (computer) in a novel way. In addendum to this i3 bot is optimized using machine learning algorithm coupled with simple yet important engineering concepts like customer feedback to burgeon its ability to deliver output in adherence to user's demands and ever-changing needs.
This paper is focused on empowering the Small scale and Medium Scale Enterprises and Institutes in the form of technological solution (SAAS model) of through I3 Bot.

Keywords: Machine learning, Chat bot, Naive Bayes classifier, Small and Medium Scale Enterprises

I. INTRODUCTION

I3 Bot stands for intelligent, interactive, interface which are the 3 pillars of the imminent software needs.
Human-computer interaction(HCI) is a multidisciplinary field of study focusing on design of the computer technology and between human and computer [1]. With the gaining demand to provide an efficient and easy human computer interactions, the study progress in natural language processing and in speech recognition has bolstered to provide an optimistic solution to Human computer speech Interaction with various interfaces. HCI draws on knowledge and skills from Anthropology, Sociology and Psychology along with Computer Science. [15]
For a fruitful use of speech to text conversion the technology must be designed in such way to break the sentences and words into meaning full phonemes. To serve this purpose advent of chatbot began to emerge. These chatbots are amalgam of real time learning and complex algorithms to provide adaptive responses.
However, these chatbots are not pervasive due to their extravagant price. The article [4] suggests that Building a Full Chatbot from the Ground Up: $30,000 – $150,000. The important to consider long-term maintenance costs, which will typically require either your own IT specialist with enough skills to manage and update the bot, or repeated sessions with outside experts to help fine-tune it. Because of which these chatbots are used extensively with tech giants and Multi-National Companies resulting in dearth of its use in modest industries, small scale enterprises and institutions.
The "I3- Bot" presented this paper heed these drawbacks to provide a web application open source software as a service model(SAAS) to small scale and medium in scale industries to **aid their sales and acts as a vehicle in path of better Customer service and interaction**.
The i3 bot is designed keeping on mind to provide real time interaction with the user to give succor to their queries revolving around the 3 I's principle.

II. LITERATURE SURVEY

This division discerns about the related papers referred while designing the i3 bot.
The paper developed by the Bayers Etiaji et al [1] aims at providing a chatbot to make a conversation with the humans and machine. The knowledge of the chatbot is stored in the data base and the appropriate response is provided by pattern matching. "The intelligent web-based voice chat bot" designed by S.J. du Preez et al [2] intends to provide voice recognition chat bot. This paper utilizes black box approach to control communication structure to and from web services. "Chappel – A Semi-automatic intelligent chatbot" developed by Bibek Behera [20] to meet a business requirement to provide a chatbot as personal assistant. The chappel is a semi-automatic chatbot that is able to provide appropriate service based on user's intent. The paper presented by Nikita Hatwar et al [21] consists of a software which harness the artificial intelligence to enable the user to interact with the system. This chatbots were designed to heed to needs of customers service, call center. The "MOOC: Buddy" designed by carmen holotese to assist as a possible recommender system for best learning resource. The chatbots

decisions here are based on the user's social media profile and interests.

The paper presented by Bhavika . R. Ranoliya et al [22] allows an efficient way to suffice user queries using Artificial Intelligence markup language (AIMC) and latent semantic analysis (LSA). "The programming challenges of Chatbot: Current and Future prospective" by AM Rahman et al [23] throws in plausible challenges of programming in current and future era of chatbots. The paper presented by YU Wee et al develops an automatic chatbot to knowledge acquisition method which includes classification model and theory of ensemble learning to make decision.

The paper presented by Bill Allcock et al [12] suggests that highly distributed user communities require high-speed access to valuable data, whether for visualization or analysis. The quantities of data involved (terabytes to petabytes), the scale of the demand (hundreds or thousands of users, data-intensive analyses, real-time constraints), and the complexity of the infrastructure that must be managed (networks, tertiary storage systems, network caches, computers, visualization systems) make the problem extremely challenging. These are the de facto standards for the data management projects worldwide.

III. Key Challenges

As we discussed earlier the chatbots are mainly advantageous and huge boon if used in write manner for any business. But we also have some key challenges which hinders the usage of these.

1. Cost of implementation: The main problem faced by SME's are the cost of the implementation of this technology in their official website. The price to develop may range from $30,000 – $150,000 [4].
2. User Interface: The minimalistic and easy to use interface is a vital component of software engineering. [5]. The study says 52% of users said that a bad mobile experience made them less likely to engage with a company. [6]
3. Self-adaptive Intelligence: The ability to learn from every interaction, Resulting in access to unlimited pool of data. This makes the chat bot system more smarter and ability to render user specific expected solution.
4. Interactive: In today's data hungry world, the requirement of solution in multiple mode of delivery form is the minimal requirement.
5. Ability to modify replies: The system is bound to make mistakes. But the ability to modify them or in certain cases block them if necessary. In order of keeping SME reputation in mind is once again a minimal requirement.
6. Analytics: The ability to trace footsteps of user is very prominent. To understand the view of customer towards SME is always an invaluable asset for enterprise. This helps in serving the customers better.
7. Security: The user information and related queries should be protected and used adhering to the local data protection policy. Especially customers Trust is an important criterion for the SME.
8. Robustness: According to a survey 50% of web users expect a site to load in 2 seconds or less, and they tend to abandon a site that isn't loaded within 3 seconds. [7] A customer lost is huge loss for SME.

IV. Proposed Methodology

The user has a query regarding a [SMALL AND MEDIUM SCALE ENTERPRISES] SME. The user wants to clarify it. The user logon to the USER panel in SME website and enquires his question vocally. The system answers to his problem and gives relative additional information. If the user is unhappy about the solution or problem intended couldn't be found, user will be able to report the question to the administrator.

The Voice to text algorithm will convert the user voice to the text. These texts are tokenized and then fed to the machine learning Naives bayes classifier algorithm [13] which will convert these user's questions into a predefined tag shown in fig1.

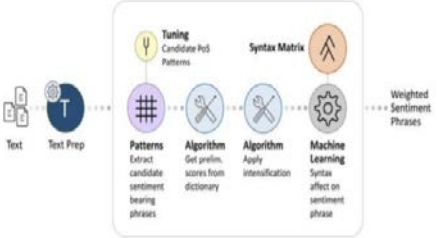

Fig1: Conversion of Text to tag classification

These tags are mapped to the solutions bundle. Each solution bundle consists of the solution to the query as information, indistinguishable human voice and a web page which helps to user to explore extra additional information towards the solution. This will generally relate to customized "landing page" of website. Ultimately helps in conversion of visitor to a client for SME.

There will be Admin panel which provides the below features: Admin Logs, User logs, Train algorithm for new questions, modify wrong answers, change admin credentials, provide graphical statistics. These **features empower the SME's to have control over the Reponses the system could provide upon queried which is the significant let down in the existing chatbots such as Siri, Cortana and others**.

V. Implementation

A. Tools and Technology

These are the below hardware and software requirements used to build I3 bot application as shown in table1.

Front end	HTML, CSS, Bootstrap
Client-Side components	Ajax, JavaScript
Scripting language	PHP, Python
Algorithm implementation language	Python
Servers	XAMPP stack and Flask Framework
PIP Modules	Textblob, python-vlc,gtts
Browser	Internet Explorer, Chrome
Hardware	Headphone, Speaker

Table 1: System Requirements

B. Applied Principles:

The I3 bot follow the 3 principles of Software Engineering: Intelligent, Interface and Interactive.

Interface:

- Rich User Interface: The Rich User Interface is key part for every web application system. How well the user can feel and use the system to navigate themselves throughout the system is the top priority. We have employed HTML, CSS, JS for frontend designing part. Python and PHP language are used for code implementation part.
- Multiple Functionalities: The admin dashboard promises the many customized functionalities for the privileged admin such as Admin Logs, User logs, Train algorithm for new questions, modify wrong answers, change admin credentials.
- Robustness: The speed of the web application should be minimal for user convenience. So standard practices such as using multi-threading techniques to training data at initial and retraining stages, storing the model using pickle, running the program as well as creating the voice output by another child process. Where ever non- required the use of the SQLI is optimized with normal file operations to decrease retrieval time of I/O operations [14].
- Quality and Design standards: The color combination standards practiced today in professional web designing world are carefully followed. Since the whole project contains my different languages, cross platform integration and unit testing will be done and recorded carefully.
- Security: The Security is the critical issue as it is in real world competitors exist, because the failure of this system could lead to financial losses. Hence for critical data storage python SQLI database will be used which is SQLite version. Every movement of the User and admin is carefully observed, and any malicious activities should be quickly attended.

Text Blob [9]:

TextBlob is a Python (2 and 3) library for processing textual data. It provides a simple API for diving into common natural language processing (NLP) tasks such as part-of-speech tagging, noun phrase extraction, sentiment analysis, classification, translation, and more.

Flask Framework [10]:

Flask is a Python web development framework based on the Werkzeug, Jinja, MarkupSafe and itsdangerous pallets libraries. It was originally created in 2010 and has since powered some of the largest websites on the internet due to its MVC (Model View Controller) architecture [11]. The Model View Controller (MVC) is a software architecture pattern, commonly used to implement user interfaces. This separates out the application logic into three separate parts, promoting modularity and ease of collaboration and reuse. It also makes applications more flexible and welcoming to iterations.

VI. Validation and Demonstration

A. Control Flow

The Control flow fig2 explains how the data transfers internally in the system. user invokes the system. The user

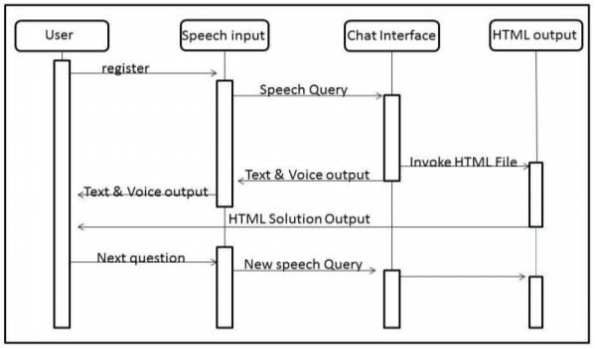

Fig 2: The Control flow diagram of the system

Control Flow Diagram

should register first (only the user name is stored) Then the system gratifies the user and prompts for the input through voice. Once the input is received it is fed into speech to text conversion algorithm. The audio file output will be converted to text form. This is later fed to text classification algorithm which returns the tag. The tag is mapped to solution bundle returns to user with Voice, Text and an Information page in the form of the HTML as user output.

Meanwhile, we will ask the user for feedback for the satisfaction of answer received. If the user is happy about solution, we can conclude that the machine has classified and retrieved accurate information as per user needs by training on the limited database. The user query can be added to training set of databases which could further bolster the performance of the Machine learning algorithm.

If the user is unhappy of the response from the system, then we will provide the opportunity to notify the question to the system admin as shown in fig3 & fig4 and admin can act accordingly, by increasing the training set values or by creating a new classification tag.

B. Real time application

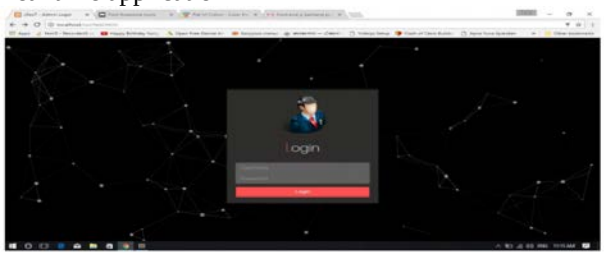

Fig3: The Admin login screen of the I3 bot.

The data are stored in SQLI database and timely database backup will be taken as per best software practices.

Fig 4 Dashboard HomePage

Fig 4: The Dashboard of the Admin.

This Dashboard have the advanced features such as

- Training the Model by adding the New questions or answering the questions which users have reported.

For SME perspective: The Ability to modify the replies for the user questions is a greatest asset which most of the Generic Chatbots available in market doesn't provide.

- Tracing the footprints of the user and analytics.

For SME Perspective: The information regarding the most frequently visited or queried questions or landing page will help SME's to fine tune their services and also a end user perspective which is vital for the marketing campaigns and product reviews.

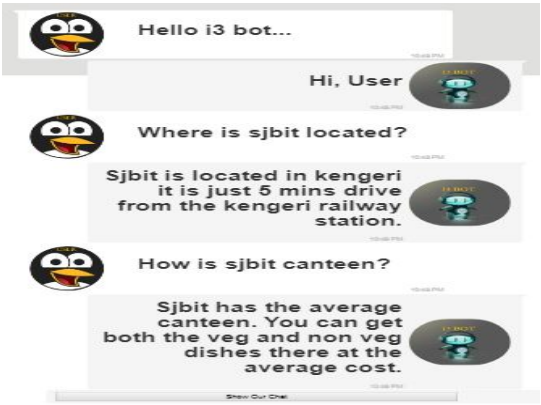

Fig 5: Chat Conversation for a Educational Institution screenshot

As the early adopters, the application solution was trained upon the sample data of Educational Institute "SJB Institute of Technology". The chatbot was questioned with frequently asked questions.

The Performance of the system was plausible. The system responded with appropriate classifications as expected and response was in the form of Text, Voice as well as HTML solution where interested users can pursue for more information as shown in figure 6.

Fig 6: The Information site page of the institute when queried for question regarding topic "Cafeteria"

C. Problems

- The training data was limited in scope.
- The voice was robotic.
- Dependency on dual Servers: Xampp and Flask. The XAMPP was used as application server. The Flask server handled the Algorithm implementation and database operations.

D. Overcome Solutions

- The System emphasizes the partial trust on the users and fetches the user's feedback. This will search for the existing questionnaire in training database and will inform the Administrator to Add them. This process of system self-evaluating its knowledge and providing a suggestion for Administrator to improvise it is a key feature of this solution.
- Since the system generated voice are robotic in nature, the alternative is Google's "text to speech"[16] could be employed which uses WaveNet Voices[17] to produce human like voice output.
- The usage of Multi-tier architecture is more secure, scalable and efficient than single tier architecture.

VII. Conclusion

The actual power of science lies in the ability to reach the horizon of users to make their life easy and simple. This software is built to attain that specific purpose especially for the SME and Institutions which lacks the technical and financial resources. This application can be hosted on server [18]: Henceforth this reduces cost of application as this is used as [Software As A Service] SAAS, Uptime of system is 99%, Robustness, Security are all inbuilt traits of modern day server. The technology coupled with the Software Engineering principles and Best Architectural principles can bring down the development cost of these system by huge margin.

This application proved that, SME due to various constraints are reluctant to these modernization, but upon onboarding these features will gain tremendous edge in [19] **soft power** and **information in terms of marketing leads**, **user insight of company**, **response time**, **chat contact channel** which is **self-service** by reducing the **service costs**, **unknown waits** and less human resource (Jobs such as receptionist, tele caller)

Future enhancements are deploying this as a Mobile phone application model since it expands the target reach for large user base for SME. The reinforcement learning, or deep learning algorithms can be used to increase accurate classification of system. The Application after perfection can be increased to perform plethora of opportunities ranging from simple to complex tasks such as Shop opening hours, Provide the on-demand Office reports to Plan the holiday by suggesting the deluge of entertainment options by previous chats, pre-enquiring the hotels upon various refiners and booking a hotel room in just one chat request. This proves that there are tremendous applications and the era is just starting.

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Applicability of United Nations Convention On Contract for The International Sale of Goods (CISG) On Non-Contracting States

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Abstract - CISG is the main international sales contract uniform treaty ratified by a significant proportion of world trade. Can courts of a non-contracting party be compelled, as propounded by some writers, to apply CISG impliedly or by default or acquire the status of force of law to be justiciable?

Index Terms - Compulsion, Contracting States, Default, Enactment, Justiciable.

I INTRODUCTION

The United Nations Convention for Contracts on International Sale of Goods (CISG) is an international trade agreement adopted in 1980 at the Vienna Convention for the International Sale of Goods. Its purpose is to eliminate any ambiguity caused by different domestic laws concerning the international sales of goods.[1] The CISG applies to contracts for sales[2] between companies located in different countries. CISG is currently in force in almost 89 countries as at 2018, which account for more than 75%[3] of world trade, making it one of the most successful international uniform laws.

The Convention for the Uniform Law of International Sales (ULIS) and the Convention for the Uniform Law on the Formation of Contracts for the International Sale of Goods[4] (ULF) were adopted in previous years. They were not accepted by many countries for material deficiencies specified within the contracts, the lack of participation on the part of European countries in the ratification process and the fact that the two conventions were not ratified by United States.[5] CISG is noted for its simplicity and was ratified by the United States in 1988, which in turn prompted other countries to ratify the convention but for some other countries like Nigeria under its article 1(1*)(*b)[6] and section 12 of the 1999 Constitution of the Federal Republic of Nigeria (Fourth Alteration) 2010 respectively. The laws within CISG supersede domestic trade laws. Even if CISG is not mentioned specifically within a contract between two companies in countries that have ratified the Convention, the companies are bound by the agreement.

In order to have parts of the Convention excluded, the contract has to explicitly mention the Convention or the parts of it that do not apply.[7]

II LEGAL BASIS OF CISG

By the combined readings of articles 30 and 53 of CISG,[8] sale contracts can be described as reciprocal exchange of goods against price. Generally, under articles 2 and 3, its scope of application is limited but applies to contracts of sales[9] for the supply of goods to be manufactured or produced, unless the party who orders the goods undertakes to supply a substantial part of the materials necessary for such manufacture or production excluding labour or other services by the party who furnishes the goods.[10] Article 1 applies in both contracting states where the buyer and seller have their respective places of business[11] or the rules of private international law lead to the application of the law of a contracting state. Article 6 provides that contracting parties may opt out of CISG or any of its provisions, otherwise will apply in a variety of situations, primarily *inter alia* to contracts where parties have chosen (party autonomy) the proper law of a CISG state to govern the contract.[12] With regard to choice of law, courts and arbitration tribunals have generally found that CISG will apply when chosen by the parties unless expressly excluded[13] or the domestic law of a state is specifically referred to.[14]

Also, in certain cases, an arbitral tribunal may apply CISG on its own initiative, as part of the *lex mercatoria*.[15] Successful implementation of CISG requires more than countries to adopt it but that courts and arbitral tribunals must interpret CISG in a uniform manner and not through the lens of domestic laws. Otherwise, divergent precedents will be created and the benefits of a harmonized regime will not be realized as parties will incur transaction costs for endless assessment interpretation of the Convention.[15] This issue is buttressed in article 7 of CISG, by creating a public international law obligation for States, via their courts, to interpret the Convention autonomously with regard 'to its international character and the need to promote in its application some uniformity', taking into account foreign case law and scholarly writings.[17] For many national courts, it is not typical to consider foreign case law instead of domestic judicial precedent (except *mutatis mutandi*) or legislation.

III CISG AND JURISDICTIONAL APPLICATION IN NATIONAL COURTS

In general, one of the most important developments in private international law and maritime law benefitting international

commerce was the recognition[18] of the concept of party autonomy to determine the applicable law.[19] Hague Principles on Choice of Law in International Commercial Contracts approved on 19 March 2015[20] (Hague Principles) in its preamble set forth general principles concerning choice of law in international commercial contracts[21]. The Hague Principles *inter alia* (a) affirm the principle of party autonomy with limited exceptions under its article 11; or (b) may be used as a model for national, regional, supranational or international instruments;[22] or (c) may be used to interpret, supplement and develop rules of private international law;[23] or (d) may be applied by courts and arbitral tribunals.[24]

Party autonomy has been a common principle in contract law, thus it has been drafted into one of the most international convention[25] in contract law. Article 19 of CISG states that, 'a reply to an offer which purports to be an acceptance but contains additions, limitations or other modifications is a rejection of the offer and constitutes a counter-offer'. Therefore it provides bargaining power to parties by letting them to negotiate the terms of contract in line with their[26] interest. It represents all characteristic of party autonomy such as freedom of contract by deciding the contractual terms and equal bargaining power by letting parties negotiate the terms as to what they give their consents.[27] In the same vein, article 6 CISG which is synonymous with article 2(2) of the Hague Principles, provides freedom to parties[28] to decide which law of the country will govern their contract. The freedom of contact has also been stipulated into The Principles of European Contract Law as:

> (1) Parties are free to enter into contract and to determine its contents, subject to the requirement of good faith and fair dealing, and the mandatory rules established by these Principles.
>
> (2) The parties may exclude the application of the any of the principles or derogate from or vary their effects, except as otherwise provided by these principles.[29]

However, party autonomy has not been implemented to provide parties a complete freedom to decide contractual terms, because some other legislation set some limitation to protect public or individual interests.[30] On the other hand, the most common limitation is mandatory rules especially in conflict of law which prone to give courts authority to decide as to what extent the terms would be enforceable.[31] Choice of law agreements should be distinguished from jurisdiction clause, forum selection clauses or choice of court clauses,[32] all of which are synonyms for the parties' agreement on the forum that will decide their dispute.[33] Choice of law agreements should be also distinguished from arbitration clause that denotes the parties' agreement to submit their dispute to an arbitral tribunal. All which are collectively referred to as dispute resolution agreements.[34]

This therefore transcends to the issue of jurisdiction of a court or arbitration tribunal approached to adjudicate on international contract of sale of goods.[35] From the perspective of private international law, it is imperative to ascertain whether a contract contains a valid choice of law and forum selection clauses. If the parties fail to select an applicable law, a court accepting to exercise jurisdiction of the dispute will have to apply the relevant conflict rule[36] of law to determine which law is applicable to the contract. The contracting parties may agree to completely or partly exclude the application of CISG by virtue of its article 6. The question may arise whether a choice of law clause referring to the law of a contracting state, implies an exclusion of CISG. The majority view in both the legal literature and case law is that a choice of law clause that refers to the law of a contracting state will lead to the application of CISG.[37] This may be different if the choice of law clause expressly refers to the application of the national law of a contracting state.

Be that as it may, the Brussel Convention of 1968 on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters and regulation (CE) No. 44/2001, provides which courts have jurisdiction in international contracts.[38] Article 2 of the Convention provides that persons domiciled in a member state shall be sued in the courts of that state. Thus, the court of the place of business of the defendant will generally have jurisdiction if it is within a member state. In addition, article 5 of the Convention which contains a very similar provision of article 5(1) of CISG, provides that in matters relating to a contract, a legal person domiciled in a member state may be sued in the courts of another member state for the place of performance of the obligation[39] in question. Thus, if a dispute arose concerning the payment of the purchase price and delivery of goods respectively in a contract governed by CISG, the places of performance were determined by the application of articles 57 and 31 of CISG respectively.[40]

It is pertinent at this juncture to consider the relevant provisions of CISG[41] in relation to its application in a national court. Article 1(1) of CISG provides:

> This Convention applies to contracts of sale of goods between parties whose places of business are in different States:
>
> a) When the States are Contracting States; or
>
> **b) When the rules of private international law lead to the application of the law of a Contracting State.**
>
> (Emphasis mine)

From the unambiguous wordings of article 1(1) of CISG, it can be deciphered that the provisions can be applied either by sub-paragraph (1)(a) or (1)(b) of article 1 by national courts. Does that mean that a non-contracting state can apply CISG in its national courts by virtue of sub-paragraph (1)(b) of article 1 when the rules of conflict of law leads to the application of the provisions of a CISG contracting state, as propounded by some writers? To attempt an answer to this question, some writers' works will be of significant assistance. Ndubuisi Nwafor[42] asserts that the effect of article 1(1)(b) of CISG on the Nigeria's conflict of law rules will effectively lead to the application of the Convention in Nigeria albeit by default particularly by compulsion, as a matter of law, by invoking the provision of article 95 of CISG, the country not a Contracting State to CISG notwithstanding.

However, it is more pertinent to note that article 95 of CISG impacts upon the Convention scope of application and this provision's interpretation therefore is of paramount importance for correct application of the Convention. In the light of the fact that almost world-wide accession to CISG, courts in contracting and non-contracting states alike are regularly faced with questions concerning its application. Therefore Nigerian courts need to pay heed to the correct interpretation of article 95 of CISG which provides thus:

> Any State may declare at the time of the deposit of its instrument of ratification, acceptance, approval or

accession that it will not be bound by subparagraph (1)(b) of article 1 of this Convention.

Even though the meaning of article 95 appears relatively clear and unambiguous at first glance, it has given rise to much controversy for its interpretation and application have generated considerable scholarly debate.[43] A reservation under article 95 of CISG is intended to limit the application of CISG only to situations governed by article 1(1)(a) of CISG (direct application) and exclude its applicability by virtue article 1 (1)(b) of CISG (indirect application). Assuming the other requirements are met, CISG is applicable to transactions involving the sale of goods between parties that have, at the time of the conclusion of the contract, their relevant place of business in different contracting states.

Pursuant to its article 1(1)(b) however, CISG has also applies when the rules of private international law of the forum state lead to the application of the law of a contracting state; unless the forum state has made an article 95 reservation. However, recently CISG Advisory Council has published an Opinion[44] on its interpretation and is hereby reproduced for considerations as follows:

1.A declaration under article 95 excludes the declaring contracting state's obligation under public international law to apply the Convention in accordance with article 1(1)(b). However, it does not prevent the courts of such a state from applying the Convention when the rules of private international law lead to the application of the law of a contracting state.

2.A declaration under article 95 is without any effect for the Convention's applicability in accordance with article 1(1)(a), in applying article 1(1)(a), it is irrelevant whether the forum state has made an article 95 declaration or whether one or both parties to the sales contract have their place of business in a state which has made an article 95 declaration.

3.When the forum is in a contracting state that has made no declaration under article 95, the Convention applies in accordance with article 1(1)(b) even when the rules of private international law lead to the application of the law of a contracting state that has made an article 95 declaration.[45]

In essence, paragraph one of the Advisory Council Opinion[46] speaks to the effect that the reservation for courts in countries who have availed themselves under article 95 to exclude application of CISG in terms of article 1(1)(b) when ratifying or acceding to the Convention. The second paragraph of the Advisory Council (AC) Opinion emphasizes the fact that an article 95 reservation has no impact upon the Convention's application in terms of article 1(1)(a).[47] Making an article 95 reservation does not impact upon a state's status as a CISG contracting state.[48] But the AC Opinion emphasizes the fact that the reservation removes a reserving state's public international law the obligation to apply CISG under article 1(1)(b).[49]

Additionally, the AC Opinion states that a court in a reservation state is still free to choose to apply the Convention under circumstances as provided for in terms of article 1(b).[50] In other words, making an article 95 reservation relieves a reservation state from the obligation to apply the CISG if the requirements for its application under article 1(1)(b) are met, but does not prohibit a court in a contracting state from applying the CISG in terms of article 95 if it so chooses. In this regard, the AC Opinion provides that a forum in a reservation state may elect to uphold a parties' direct choice of CISG as governing law of their contract or the choice of a CISG contracting states.[51]

The rules relating to the validity of a choice of law clause form part of private international law and the forum would uphold such a choice in line with its principles of private international law. This view may possibly be disputed if the parties choose the law of a reservation contracting state as governing law of their contract. In such instances, it may be argued and correctly so, that the correct application of the proper law would require the domestic sales law of the chosen *lex causae* is to be applied.

Application of CISG under its article 1(1)(b) amounts to application of the Convention as part of the proper law of the contract, assuming of course that the *lex causae* is that of a CISG contracting state. It is also established that a state that made article 95 reservation remains a contracting state under CISG. It is widely accepted that the *lex causae* should be applied in the same manner as a forum if its state of origin would have applied it.[52]

The AC Opinion also emphasizes the fact that a forum in a non-contracting state is under no obligation to refer to CISG directly.[53] A court in non-contracting state will be faced with possibly applying the CISG when its rules of private international law point to the law of a contracting state as *lex causae.* If the *lex causae* is that of a CISG contracting state that made article 95 reservation and the requirements for application of the CISG under article 1(1)(a) are not met, the AC Opinion states that the court would most probably apply the domestic law of the *lex causae* since a forum of the *lex causae* would have also applied its domestic law under these circumstances.[54]

It is my humble view that the application of CISG under these circumstances is not appropriate as it negates the rules of interpretation of laws as well as due to the fact that the requirements for its application under article 1(1)(a) are not met as well as under article 1(1)(b) which is excluded by the proper law state. It should be noted that literal rule is a rule used in interpreting statutes. This rule explains what the law is rather than what the law means. When interpreting a statute, the courts generally apply the literal rule first before applying any other rules of interpretation. In literal rule, the words in a statute are given its plain, ordinary and literal meaning.[55] Moreover, article 1(1)(b) does not form part of the law of the forum, since the forum is situated in a non-contracting state. Application of CISG under the circumstances therefore, would not constitute correct application of the proper law.[56]

IV CONCLUSION

It is safe to conclude that national courts of article 95 reservation states apply CISG once the requirements for its application are met since the AC Opinion stresses the fact that article 95 reservation relieves the reservation states from the public international law obligation to apply CISG under article 1(1) (b) but not prohibit them from applying it should they so wish to do.

In effect, CISG applies to states that have ratified CISG which are referred within the Convention as 'Contracting States'. By necessary implication therefore, for CISG to be applied in non-contracting states national courts, it must first and foremost

ratify, accept, approve or accede to CISG, pursuant to and under either article 1(1)(a) or article 1(1)(b).

A non-contracting state cannot by any stretch of interpretation of the Convention, apply CISG and it remains non-justiciable in its courts, either impliedly or by default or by compulsion unless and until, for example in Nigeria, ratified under section 12(1) of the 1999 Constitution (Fourth Alteration) as amended. The section is to the effect that no treaty between the Federation and any other country shall have the force of law except to the extent to which any such treaty has been enacted into law by the National Assembly.

In the final analysis, parties to a contract cannot by virtue of party autonomy, agree to employ CISG as the governing law of their contract if their respective countries or one of the parties country is not a contracting state; and therefore lacks the jurisdiction to exercise and determine dispute brought before it for adjudication. More so, any judgment obtained in any contracting states of CISG, cannot be recognized and enforced in a non party state for not being party to any bilateral or multilateral convention on the recognition and enforcement of judgments.

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I have detected and corrected some errors in the original work, but others still remain no doubt. All these are mine.

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11. CISG Advisory Council Opinion No. 4, Contracts for the Sale of Goods to Be Manufactured or Produced and Mixed Contracts (Article 3 CISG) available at <https://www.cisg.law.pace.edu/cisg/CISG-AC-op4.html>; see William P. Johnson, Analysis of INCOTERMS as Usage under Article 9 of the CISG, *University of Pennsylvania Journal of International Law* (2004(2)) 379-430<http://cisgw3.law.pace.edu/cisg/biblio/j...>; < Wethmar-Lemmer 'Applying the CISG via the rules of private international law: Articles 1(1)(b) and 95 of the CISG – analysing CISG Advisory Council Opinion 15' 2016 De Jure 58-73 http://dx.doi.org/10.17159/2225-7160/2016/v49n1a4 also<http://www.scielo.org.za/pdf/dejure/v49n...>
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27. *Aminu Ishola Investment Ltd v Afribank Nig Ltd* (2013) 9 NWLR (Pt 1359) 380, 409, paras A-G, parties to an agreement retain the commercial freedom to determine their own terms. No other person, not even the court, can determine the terms of contract between parties thereto. The duty of the court is to strictly interpret the terms of the agreement on its clear terms. It went to state that parties are bound by the terms of an agreement freely entered into by them and the duty of a trial court is simply to give effect to this agreement freely entered into by the parties and not to make a new agreement for them. See also *Nika Fishly Co Ltd v Lavina Corporation* (2008) 16 NWLR (Pt 1114) 509.

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37. see <www.uncitral.org/uncitral/en/uncitral_texts/sale_goods/1980CISG_status.html> visited on 30/05/2018.
38. Nigeria is not party to any bilateral or multilateral convention on the recognition and enforcement of judgments. The enforcement of foreign judgments in Nigeria is therefore governed by two statutes. That is to say, the Reciprocal Enforcement of Judgments Ordinance 1958 and the Foreign Judgment (Reciprocal Enforcement) Act Cap. C. 35 LFN 2004 <www,uubo.org/media/…/enforcement-of-foreign-judgments-under-nigerian-law-pdf> visited on 01/06/2018. Same is applicable, for while the United States has been a signatory of the 1958 United Nations Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York Convention) since 1970, it is not currently party to any international treaty for the recognition of foreign courts judgments; see Yuliya Zeynalova,The Law on Recognition and Enforcement of Foreign Judgments: Is It Broken and How Do We Fix It?, 31 BerkeleyJ. Int'lLaw. 150 (2013). < https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?referer&httpsredir=1&article=1435&context=bjil>.Unlike foreign arbitral awards, which are governed by the New York Convention, no treaty outlines the circumstances under which U.S courts may recognize foreign awards and vice versa. Transnational litigants are therefore more likely to encounter difficulties enforcing their foreign courts awards than parties seeking to enforce their foreign arbitral awards. This disparity is particularly clear because of the almost universal agreement that recognition and enforcement under the New York Convention 'works' and the absence of a comparably reliable mechanism for the recognition and enforcement of foreign courts awards. In the United States for instance, while the principle of Comity of Nations, the common law and individual states' laws do allow American courts to recognize and enforce foreign judgments, foreign courts may not necessarily reciprocate. Enforcing U.S courts judgments abroad can prove especially difficult in light of divergent rules on jurisdiction, requirements for special service of process, reciprocity and some foreign countries' public policy concerns over enforcing American jury awards carrying hefty punitive damages. <https://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=1435& context=bjil> visited on 01/06/2018.
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The Administrative Officers who engaged with the monetary transactions in Ancient Sri Lanka.

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Abstract- It is impossible for the king to control the economy of the country alone; therefore he needed a supportive staff for it. The administrative officers who helped the king in the monetary transactions can be identified from the Brāhmī inscriptions, chronicles as well as from the *Vinaya* commentaries, in Sri Lanka. Some of the administrative officers who have helped the king in the monetary transactions are discussed here.

Index Terms- monetary transactions, vamsa, inscriptions, trade, administrative, officers

I. Treasurer

The treasurers are named as "badakarika" in the Brāhmī inscriptions. Nearly seventeen Brāhmī inscriptions have been found bearing the term "badakarika" and "badagarika". These terms are hitherto interpreted as treasurer < Skt. bhāndāgārika (*EZ* 1933. vol. i: 145).

The Tōravamayiläva inscription in the North Western Province mentions a chief mercenary soldier, called Śumana (*EZ* 1984. vol. vii. no. 10: 55). The Bambaragastalāva cave in the Eastern Province mentions mercenary soldiers, called Nagakula; and Gotimita (*EZ* 1984. vol. vii. no. 11: 55-56). The Koravakgala cave inscription in the Southern Province, speaks of a mercenary solider of the great king Pita. "Pita- Mahārajaha" has been identified by S. Paranavithāna, as the king Vattagāmaniabhaya who ruled in 103 and 89-77 B.C.E. (*EZ* 1984. vol. vii. no. 55: 75; *IC* 1970. vol. i. no. 621: 47).

The two Mihintale cave inscriptions in the Northern Central Province shed light of a mercenary soldier, called "Parumaka Sēna" (*EZ* 1984. vol. vii. no. 59. 60: 77-78). The Nuvarakanda inscription speaks of a treasurer, called Anurādha (*IC* 1970. vol. i. no. 916: 71). The Tōrava Mayiläva inscription mentions of an officer in charge of the store house of goods (*IC* 1970. vol. i. no. 1035: 81). The Rāgala Vihāra inscription speaks of a minister "Aha" the treasurer (*IC* 1970. vol. i. no. 1192: 95). As mentioned in the *Hiri Sūtra Varnanā* in the *Suttanipātattha kathā (paramatthajōthikā)* there were treasurers in the families too (2008: 332).

The "kōsa" means treasury (*Dīgha. Att* 2008: 270). There were three types of treasury, according to the *Kāma Sūtra Nirdēsa Varnanā in Mahāniddēsatthakatā* and the *Kūtadanta Sūtra Varnana* in the *Dīghanikāyatthakatha (Sumangala vilāsinī)* They are:

1. Treasury for Money
2. Treasury for grain
3. Ttreasury for cloths (*Nid. Att* 2008: 17; *Dīgha. Att* 2008: 270).

Further, it reveals the reasons for the destruction of money in the treasury (*Nid. Att* 2008: 35). As mentioned in the *Guhattha Sūtra Nirdēsa Varnanā* in *Mahāniddēsatthakatā,* the king's jewelery have been protected by a treasurer. The tag has been tied in each jewelery, mentioning its' name. When the king ordered to bring a jewelery the treasurer has to enter the treasury with the alighted lamp and read the tags and bring the jewelries which the king need (*Nid. Att* 2008: 197). This shows that there was a separate treasurer who protected the king's jewelries apart from the treasurer of money, treasurer of grain and that of treasurer of cloths.

According to the *Dhammuddesavāra kathā* in *Dhammasnganippakarana atthakathā (Atthasālinī)*, the treasurer of the king has to protect the ten gems and bless the king each morning and the evening. Further, it is mentioned that the treasurer of the *Sakvithi raja* has to report the amount of the elephants, horses, chariots, soldiers, as well as the amount of the raw gold, dens of gold and also the properties which king possesses, each morning and evening (*Dham. Att* 2008: 172). There was a separate treasury for the elephants, the horses and the chariots (*Dīgha. Att* 2008: 270).

According to the *Tinsaka Varnnā* in the *Vinayattakathā (Samantapāsādikā)*, the robes have been kept in a separate treasury (*Vin. Att* 2004: 196). The monks also have been appointed as treasurers in the temples (*Vina. Att* 2009: 337). The Chinese monk Fah-Hian who visited the Sri Lanka on 5th C.E. gives a clear idea of treasury belonged to the monks. "Their king once enters the treasury, and going round it for the purpose of inspection, he saw there this *mani* gem. On beholding it, a covetous feeling sprang up in his heart, and he desired to take it away with him. For three days this thought afflicted him, but then he came to his right mind. He directly reported to the assembly of the priests, and bowing down his head, he repented for his former wicked purpose, and addressing them, said, "Would that you make a rule from this time, forth and forever, no account to allow the king to enter your treasury to look (a the jewels,) except he is a member of fraternity and of forty years of age" (S. Beal 1993: 154). He further mentions that the treasury of this congregation of priests contains numerous gems and a *mani* Jewel of inestimable value (S. Beal 1993: 154).

The term *'deruvan dekamtän'* occurs most frequently in inscriptions, but it does not occur in any literary work (R. A. L. H. Gunawardana 1979: 187). The word "*kamtän"* carries the connotation of an "office" or "officials". S. Paranavithāna (*E. Z* 1933. vol. iii: 143) has made the plausible suggestion that "deruvana", may refer to "two treasuries". The two treasury establishments were known in both state and temple administration of South India (R. A. L. H. Gunawardana 1979: 187).

According to the merit book, of king Dutugämunu he had constructed hospitals in eighteen places in Sri Lanka and gave money to the physicians from the treasury (*Thū.v* 1994: 235). The king Dutugämuṇu has appointed scholars for each village in Sri Lanka to propagate the doctrine of dhamma among the civilians, and the king himself has given their wages on the monthly basis. The king had given four nalī of ghee, jaggery made of sugar cane, sticks of sugar cane, bananas and jackfruits from the treasury monthly (*Thū.v* 1994: 235). As mentioned in the *Thūpavamsa* one may get an idea of items, kept in the treasury. According the above mentioned ghee, jaggery made of sugar cane, sticks of sugar cane, bananas and jackfruits were issued by the treasury. The king Dutugämunu appointed a minister, called Sangha to protect his treasury (*Thū.v* 1994: 239).

The king Bhāthikābayatissa has gained the oil which is deposited in the treasury for the ceremony of the Mahāthupa (*Thū.v* 1994: 211). The king Sirisangabo (251-258 C.E.) had a treasurer, called Goluabhā (*MV* 1967. 36: 91).

The king Sena I (833-853 C.E.) had faced with a attack from the Pandya Dēśa. Śri Māra Śri Wallabha invaded Sri Lanka. The *Mahāvaṃsa* mentions that having taken all the valuable properties, the king left the town and turned towards Malaya (*MV* 1950. 50: 20-21). Among this valuable property, he must have taken the money to the Malaya area. Furthermore, the *Mahāvamsa* mentions that Pandu king took away all the valuables in the treasure house of the king and plundered what there was to plunder in vihāra and the town (*MV* 1950. 50: 33-34).

II. Revenue collectors

The Kandegamakanda inscription speaks of a revenue collector called *Maha aya* (*IC* 1970. vol. i. no. 289: 23) The Rajagala inscription has mentioned of the revenue officer of the great king Abhaya (*IC* 1970. vol. i. no. 429: 33). The Malvatta Brāhmī inscription giving the details of the revenue collector of Cittadevī (*IC* 1970. vol. i. no. 471: 36). The Situlpavuva Ekundara Väva inscription, mentioning the revenue officer of king Tissa (*IC* 1970. vol. i. no. 647: 48). The Brāhmī Inscription which is come to us from the Tissamahārama speaks of a revenue officer (*IC* 1970. vol. i. no. 703: 53).

The *Kūtadanta Sūtra Varnana* in the *Dīghanikāyatthakatha (Sumangala vilāsinī)* mentions an interesting story of a king. The king started to give food for the subjects in the five places of the city by spending five hundred thousand each day. Subjects are allowed to take food to their house. In the evening the king gave the cloths and garlands to the subjects. Finally the subjects thought we should give something to the king in return. They all got together and collected money from the villages and put them into carts and hand over it to the king (*Dīgha. Att* 2008: 276). This shows that the king needs the revenue, to protect and to treat the people and from this action the country will become successful.

III. Accountants

The term "*kanaka*" (Pkt. *gaṇaka*) means "accountant". The term "*gaṇaka*" occurs in this sense in the Sinhala-Brāhmī inscriptions (*IC* 1970: xcv). In later Tamil inscriptions, "Kaṇakkaṉ" meant the 'accountant who maintained the accounts of the village or temple (I. Mahādēvan 2003: 123). As mentioned in the *Dīpavamsa,* the king Dēvanampiyatissa has sent his son Tissa, an accountant to Dhammāśhoka (*DV* 1959. 11: 30). The Maha alagamuva inscription in Kalāgam-palāta in the Anurādhapura district mentions of an accountant (*IC* 1970. vol. i. no. 212: 17). The Miyuṅguṇa Vehera inscription in the Mānmunai Pattu of the Ampāra district speaks of a chief accountant (*IC* 1970. vol. i. no. 419: 32).

The names of two accounts have been mentioned in two inscriptions in Maňdagala in the Yāla Game Sanctuary in Māgam Pattu of the Hambantota district. An accountant, called Nuguya (*IC* 1970. vol. i. no. 576: 44) and the accountant called Rohaka (*IC* 1970. vol. i. no. 580: 44) can be identified from it. The Situlpavuva inscription in Māgam Pattu of the Hambantota district gives information of an accountant called Tissa, son of the accountant Tissa (*IC* 1970. vol. i. no. 619: 47). The Sīlavakanda inscription in the Māgam Pattu of the Hambantota district brings out of an accountant called Raki (*I C* 1970. vol. i. no. 673: 51). The Magul Maha Vihāra in the Yāla Game Sanctuary in Māgam Pattu of the Hambantota district also refers to an accountant (*I C* 1970. vol. i. no. 679: 51). The Välaellugoda –Kanda inscription in the Buttala kōrale of the Monarāgala disrict stipulates of a cave belonging to an accountant called Tissa (*IC* 1970. vol. i. no. 729: 55). The Mullegama inscription of Demaḷ Hatpattu in the Puttalam district talks about an accountant (*IC* 1970. vol. i. no. 1070: 83). Alagarmalai Tamil Brahmi inscription no:5 in South India also speaks of "Kanaka" the son of Ataṉ, the accountant who lived in the 1st B.C.E. (I. Mahadevan 2003: 373).

IV. Granary-keepers

The two inscriptions of the Maha alagamuva in Kalāgam-palāta in the Anurādhapura district mentions of a store keeper called Uttara (*IC* 1970. vol. i. no 214: 17; *EZ* 1984. vol. vii. no .07: 54; *IC* 1970. vol. i. no. 226: 18). The other inscriptions belonged to this same place presented information of a granary–keeper called, Cala. (*EZ* 1984. vol. vii. no. 08: 55).

V. Summery

It is impossible for the king to control the economy of the country alone; therefore he needed a supportive staff for it. The administrative officers who helped the king in the monetary transactions, during the early period of Anuradhapura can be revealed from the primary sources.

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Buddhism, Xuanzang and Sri Lanka

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Abstract- There are many foreign accounts on Sri Lankan history. The "Record of the Western Regions" of Xuanzang's having a considerable accounts on Sri Lanka. Although there are many other divergences and discrepancies with *Mahāvamasa* and the other chronicles, we are lucky to gain some controversial historical facts from the above text. This enables us to gain a better understanding of the religious milieu that formed or existed during this period. I have noticed interesting sequel to Divyāvadāna with this. In this research paper I have discussed only very few historical factors in it. The evidence at our disposal is adequate to portray the political, religious as well as the social factors during 7th Century in Sri Lanka. It is also necessary to bear in mind Xuanzang always give more detailed information than the laconic Faxian and is therefore a valuable source which needs, however, careful historical interpretation. There are quite miraculous stories in it. The main objective of this research paper is to identify the authenticity of some historical facts in the report on Sri Lank in Xuanzang's "Record of the Western Regions" (Datang Xiyu ji). He travelled to India in seventh century C.E. Although he wanted to visit Sri Lanka, he could not visit the island owing to a famine and political unrest in Sri Lanka. He visited Kānchipuram, and there he met the chief monks of the Bodhimegheśvara and Abhayadamṣṭra with three hundred other fellow monks. Xuanzang's records of Sri Lanka was based on, what he has heard from the above monks.

Index Terms- monks, records, chronicles, compilation, legend

I. Introduction

In this research the attention is made to compare the records of the Xuanzang with the chronicles of Sri Lanka, the *Divyāvadāna*, the records of *Faxian* and the *Jātaka stories*. Xuanzang reports two stories regarding the origin of Sinhalese people. One of the stories is much more similar to the *Mahāvamsa*, and the other is similar to that of the *Divyāvadāna*. It seems as if the two different traditions have been used in Xuanzang's record. Xuanzang sheds light on the fraternity of the sangha's, Tooth Relic Temple of Sri Lanka and the ceremonies conducted for the veneration of it, monasteries of monks, trade and the economy. The valuable historical facts can be gathered, which belongs to the 14th century as well. This paper proposes to discuss the significance of all these scenarios.

II. Objective

The main objective of this research paper is to identify the authenticity of the historical facts compiled on Sri Lanka, by Xuanzng.

III. Methodology

Samuel Beal's English translation of the Buddhist Records of Western world (1906) and Li Rongxi's Great Tang Dynasty Record of the Western Regions, (1996) were used. Max Deeg's unpublished English translation of Xuanzang's text strengthened my knowledge and it contributed to writing this article. Other evidences were collected from Faxian's travel records and the Pāli Vaṃsa tradition. The inscriptions of Sri Lanka have also been studied. The evidence of the different texts permits us to gain, with some care, insight into history.

IV. Result

The geographical location of Sri Lanka has been recorded by Xuanzang. According to him "the Kingdom of Siṃhala has a circumference of more than seven thousand miles. The great capital has a circumference of more than forty miles" (Rongxi Li,1996, 323). Further he mentions that the land is fertile and the seasons are hot. Although there are differences in the figures, the *Dīpavamsa* which is considered to be the first chronicle of Sri Lanka has and was written in 5th Century gives similar description as Xuanzang (Oldenberg Hermann, 1992, 1:18). As mentioned by Xuanzang, farming is done according to the seasons (Rongxi Li, 1996, 323). The Tōnigala rock inscription to the third year of king Śrīmegahavarnna (303-331 C.E.) shows that farming was done according to the seasons (Wickremasinghe Don Marino De Silva & Codrington, 1933, vol. iii: 178).

Xuanzang (Deeg Max, translation of records of Xuanzang, unpublished) says that this land originally was an island with treasures, (because) there were (so) many rare jewels. The main income of the kings in the Rohana kingdom was the gem trade. This is one of the main reasons why Sri Lanka is known as *"Ratnadīpa"*. The *Mahāvamsa* refers to eight kinds of pearls presented to Aśoka by king Dēvānampiyatissa (circa 250-210 B.C.E.). The eight kinds of pearls are horse-pearl, elephant-pearl, wagon- pearl, myrobalan pearl, bracelet pearl, ring pearl, *kakūdha* fruit pearl and common pearl (Geiger (1950), 11:14. 78). The Pāli *Abhidhānappadīpikā* also reports the same eight types of pearl as quoted in *Mahāvamsa* (Childers, 1976, 1061).

As reported in Xuanzang's Record Lanka was inhabited by ghosts. In most of the literary sources evidence of this is also

given. Why was the aboriginal population of Sri Lanka described as ghosts? Sri Lanka maintained very close cultural, political and trade relations with South India. Tamil traders were very active in Sri Lanka from the 4th century B.C.E. to 11th century C.E. Most probably the south Indian traders who gained the maximum profit by the trade might have spread that Lanka was inhabited by ghosts. Hence they could frighten other merchants interested in going to the island and gained the maximum profit from the trade and could not face any competition for the trading activities (Casson, 1991, 8-11). Osmund Bopearachchi notes that during this period the South Indian traders may have played the intermediary role between the Roman traders and the Sri Lankans (Bopearachchi , 2008, 4).

Xuanzang describes the appearance of the people of the lion-kingdom as common and dark; they have square chins and big foreheads; their temperament is rude and violent, and they can bear drinking poisoned wine. The people are mostly brave and strong ((Rongxi Li (1996), 326). Here it looks as if Xuanzang makes an effort to prove the leonic origin of Sinhalese from these characteristic features.

Xuanzang also states that the kingdom of Sinhala formerly was conducted immoral religious worship. This probably refers to the worshipping of ancestors (Geiger Wilhelm , 1950, 10:85), worshipping of trees (Marshall John, vol. i: 63), worshipping of *yaksa*s (Geiger Wilhelm, 1950, 10:84), worshipping of gods or *deva*s, worshipping of niganthas (Jains) (Geiger Wilhelm, 1950, 10:97) and śaivaism, p*aribbājaka*s and *ājīvaka*s (Geiger Wilhelm, 1950, 10:101-102), *pāsanda*s and *pabbajita*s and many other ascetics, known as *samana*s seem to have been found in fair numbers on the island (Geiger Wilhelm,1950, 10:96). .

According to Xuanzang's description the port situated near to Kāncipura could gave easy access to Sri Lanka (Buddhadatta P. 2014, 311). The *Sīhalavatthuppakāranaya*, the oldest existing literary source written in the 3rd or the 4th century C.E., states that the traders of Sri Lanka sailed from Mahākonda and landed at Kāvēripattana in India, and from there they had further traveled to North India and China. One story reports that nearly sixty monks from the South of Sri Lanka (Rohanadesa) had entered Anurādhapura, embarked from the journey from Mahākonda and disembarked at Kāvērapattana in order to worship the Bō-tree in Uttarāpatha, (Buddhadatta P., 1958, 35). The location of the port Mahākonda is hitherto unknown. It might be the port of Mahātittha (Mānthai) situated in the Mannar district to the North Western side of Sri Lanka. As mentioned, most of the monks might have used this route to visit the Bō-tree (Buddhadatta P., 1958, 37-39). Perhaps the *thera* Bodhimegheśvara might have used this sea route to visit Kānchipuram. When meeting the eminent monks Bodhimegheśvara and Abhayadamstra who had come from Sri Lanka Xuangzang asked them a few questions on the Yogācāraśāstra could they not answer as properly as Śīlabadra with whom Xuanzang had previously studied at Nālandā.

The Chinese pilgrim Xuangzang was in India for about sixteen years form 630-645 A.C (Wang B.& Sen. Tansen, 2011, 95). Although Xuanzang wanted to visit Sri Lanka, he could not visit the island because of a famine and political unrest. According to Xuanzang's biography by Huili, when he visited Kānchipura, he met the eminent monks of the Bodhimegheśvara and Abhayadamsṭra with three hundred other fellow monks who had come to South India because of the political unrest in Sri Lanka. Xuanzang's record of Sri Lanka was based on what he has heard from these monks. It is a fortunate fact that the monk Bodhimegheśvara can be identified with the monk Bodhi in Vamsa tradition.

As recorded in the second part of the Mahāvamsa the monk Bodhi dwelled at the monastery of Abhayagiri. Bodhi, who had seen many undisciplined *bhikkhu*s in the Abhayuttaravihāra, requested for a disciplinary meeting (sanghakamma) (Geiger Wilhelm, 1950, 44:75-80) summoned by the king Silāmēghhavanna (623-632 C.E.), accepted the *thera*'s request and allowed him to perform the sanghakamma. Then all the undisciplined *bhikkhu*s who had been expelled from the order, took counsel together, assassinated Bodhi and annulled the act. When the king heard this, he was enraged, seized them all, had their hands cut off and made them guardians of the bathing tanks. Another hundred *bhikkhu*s he expelled to Jambudīpa. According the Mahāvamsa in remembrance of Bodhi's efforts the king cleansed the order. When the king Silāmēghhavanna invited the *bhikkhu*s of the Mahāvihāra with the others to celebrate together the *uposatha* festival, he was refused. The king became angry he abused and rebuked them with harsh words. Then, without any pardon, he exiled the *bhikkhu*s to Dhakkhinadesa. Thereupon the king was attacked by a disease and suddenly died.

As stated in the *Mahāvamsa* Bodhi was been killed secretly by a group of monks who stood against his order. Perhaps, however, Bodhi was have not really killed but had fled the country. He might be the monk who was met by the Xuanzang under the name Bodhimegeśvara. If, however, Bodhi was really killed a conflict between rivalling groups of monks, there must have been a monk called Bodhimegheśvara among the hundred *bhikkhu*s who were expelled by the king to Jambudīpa. By bringing Xuanzang's report into a broader context some historical facts can be compared with the Sri Lankan vamsa tradtion. The hundred *bhikkhu*s who were exiled to Jambudīpa by king Silāmeghavaṇṇa (623-632 C.E.) can be considered to be historical with the help of Xuanzang's report.

The unexpected death of the king Silāmēgavaṇṇa caused a chaotic situation in Sri Lanka, and this situation might have triggered other monks to flee to South India too, namely the three hundred monks who were met by Xuanzang at Kāñcipura.

According to the *vamsa* tradition Silāmeghavanna had banished only one hundred *bhikkhu*s. The question that would naturally arise is: who were the three hundred monks mentioned by Xuanzang? To which monastery in Sri Lanka did they belong? What made them to come to Kāñcipura? Xuanzang's biography reminds us that there was a famine and political unrest during this particular period in Sri Lanka. Owing to the above incidence the monks from the Abayagirivihāra as well as from the Mahāvihāra fled to Kāñcipura. It can be presumed from travel records of Xuanzang and Faxian there were two historiographical tradition linked to the two most influential monasteries called Abhayagirivihāra and Mahāvihāra in Sri Lanka. Xuanzang indirectly drew on these two traditions whilst compilation of his historical records.

Xuanzang states that to the side of the royal palace there is a monastic structure, more than one hundred feet high, containing the Buddha's tooth relic. The building is glittering of pearls and is adorned with precious jewels. On the top of the monastic structure a pillar is erected as a sign, on top of which one has installed a big

padmaraga. The padmaraga is considered as a valuable gem. The king bathes the Buddha's tooth three times a day, washes it with scented water or spreads it with incense powder. Senaka Bandaranayke suggests that the building known today as Daḷadāgē Tooth Relic Temple could be the royal palace.

As noted by the Xuanzang, to the side of the monastic structure containing the Buddha's tooth there is a small monastic structure also glittering of and embellished with many jewels. Inside is a golden statue of the Buddha, casted in the full body size. A former king of this kingdom had its *usnīsa* embellished with a very valuable jewel. This building could be easily identified. This could be considered to be an image house built in Sri Lanka as the *gediga* architectural tradition in the period between 7th -9th century. *Gedige* is known as *ginjakavasta* in Pāli and accordingly the whole image house is built using only bricks. It is evident from the arched roof of the structure that it consisted of brick walls. Architectural analysis shows that the structure is designed mainly according the Pallava architectural style. The patronage of its construction is unknown. No evidence of the image of the Buddha is available at present. As Xuanzang records, a thievish servant had stolen the gem that embellished the *usnīsa*. This story is not reflected in any *vaṃsa* tradition.

As described by Xuanzan, to the side of the royal palace there is a huge kitchen through which eighteen thousand monks are fed every day. According to the *vamsa*s king Devampiyatissa (250-210 B.C.E) constructed the Mahāpāli alms hall for the monks (Geiger Wilhelm, 1950, 20:17-27). When the monks come at the time of the meal, they carry their alms bowls and receive the food, and after they have eaten, each of them returns to his cell. The travel reports in the accounts of Chinese Buddhist pilgrims give realistic descriptions of the sites (Deeg Max, 2003, 8). The record also states that since some decades there is political turmoil in the kingdom, and since then a ruler had been selected to continue the alms giving and the tradition was abandoned. As explained above, this must have been the time of the king Sīlameghavanna in Sri Lanka (623-632 C.E).

V. Discussion and Conclusion

Some of the details given by Xuanzang may be carefully verified by comparing the record with other sources, textual as well as archaeological. But it should be kept in mind that, due to the circumstances of his report, Xuanzang is not to be taken as a trustworthy witness in all cases. What Xuanzang saw or reported on does need not necessarily have been conform with the report of, let us say, Faxian who travelled the wider region two hundred years earlier (Deeg Max, 2003, 16). Xuanzang's description contains information about the historical, social, economic and cultural aspects of ancient Sri Lanka, but also helps to restore some details of the Sri Lankan history. Xuanzang draws on two different monastic historiographical traditions when compiling his record of Sri Lanka. Xuanzang always give more detailed information than the laconic Faxian and is therefore a valuable source which needs, however, careful historical interpretation.

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A Model To Reduce Traffic Congestion In Colombo City

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Abstract: -Traffic congestion is an adverse problem in the world and Colombo city incurs a huge negative impact from traffic congestion. The number of vehicles drive into the Colombo city increasing day by day and the roads are congested most hours of the day. Among several techniques, which can use to reduce traffic congestion, this research aims to give a solution by reducing the number of vehicles enter to the city. Therefore, motive of this research is to introduce a model to reduce traffic congestion in Colombo city by establishing parking locations in critically congested areas. In order to fulfil this objective, concept of cut in graph theory is applied. Furthermore, to analyse the traffic situation and to evaluate traffic measurements, multimodal traffic simulation software PTV Vissim 9 is used.
Colombo city entry points and area inside the Colombo city periphery are considered when constructing the model within some defined limitations.
This study is mainly based on identifying critically congested roads by traffic measurements and introducing cuts as parking locations to control the vehicle flow in to the city.
As the outcome of this research, three locations are identified to establish parking areas. This concept can be initiated by motivating people to use parking locations to park their private vehicles and by providing public transportation more conveniently and comfortably.

Key words: Graph theory, cut-set, traffic model, queue delay

1. INTRODUCTION

1.1 Background

Over the past few decades, transport demand has highly increased, notably in the Colombo Metropolitan Area. With the growth of traffic demand, traffic congestion has increased resulting many negative impacts. It causes for the economic loss, by travel time cost and by increasing vehicle operating costs such as fuel consumption. Even though many actions have been taken to reduce traffic congestion in the Colombo city, most of them have not succeeded. Therefore, the necessity of a better solution is provisional and significant.

In this project, a traffic model is introduced to control the congested traffic situations by calculating traffic measurements, using a traffic simulation software. PTV Vissim 9 is the traffic simulation software used to obtain traffic parameters and it is a leading microscopic simulation program for modelling multimodal transport operations. Vissim is a microscopic, time step oriented, and behaviour-based simulation tool for modelling urban and rural traffic.
The concept of Cut-Set in graph theory is used to identify the locations to establish parking areas by reducing number of vehicles enter to the city from entry points.

2. METHODOLOGY

2.1 Introduction

Graph theory is used to model the road network into a graph considering class A and class B roads according to Level of Service. Then the network is constructed in the PTV Vissim 9 software according to the developed graph and considering the number of lanes in road segments and distance between two nodes in the graph. The modelled graph and the considered entry points are shown in the figure 2.1.

By locating data collection points, traffic simulation results are obtained. By analysing simulation results, congested road segments can be identified and cuts are introduced as parking locations to re-

duce the number of vehicles enter to the city. Then again simulation results are analysed to check the effect of introducing cuts by calculating the reduced percentage of queue delay.

2.2 Developing the network

In order to develop the traffic network in PTV Vissim, the links (i.e. the roads) were traced. Each link is traced considering the number of lanes, distance between the junctions and their directions. Width per lane is taken as 3.50m considering standard road conditions.

In this model, cycle time of the signal controlling systems are defined as follows.
Junctions formed by intersection of three roads: 90 seconds
Junctions formed by intersection of four roads: 120 seconds
Junctions formed by intersection of five roads: 150 seconds
The movement of vehicles are defined as follows. When one route allows to move through the intersection, other routes has red signs. Figure 2.2 shows the first 30 seconds of the cycle time in a

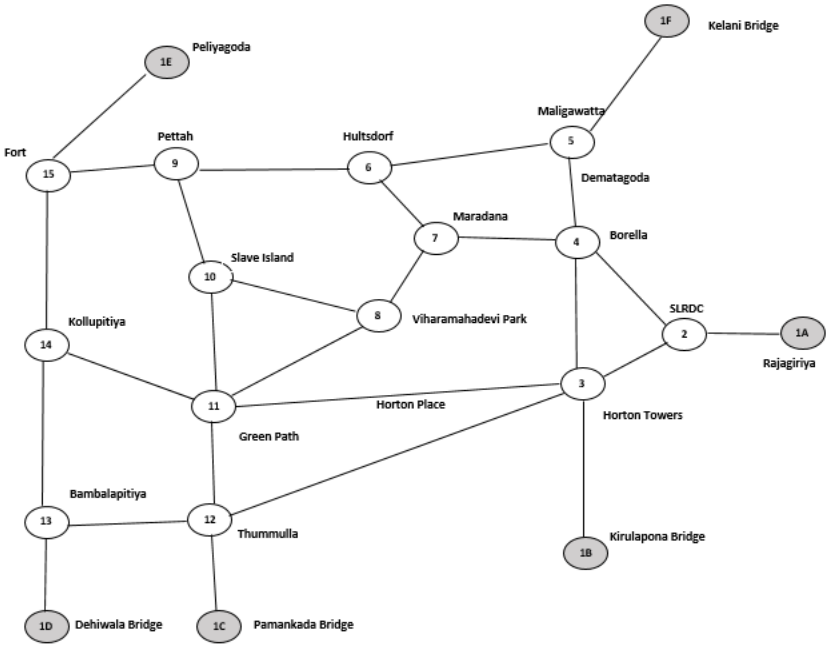

Figure2.1 Developed graph of the road network

The network is constructed for the scale 1:10. In other words, 1m link in the network represents 10m of the road. After designing the network, vehicle routes are constructed in a junction. Then the vehicle types and vehicle classes are added. For the simulation vehicle compositions are defined at each entry point.
Signal heads are set to control the flow, to avoid vehicle crashes, and to simulate the real situation.

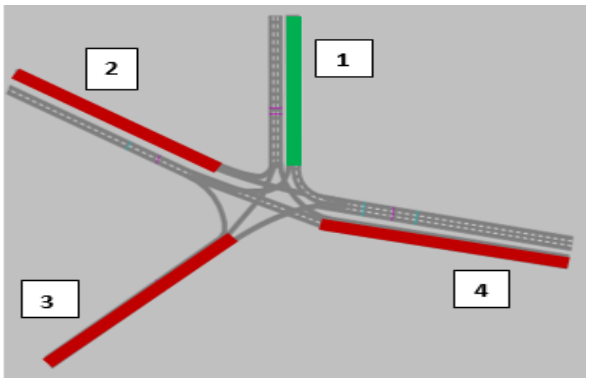

Figure 2.2: First 30 seconds under signal controllers at a junction

junction with 4 roads. In next 30 seconds, road 2 allows green light and road 1, 3 and 4 get red light and so on.
Apportionment of green time is set by allocating 30 seconds to each route. In the modelled network, signal heads are located at 43 points. In every road segment, signal heads are located for each lane towards the junction.

To evaluate traffic parameters, data collecting method is selected and 120 data collection points are
located at signal heads. Queue delay is considered as the traffic evaluation parameter and it gives the average time vehicles has spent is a congested state in seconds. After the simulation, simulation results of the traffic parameter are collected.
Critically congested road segments in the network were identified by analysing simulation results of the traffic parameter, to introduce cuts. The locations where the cuts were introduced are the places where the parking locations should be established.

To analyse the results and to introduce cuts, following criteria is defined.
1. Queue delay of the lane with maximum queue delay is considered as the queue delay of the link.
2. Links which have queue delay greater than or equal 300 seconds are considered as the roads with critical traffic congestion by observing traffic simulation results for several input values.
3. Vehicle input volumes are reformed by the consideration of links with critical traffic congestion.
4. Vehicle input volumes and compositions are reformed by introducing cuts to the network system.
5. Parking locations are introduced to limit MCL (Motor Cycle), CAR and TWL (Three Wheeler).
6. BUS are introduced to fill the gap of passengers which are reduced when reducing the number of MCL, CAR and TWL.
7. When introducing a cut in a link (for the first time), number of MCL, CAR, TWL were reduced by 50%.
8. When introducing another cut in the same link (for the second time), 1/3 of the remaining number of vehicles is reduced from MCL, CAR and TWL.
9. Composition of HGV (Heavy Good Vehicle) and LGV (Light Good Vehicle) remained unchanged after introducing cut, since the change in relative flow is negligible.

3. RESULTS AND DISCUSSION

3.1 Simulation and introducing cuts

First simulation is done by setting the volume of vehicle inputs in each entry point according to the data collected from Road Development Authority. According to the data, vehicle entry volumes are counted for 24 hours. In this study, those values are modified regarding peak hour vehicle entry volume, by considering 10% of the total number of vehicles counted for 24 hours. In the graphed model, entry points at SLRDC(Sri Lanka Land Reclamation and Development Corporation) and Near Ayurveda hospital (Borella - Rajagiriya Road) are considered as one entry point. Therefore, average value of number of vehicles have used as the sample input values.

Table 3.1: Initial vehicle input volumes

Vehicle Input Points	Volume
1A	7000
1B	5000
1C	5500
1D	5500
1E	6000
1F	9000

After the first simulation, following output is obtained. Since a link consists with 2 or more lanes and output results of the parameter is received for each lane of the link, queue delay of the lane with maximum queue delay is considered as the queue delay of that particular link.

Table 3.2 Maximum Queue Delay after first simulation

Data Collection Measurement	Queue Delay	Maximum Queue Delay of the link
9-6 (Lane 1)	216.7	
9-6 (Lane 2)	254.6	
9-6 (Lane 3)	300.0	300.0

After the first simulation, congested road segment can be identified between Pettah - Hultsdorf with maximum queue delay of 300.0 seconds.
In order to reduce number of vehicles flows to the link 9-6, a cut was introduced at 1E-15 link by changing the composition as in the following table.

Table 3.3 Changed compositions in the link 1E-15

Vehicle Type	Current Percentage (%)	No. of vehicles Before the cut	No. of vehicles after the cut	New Percentage (%)
MCL	25.5	1530	765	20.7
TWL	30.5	1830	915	24.7
CAR	21.2	1272	636	17.18
BUS	2.15	145	274	7.4

After introducing the cut in the link 1E-15, volume of that link is reduced by reducing the number of MCL, TWL and CAR by 50% and adding the corresponding percentage to loss of passengers to number of BUS and simulation is done again. New percentages are introduced as follows. Average number of passengers in MCL, TWL, CAR and BUS are considered as 2, 3, 3, and 75 respectively. Total number of vehicles after introducing the cut is calculated by reducing the sum of reduced number of vehicles from the total number of vehicles before introducing the cut. The vehicle input volume in link 1E-15 for the second simulation is rounded off to 3700 after reducing MCL, TWL, CAR and adding BUS.
Simulation results after the second simulation is in the table 3.4 below.

Table 3.4 Maximum Queue Delay after second simulation

Data Collection Measurement	Queue Delay	Maximum Queue Delay of the link
3-4 (Lane 1)	208.9	
3-4 (Lane 2)	221.9	
3-4 (Lane 3)	303.5	303.5

It can be noticed that the queue delay of the link 9-6 is reduced by 15% after introducing the cut in the link 1E-15. After the second simulation, link 3-4 has 303.5 seconds as the queue delay. In order to control the vehicle flow in that link, a cut is introduced in the link 1B-3 since it affects the link 1B-3 most.

The vehicle input volume in link 1B-3 for the third simulation is rounded off to 2900 after reducing MCL, TWL, CAR and adding BUS. Number of passengers to fill the gap of reducing vehicles were calculated using the same criteria mentioned above when introducing the first cut an added BUS accordingly. Vehicle compositions before and after introducing the cut in the link 1B-3 are listed in the table 3.5 below.

Table 3.5 Changed compositions in the link 1B-3

Vehicle Type	Current Percentage (%)	No. of vehicles before the cut	No. of vehicles after the cut	New Percentage (%)
MCL	19.7	959	480	16.55
TWL	25.28	1264	632	21.79
CAR	40.96	2048	1024	35.31
BUS	2.15	125	205	7.06

After the third simulation, queue delay of the link 3-4 is reduced by 11.4% and link 6-5 and link 7-6 has 325.6 seconds and 319.0 seconds of queue delay respectively. In order to control the number of vehicles flow to the links 3-4 and 7-6, 2 cuts are introduced simultaneously. Since link 1E-15 affects the link 7-6 another cut is introduced in the link 1E-15. Current vehicle volume of link 1A-2, 1B-3 and 1C-12 are 7000, 2900, 5500 respectively. The second cut is introduced in the link 1A-2 and 1A-2 link is selected out of 1B-3 and 1C-12 by considering the maximum vehicle flow.

Table 3.6 Maximum Queue Delay after third simulation in 6-5 link

Data Collection Measurement	Queue Delay	Maximum Queue Delay of the link
6-5 (Lane 1)	325.6	
6-5 (Lane 2)	255.3	
6-5 (Lane 3)	288.2	325.6

Vehicle flow and the compositions of the entry points in the links 1A-2 and 1E-15 are reformed according to the criteria mentioned above. Table 3.8 and table 3.9 display the changes of the links which should be made when introducing the new cuts.

Table 3.7 Maximum Queue Delay after third simulation in 7-6 link

Data Collection Measurement	Queue Delay	Maximum Queue Delay of the link
7-6 (Lane 1)	232.2	
7-6 (Lane 2)	233.1	
7-6 (Lane 3)	306.9	
7-6 (Lane 4)	318.9	318.9

Total number of vehicles enter through 1A-2 and 1E-15 was changed from 7000 to 4100 and 3700 to 2200 respectively.

Table 3.8 Changed compositions in the link 1E-15

Vehicle Type	Current Percentage (%)	No. of vehicles Before the cut	No. of vehicles after the cut	New Percentage (%)
MCL	20.7	765	510	23
TWL	24.7	915	610	27
CAR	17.18	636	424	19
BUS	7.4	274	401	13.6

Table 3.9 Changed compositions in the link 1A-2

Vehicle Type	Current Percentage (%)	No. of vehicles Before the cut	No. of vehicles after the cut	New Percentage (%)
MCL	22.14	1550	775	18.90
TWL	22.14	1550	775	18.90
CAR	37.73	2650	1325	32.31
BUS	2.15	297	433	10.5

Finally, after introducing the cuts in the links 1A-2 and 1E-15, queue delay of every link resulted as below 300 seconds. Since every link is removed from congested state, this situation can be identified as an optimum state.

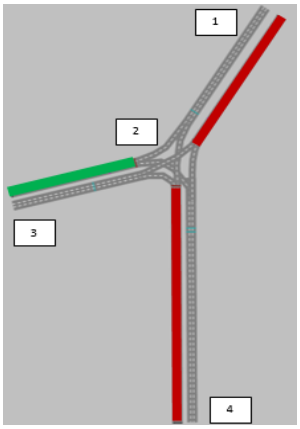

Figure 4.1: Signal-Controlling System 1

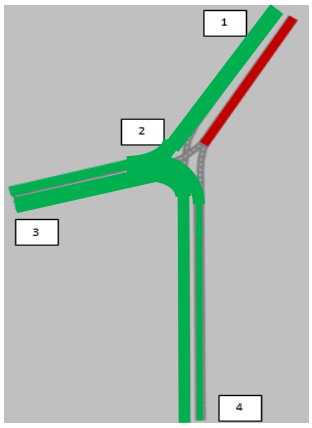

Figure 4.2: Signal-Controlling System 2

3.2 Analysis on traffic signal controlling system

When compare with real situations 300 seconds is relatively high-congested state. These results are obtained since the cycle time of a junction is designed in a way, which restricts two or more movements in the same time.

To analyse this situation, above system is used. A junction is designed for the same cycle time and set the movements at the same time without any crashes of vehicles. (Figure 4.1: Traffic Signal-System 1).
The same junction was used with the equal cycle time but restricting the movements at the same time (Figure 4.2: Traffic Signal-System 2). After simulating the two networks for a same period of time, following results were obtained.

Table 3.10 Traffic Simulation results on comparing Traffic Controlling system

Data Collection Measurement	Delay time for network 1 (s)	Delay time for network 2 (s)	Difference of two results as a percentage (%)
1-2 Link	214.4	158.2	26%
2-3 Link	162.5	143.5	12%
2-4 Link	112.1	48.2	57%

By observing the results obtained, it can be noticed that the optimum traffic controlling system resulting reduced delay time than the system with restricted movements. Therefore, it can be concluded that green time allocation of the traffic controlling system affects the queue delay of the network.

4. CONCLUSION

In this study, the number of vehicles enter to the road network has controlled by introducing parking locations to the system. Traffic parameter, queue delay is used to identify congested road segments. By analysing the simulation results of the network before and after introducing the cuts it can be concluded that the congested situations of the roads can reduce by introducing parking locations.
By the analysis on traffic controlling systems, it can be concluded that the green time allocation of the signal controlling system affects the queue delay in roads.
According to the constructed model and the defined criteria in this study, three locations can be identified to establish parking areas. Three parking areas can be suggested in between SLRDC and Rajagiriya in Kollupitiya-Sri Jayewardenepura route, between Horton Towers and Kirulapona Bridge in Baseline Road and between Peliyagoda and Fort in Puttalam-Peliyagoda Road.

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Establishment of Modified Chitosan Membrane For Wound Dressing Applications

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Abstract: In this research work, wound dressing materials were prepared as composite membranes from chitosan, sodium alginate and calcium chloride by autoclaving method. The important parameters for wound dressing materials are tensile strength, elongation at break, tear strength, antibacterial activities and wound healing activity. Moreover biodegradability of composite membrane is one of the important parameters for reduction environmental pollution. This research work concerns with the preparation, characterization and application of biodegradable modified chitosan composite membranes (MCM) for wound dressing materials. Physicomechanical properties of MCM were also studied. According to these properties, optimum ratio was chosen. The characterization was also carried out by FT IR, SEM, XRD and TG-DTA analyses. Swelling nature of that membrane was carried out in various temperatures and pH. The biodegradability of prepared MCM was studied by soil burial method. In *vitro* antibacterial activity of prepared MCM-1 was investigated using agar disc diffusion method. The prepared MCM-1 was tested for the antibacterial activity against (a) *Staphylococcus aureus* (b) *Pseudomonas aeruginosa*. In *vivo* the healing activity of the prepared membrane was utilized by using wistar rats. In the view of results were achieved the prepared modified chitosan composite membrane have the potentially to be as a useful wound dressing material in some medical fields.

***Keywords**:* Biodegradable modified chitosan membrane (MCM), antibacterial activity, soil burial, wound dressing.

I. Introduction

This research work is mainly on preparation and characterization of modified chitosan membrane for wound dressing applications. Composites are materials made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristics different from the individual components. This individual components remain separate and distinct within the finished structure. In the present work, chitosan was chosen because of its biodegradability and unique properties. Sodium alginate was chosen because of its novel hemostatic and antibacterial properties. Calcium has numerous physical and chemical characteristics which enable to be used in a wide range of applications. According to the objectives of this research, chitosan calcium alginate membranes prepared by using chitosan, sodium alginate and calcium chloride. These membranes were insafe hands after suitable characterization, determination and necessary analyses. The prepared membranes were used in medical field for multi-purposes.

II. Experimental

In preparation of modified chitosan membrane, the following materials were used: chitosan, sodium alginate, calcium chloride, acetic acid and glycerine. The procedure for membrane was shown in the following flow chart and the prepared

hydrogel was shown in Figure 1. The commercial chitosan were identified by moisture and ash contents. The prepared modified chitosan membranes (MCM) were characterized by analytical instruments and physicomechanical properties.

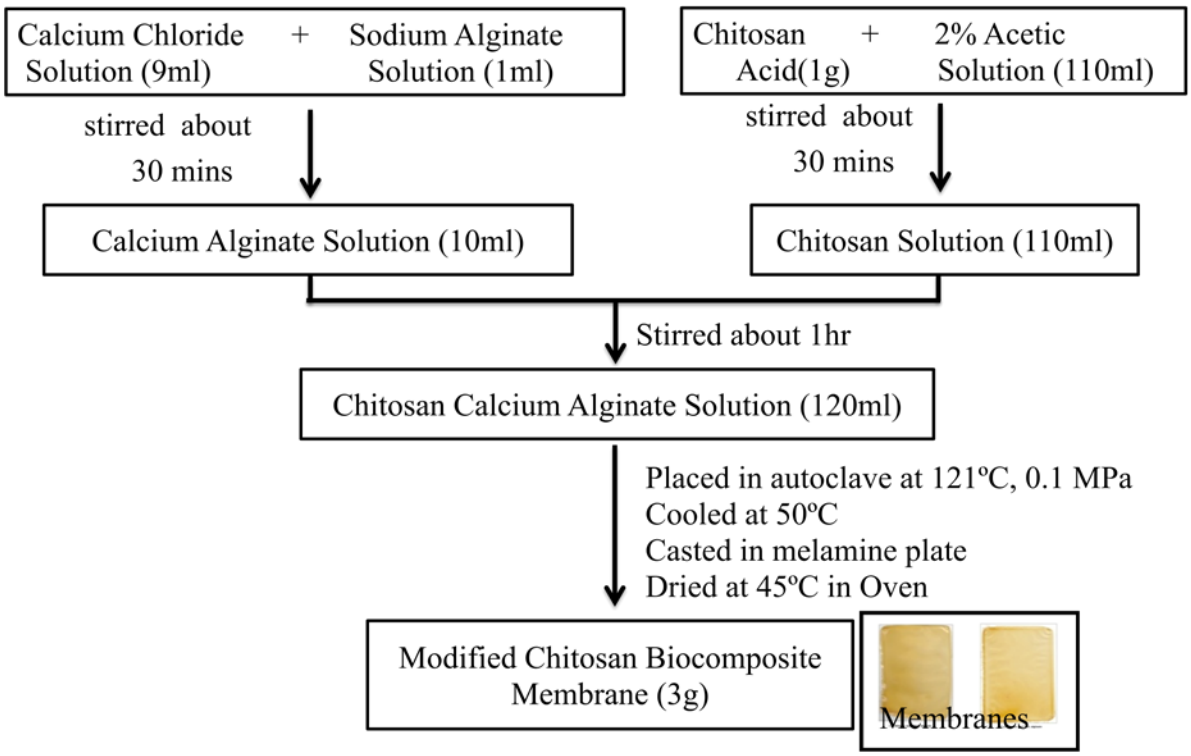


Figure 1. The flow chart of preparation of modified chitosan membrane

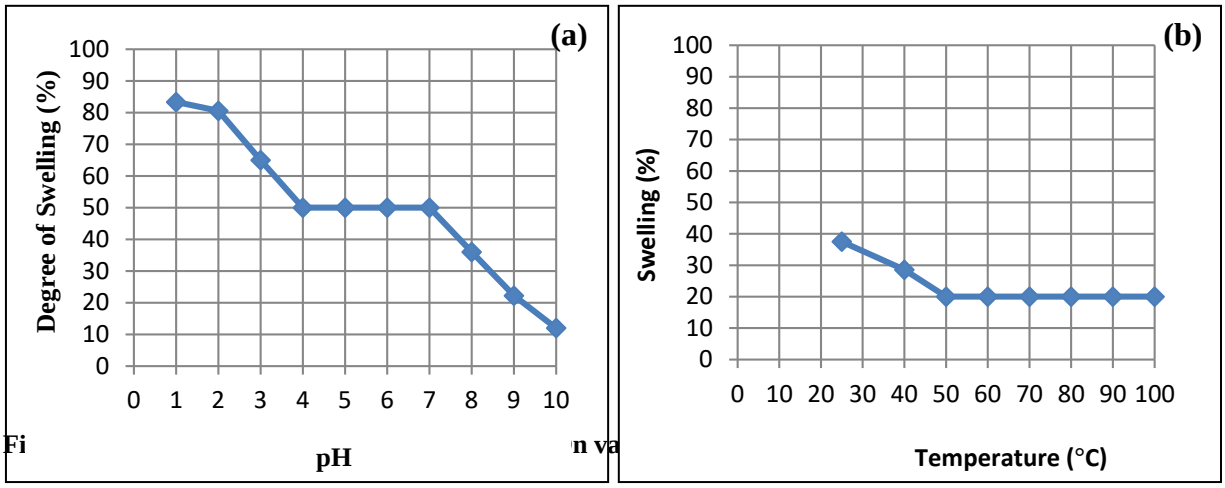
III. Results and Discussion

The degree of swelling and modified chitosan membrane was shown in Figure 2. The physicomechanical properties of prepared modified chitosan membranes (MCM) were determined for the purpose of optimization of the desired products in Table 1. From the results of these properties, modified chitosan membranes (MCM-1) sample was chosen as optimum condition from the other samples (i.e., MCM 2 to 9) for the desired products.

Table 1. Physicomechanical Measurement of Modified Chitosan Membranes

No	Test	ZNN-1	ZNN-2	ZNN-3	ZNN-4	ZNN-5	ZNN-6	ZNN-7	ZNN-8	ZNN-9
1	Thickness (mm)	0.10	0.14	0.15	0.11	0.15	0.09	0.20	0.11	0.15
2	Tensile Strength (MPa)	5.7	1.7	3.7	1.3	3.4	3.7	1.8	4.8	0.12
3	Elongation at Break (%)	15	2	16	1	10	8	2	14	1
4	Tear Strength (kN/m)	16.7	7.8	12.5	4.6	6.7	13.3	3.9	10.0	4.6

* The name of the sample (1, 2, 3,….) means the amount of sodium alginate (ml).



Fi n va

(b) On different temperatures

The prepared membrane (MCM-1) was characterized by FT IR, SEM, XRD and TG-DTA analyses were shown in Figures (3 - 7). From the results of FT IR analysis the functional groups of chitosan and MCM could be confirmed in Table 2. According to SEM micrographs similar pattern of pores are distributed on the surface of (MCM). The MCM-1 shows the sponge like nature and cluster form. This indicates that this membrane has good sorption properties. With respect to the XRD analysis of the MCM-1, it can be assumed that the semi-crystallize nature which support to normal sorption character for wound dressing.

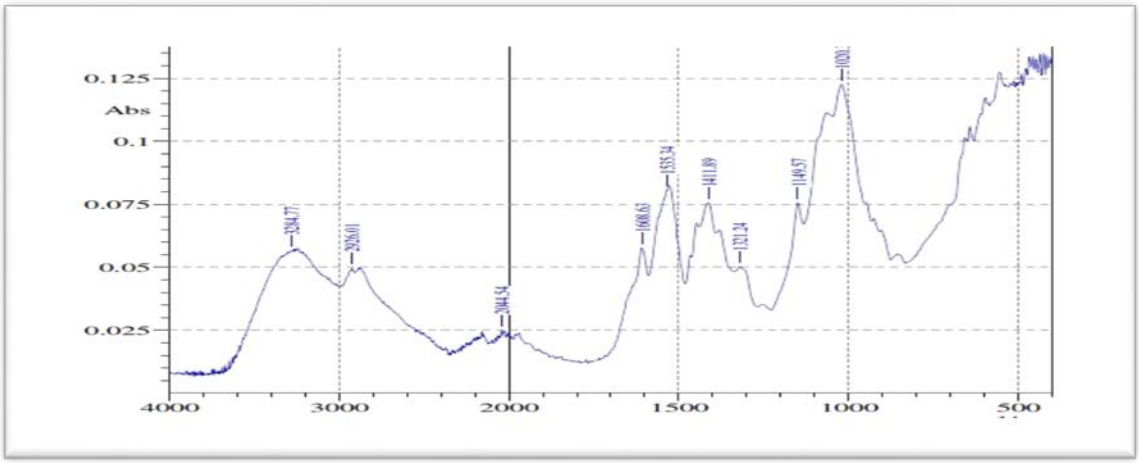


Figure 3. FT IR spectrum of modified chitosan membrane

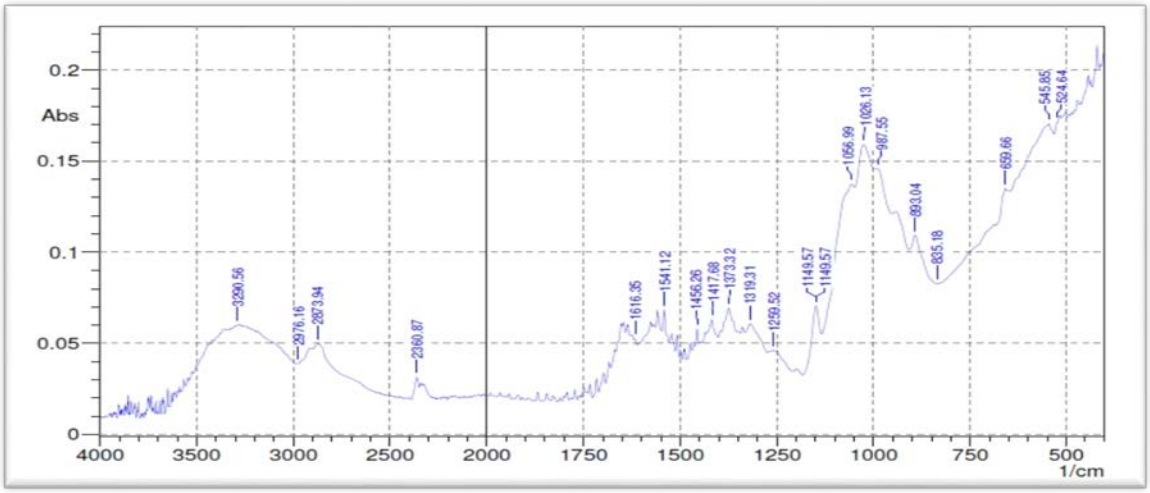


Figure 4. FT IR spectrum of chitosan

Table 2. FT-IR Spectral Assignment for Chitosan and Modified Chitosan Membranes

Wavenumber, cm^{-1}			Characteristic Vibration
Observed		From References	
Chitosan	Modified Chitosan Membrane		
3290	3248	3650-3200	ν_{OH} stretching
2873	2926	3300-2700	ν_{CH} Saturated /unsaturated
1616	1608	1680-1580	$\nu_{C=C}$ Stretching
1417	1411	1450-1365	δ_{CH} Bending
1259 - 835	1149-1020	1300-800	ν_{C-O} stretching alcohol

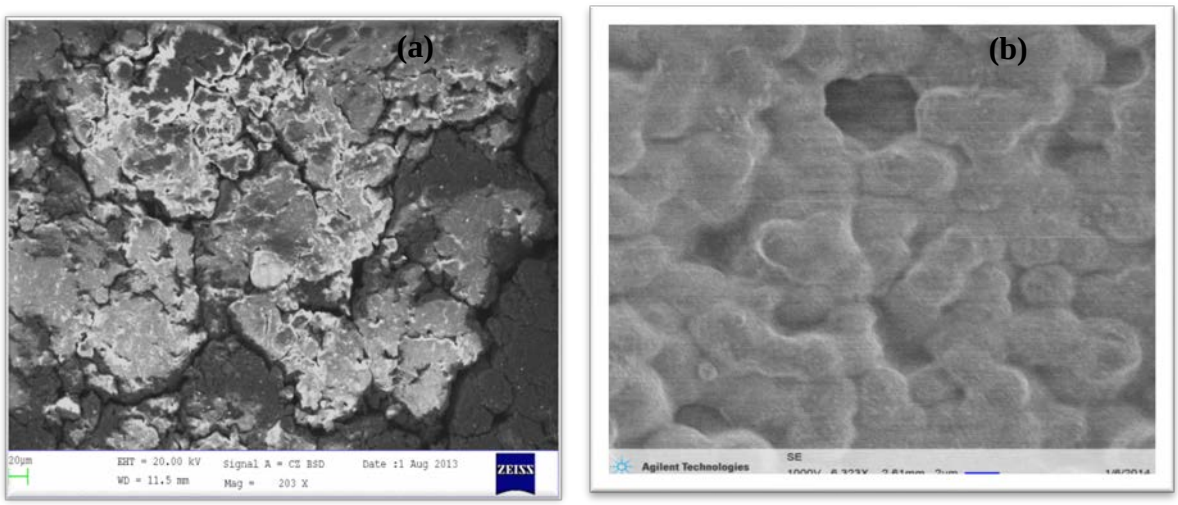


Figure 5. SEM image of (a) Chitosan (b) Modified chitosan membrane

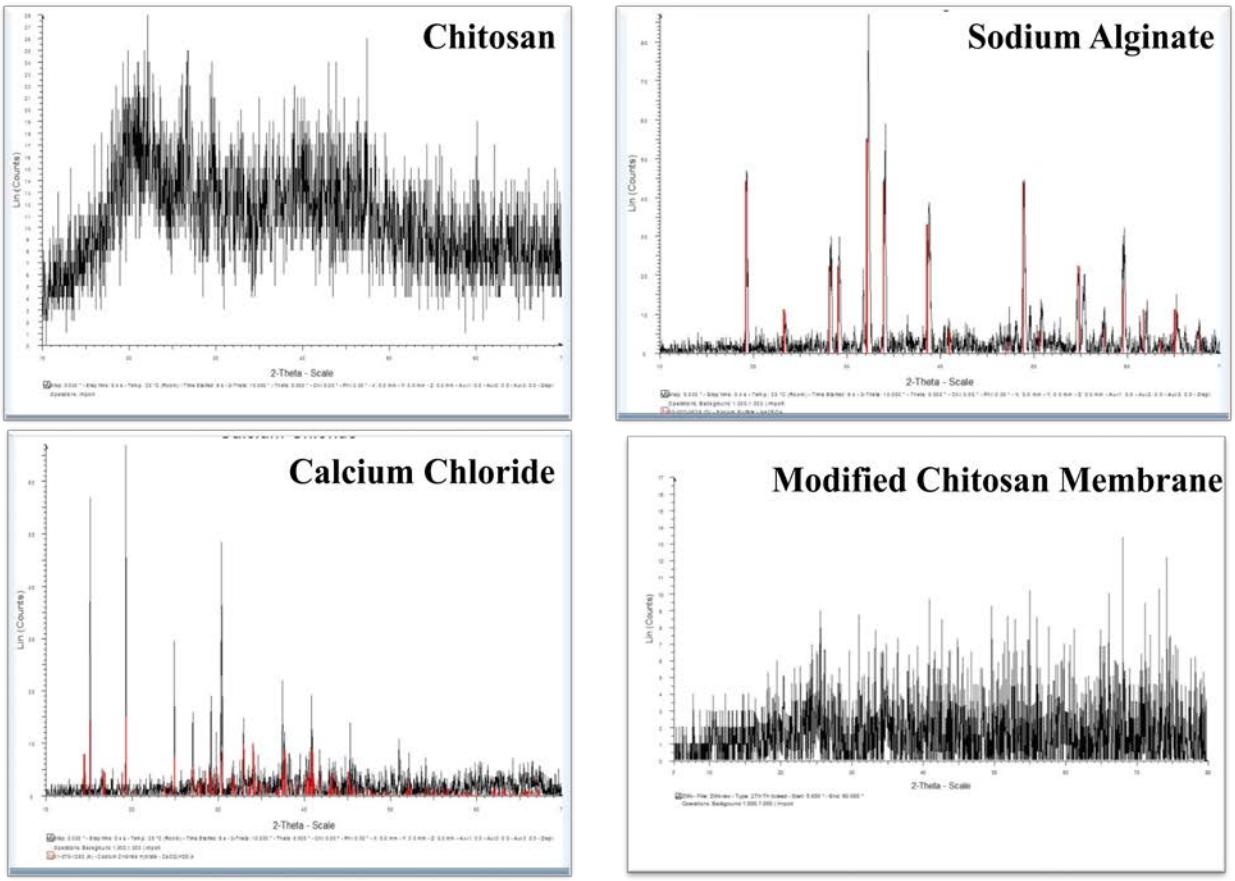


Figure 6. XRD diffractograms of chitosan, sodium alginate, calcium chloride and MCM-1

From the results of TG-DTA analysis, thermal stability of MCM-1 was found to be stored at room temperature in Table 3.

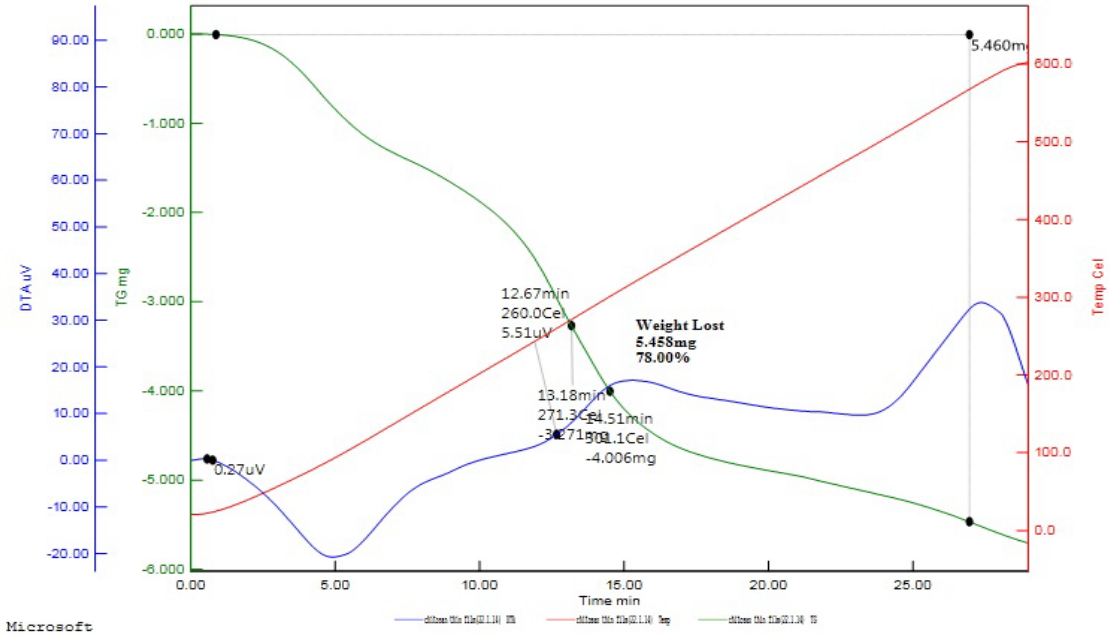


Figure 7. TG-DTA analysis of modified chitosan membrane

Table 3. Thermal Degradation Analysis Data of MCM

Temperature Range (^{0}C)	Weight Loss (%)	Peak's Temperature (^{0}C)	Nature of Peak	Remark
25-130	17.85	-	Endothermic	Removal of moisture and loss of volatile materials from the membrane.
130-440	51.25	-	Exothermic	Loss of hydroxyl group and depolymerization.
440-585	8.90	-	Exothermic	Complete combustion and residual weight is trace elements of Na and Ca.

From the purpose of antibacterial activities test of MCM-1, the *vitro* study was carried out by agar disc diffusion method (Figures 8 - 10). *In vivo* study, the MCM-1 was shown in Figures 11 and 12 on *S.aureus* and Figures 13 and 14 on *P. aeruginosa.*

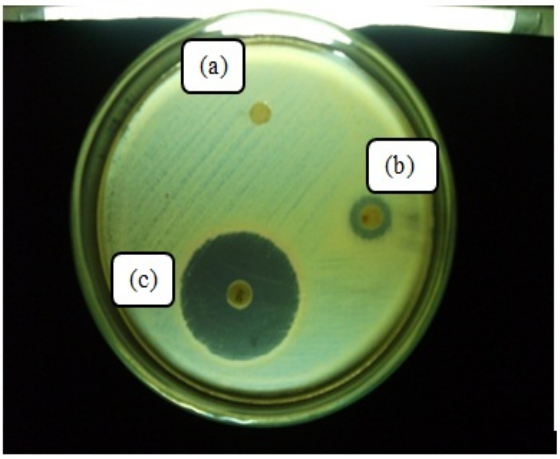


Figure 8. Antibacterial activity of MCM on *Staphylococcus aureus*

(a) Acetic Acid (control)

(b) MCM

(c) Amoxycillin (Standard)

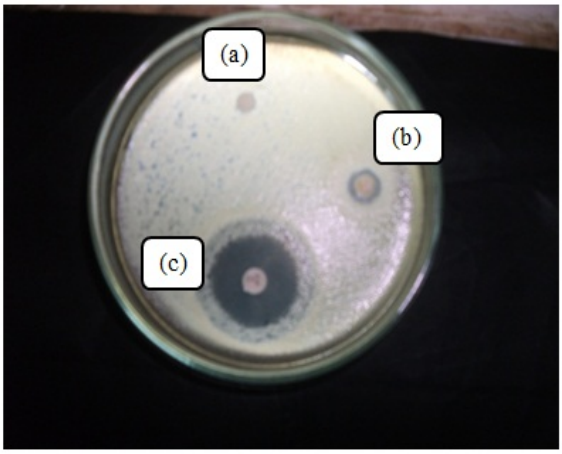


Figure 9. Antibacterial activity of MCM on *Pseudomonas* .

(a) Acetic Acid (control)

(b) MCM

(c) Ciprofloxacin(Standard)

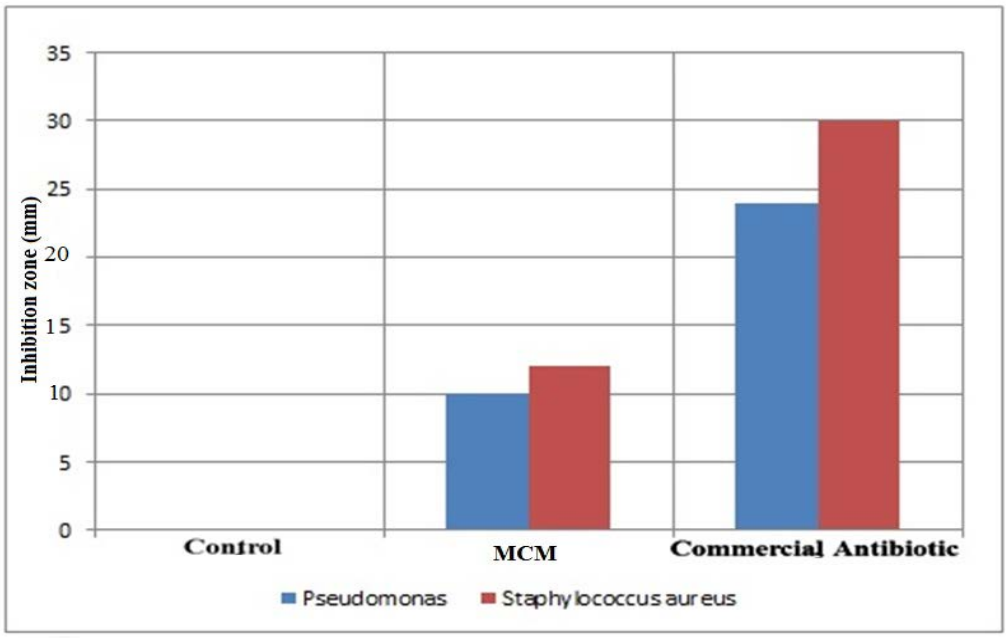


Figure 10. Antibacterial activity of control, MCM and antibiotic

Figure 11. Effect of MCM dressing on open wound (*S. aureus*)

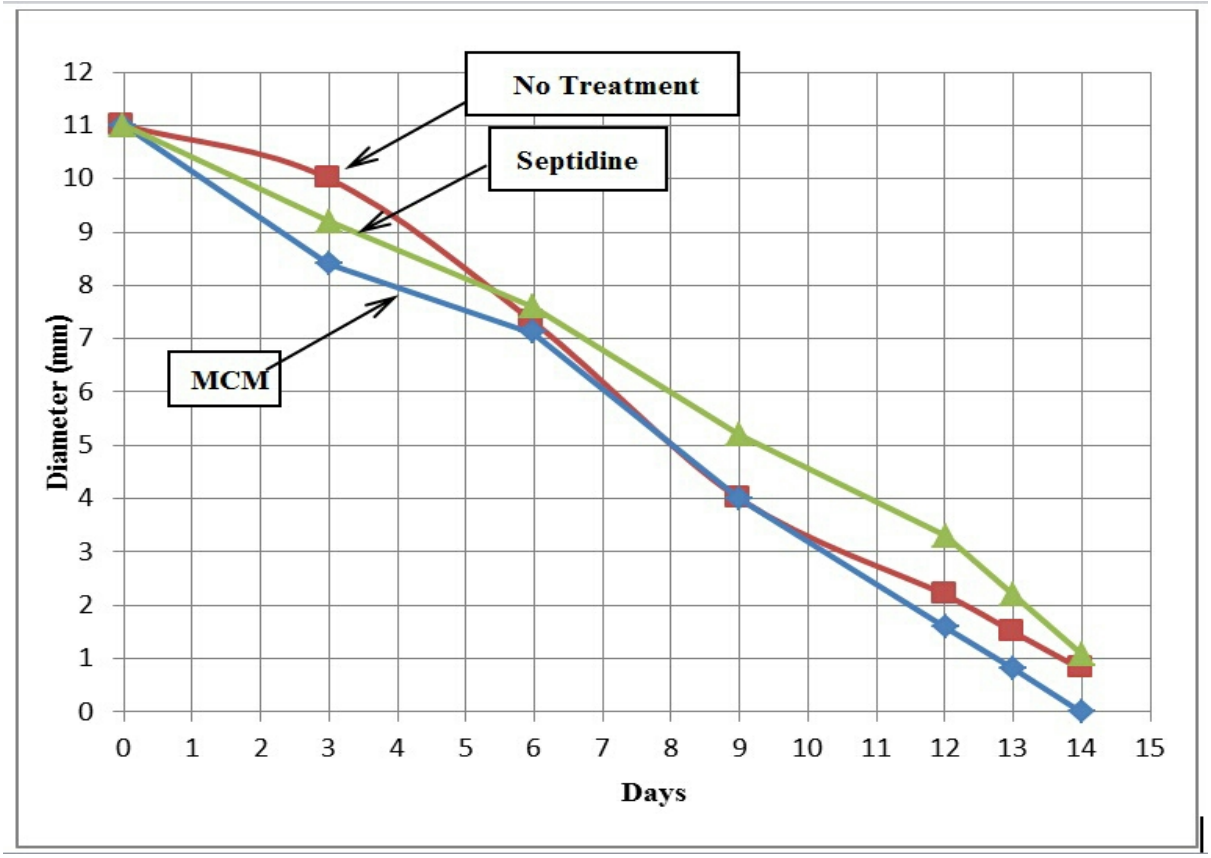


Figure 12. Effect of MCM dressing on open wound (*S. Aureus*)

Figure 13. Effect of MCM dressing on open wound (*P. aeruginosa*)

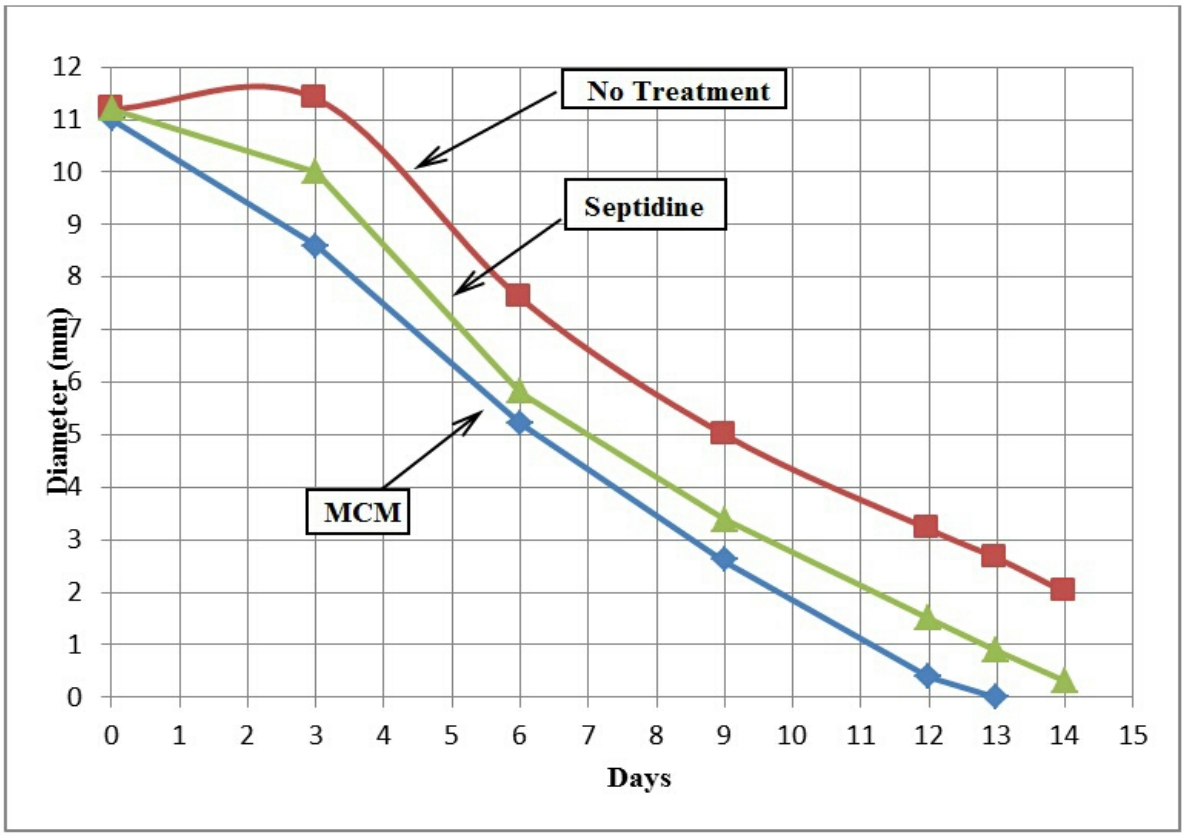


Figure 14. Effect of MCM dressing on open wound (*Pseudomonas*)

In this work, biodegradation of MCM-1 was tested by soil burial test. It shows this process of MCM for 2 months (Figure 15). The prepared modified chitosan membrane (MCM) was shown in (Figure 16).

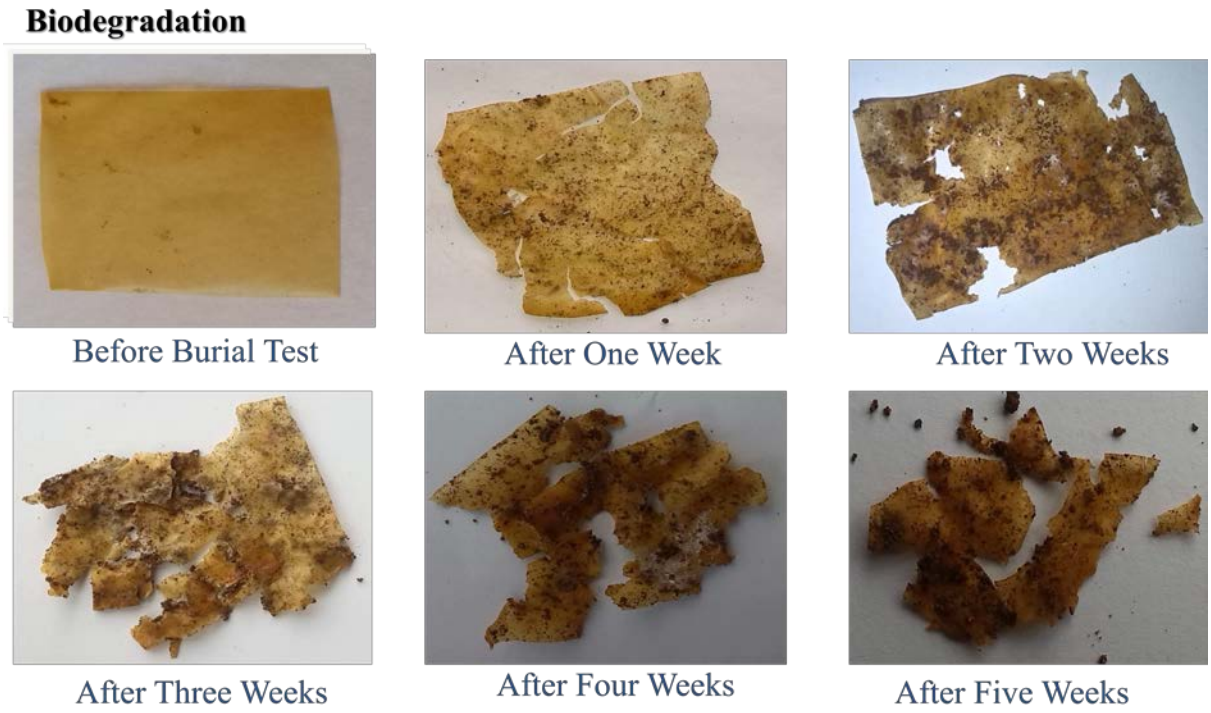


Figure 15. The physical appearances of MCM

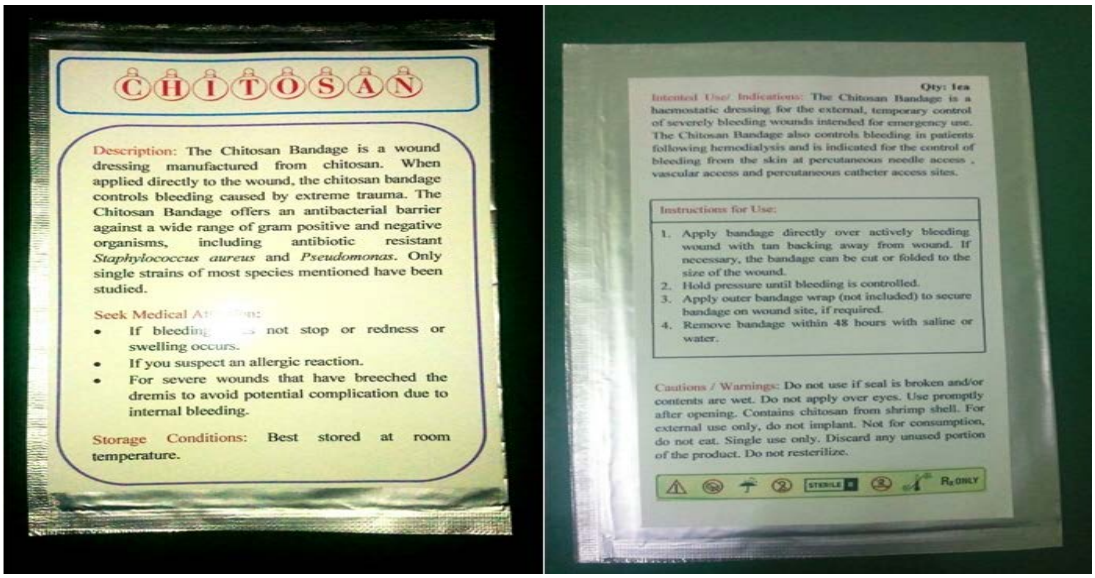


Figure 16. Prepared modified chitosan membrane (MCM)

IV. Conclusion

In this research work, chitosan, sodium alginate and calcium chloride were mixed in various ratios of the following : (1) 1 g of chitosan in 110 mL of 2 % acetic acid, (2) (1 mL - 9 mL) of 2 % sodium alginate solution and (3) (1 mL - 9 mL) of 2 % calcium chloride solution . Totally nine types of modified chitosan membranes (MCM) were prepared as the desired products.

The physicomechanical properties (such as tensile strength, percent elongation at break, tear strength) of prepared MCM were determined for the purpose of optimization of the desired products. Based on the results, MCM-1 sample was chosen as optimum condition from the other samples (i.e., MCM 1 to 9) for the desired products.

From the results of FT IR analysis, the functional groups could be confirmed. According to SEM micrographs show sponge like nature and cluster form. This indicates that membrane has good sorption properties. With respect to the XRD analysis of MCM-1, it can be assumed that semi-crystalline nature which supports to normal sorption character for wound dressing. From the results of TG-DTA analysis, thermal stability of MCM-1 was found to be stored at room temperature. According to the determination of swelling MCM-1, the swelling ratio was found to be not only the highest at acidic medium but also the lowest at alkaline medium.

For the purpose of antibacterial activities test of MCM-1 the *vitro* study was carried out by agar disc diffusion method. In *vivo* study, MCM-1 shows more than 98 % of reduction in wound area after 12 days on *P.aeruginosa* and 14 days on *S.aureus.* In this work, biodegradation of MCM was tested by soil burial test. It can be seen clearly significant deformation of MCM.

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Adsorption Capacity of Vegetable Stalk Alginate Biosorbent Beads on the Removal of Pb^{2+} and Cu^{2+} Ions

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Abstract- This work concerns with the adsorption capacity of Calcium Alginate, Bagasse-Calcium Alginate and *Jatropha curcas*- Calcium Alginate Beads on the removal of Pb^{2+} and Cu^{2+} ion in wastewater of Myanmar industry. On the aspect of removal of Pb^{2+} and Cu^{2+} ions by three types of beads, the removal percent depends on pH, the mass of adsorbent dose and the time contact between adsorbent and adsorbate. The optimal pH for the removal of Pb^{2+} was observed at 6 and at pH 5 for Cu^{2+} ion. The equilibrium for the removal of Pb^{2+} and Cu^{2+} ions were reached after 30 minute in contact with the beads and metal solution. So, the prepared biosorbent beads can be used as adsorbent for the removal of heavy metals from wastewater.

Keywords: adsorption; three types of beads; lead; copper; adsorbent; adsorbate

1. INTRODUCTION

Heavy metals are defined as metals with a specific weight usually more than 5.0 g /cm^3, which is five times heavier than water. The toxicity of heavy metals occurs even in low concentration of about 1.0 - 10.0 mg/ L (Website 1). Heavy metals can pose health hazards to man and aquatic lives if their concentrations exceed allowable limits. Concentration of heavy metals below these limit even have potential for long-term contamination, because heavy metals are known to be accumulative within biological systems (Quek *et al*.,1998) Heavy metal pollution of aqueous streams is a major environmental problem for the modern world.

Adsorption techniques for water treatment have become more popular in recent years with regard to their efficiency in the removal of pollutants, especially heavy metal ions, colour, odor and organic pollution (Lai and Lin,2003, Steinhauser *et al*., 2008). Adsorption has advantages over other methods for remediation of heavy metals from contaminated water because its design is simple (Viraraghyan and Rao, 1991).

The utilized materials in this work were sugarcane bagasse and *Jatropha curcas* stalks waste. The vegetable stalk alginate biosorbent beads were found to be effective in its exchange and removal capacity towards the toxic heavy metal such as lead and copper.

Sugarcane Bagasse has high and fast adsorption capacities due to its porous structure and tremendous surface area. The main stem of the *Jatropha curcas* plant should be cut once the tree in 1 m tall. This will lead to increase branching of the tree. The more branches a plant has, the higher the production of fruits and therefore more seeds (Sukarin, Yamada and Sakaguchi.,1987). These removing or cutting branches are agricultural waste which were prepared dry *Jatropha curcas* powder and they can be used as low cost heavy metal adsorbent in this paper.

Figure 1: Photograph of sugarcane plant

Figure 2: Photograph of *Jatropha curcas* plant

2. EXPERIMENTAL

2.1 Sampling and Preparation of Vegetable Stalk Alginate Biosorbent Beads

Bagasse waste were obtained from Sugarcane plant from Ein Mae Township, Ayeyarwaddy Division and *Jatropha curcas* stalk waste were kindly supplied by Myanmar Five Star Line, Part of Terminal, Thaketa Township, Yangon in October, 2006 . The waste were rinsed three times with distilled water, dried, cut and grounded to obtain a fine powder. The fine powder was sieved to get the particle size range of 105-125 µm. These bagasse powder and *Jatropha curcas* stalk powder were stored in separately in tightly sealed bottle and they were ready to use.

In the preparation of three types of beads (calcium alginate beads, bagasse-calcium alginate beads and *Jatropha curcas*-calcium alginate beads) by using the optimum conditions were found to as 2% w/v of vegetable stalk powder, 6% sodium alginate and 10% calcium chloride. The beads were allowed to harden in this solution for 24 hr.

2.2 Removal of Metal Ions from Aqueous Solution

2.2.1 Materials

Lead II nitrate, copper II sulphate, sulphuric acid, hydrochloric acid, sodium hydroxide, potassium iodide, sodium thiosulphate, EDTA, starch, Xylenol orange,

2.2.2 Apparatus

A measuring cylinder (100 mL), bulb pipette, Erlenmeyer flasks (250 mL), pH meter (Jenway, England), electric shaker bath (0-200ºC) (SBS-30, Bibby UK), balance (Sartorius AG BL 2105)

2.2.3 Pretreatment

The biosorbent composite beads were dried at room temperature (25ºC) and these beads (diameter 1.6 $\pm$ 0.2 mm) were used in sorption experiments (Ashok, *et al.*, 2002). Stock solution containing 1000 mgL^{-1} of heavy metals ions were prepared by dissolving lead II nitrate and copper II sulphate respectively. Sample solutions were prepared from the stock solution by diluting appropriate aliquots with distilled water.

The adsorption experimental studies were carried out at room temperature using conical flasks containing 2.00 g dried biosorbent composite beads and 100 mL of heavy metal ion solution.

2.3 Effect of pH on the Removal of Lead

2.3.1 Sample

Prepared biosorbent beads (CA, BCA and JCA beads)

2.3.2 Procedure

The standard stock solution (200 mg L^{-1}) of lead II nitrate solution at various pH (3, 4, 5, 6) were prepared by adding 0.1 M nitric acid and 0.1 M sodium hydroxide solution. A fixed amount of biocomposite beads, 2 g was added to 100 mL of 200 mg L^{-1} lead II nitrate solution and the mixture was shaken with a shaker for 1 hr at room temperature. Then the mixture was filtered through filter paper Whatmann No.1 and Pb^{2+} ion in the filtrate was determined by complexometric titration using xylenol orange as indicator**.**

2.4 Effect of pH on the Removal of Copper

2.4.1 Procedure

The standard stock solution (200 mg L^{-1}) of copper II sulphate solution at various pH (3, 4, 5, 6) were prepared by adding 0.1 M sulphuric acid and 0.1 M sodium hydroxide solution respectively. A fixed amount of biocomposite beads, 2 g was added to 200 mg L^{-1} copper II sulphate solution and the mixture were shaken with a shaker for 1 hr at room temperature. Then the mixture was filtered through filter paper and Cu^{2+} ion in the filtrate was determined by iodometric titration using strach indicator.

2.5 Effect of Contact Time on the Removal of Lead

2.5.1 Procedure

Accurate weighed prepared biosorbent beads (2 g) were placed in separate flasks. Then 100 mL of lead stock solution (100 mgL^{-1}), adjusted at pH 6 was added into each flasks. The flasks were placed on an electric shaker and were shaken to reach the equilibrium. The contact time was varied at interval of 10 min, 20 min, 30 min, 40 min, 50 min and 60 min. The sample solution was separated by filtration. The residual lead content in the solution was determined by complexometric titration.

2.6 Effect of Contact Time on Removal of Copper

2.6.1 Procedure

Accurate weighed prepared biosorbent beads (2 g) were placed in separate flasks. Then 100 mL of copper stock solution (200 mgL^{-1}), adjusted a pH 5 was added into each flasks. The flasks were placed on an electric shaker and were shaken to reach the equilibrium. The contact time was varied at interval of 10 min, 20 min, 30 min, 40 min, 50 min and 60 min. The sample solution was separated by filtration. The residual copper content in the solution was determined by iodometric titration.

2.7 Effect of Dosage on the Removal of Lead

2.7.1 Procedure

Prepared biosorbent beads sample of various masses ranging from 1 g to 5 g were placed in the flasks and 100 mL of standard lead II nitrate solution (200 mgL^{-1}) was added to each flask at pH 6. And then the loaded flasks were placed on an electric shaker. In order to attain complete equilibrium, the solutions were shaken for one hour at room temperature.

The sample solutions were removed from the adsorbent by filtration. The residual content of lead in the solution was determined by complexometric titration.

2.8 Effect of Dosage on the Removal of Copper

2.8.1 Procedure

Prepared biosorbent beads sample of various masses ranging from 1 g to 5 g were placed in each flasks and 100 mL of standard copper II sulphate solution (200 mgL^{-1}) was added to each flask at pH 5. And then the loaded flasks were placed on an electric shaker. In order to attain complete equilibrium, the solutions were shaken for one hour at room temperature. These mixtures were separated out by filtration. The residual content of copper in the filtrate was determined by iodometric method (Vogel, 1961).

2.9 Characterization of Metal Sorbed Vegetable Stalks Alginate Biosorbent Beads

2.9.3 XRD Analysis

Materials
Metal sorbed biosorbent composite beads
Apparatus
XRD Diffractometer (Rigaku, D-Max – 2200)

2.9.4 SEM Analysis

Materials
Metal sorbed biosorbent composite beads
Apparatus
Scanning Electron Microscope (JOEL-JSM-5610-Japan)
Ion Sputter (JFC-1600)

2.10 Application of Prepared Biosorbent Beads on the Removal of Toxic Heavy Metal Ions in Industrial Wastewater

Industrial wastewater were collected from GS Battery Factory in Hlaing Tharyar Township, Yangon Division, Myanmar in 2009 .

2.10.1 Procedure

The trace element lead and copper from GS battery wastewater were determined by Atomic Absorption Spectrophotometry.

0.2 g of prepared biosorbent beads were placed in each flasks and 10 mL of battery wastewater was added into each flask. The flasks were placed on the electric shaker and were shaken for 1 hr at room temperature. The wastewater solution containing heavy metal ions were removed by prepared adsorbent and the residue of lead and copper in the filtrate were determined by atomic absorption spectrophotometry. In such a way, the removal amount of lead and copper from industrial wastewater by vegetable stalk alginate beads could be obtained.

3. RESULTS AND DISCUSSION

3.1 Preparation of Vegetable Stalks Alginate Biosorbent Beads

Figure 3 show that the calcium alginate beads, bagasse, calcium alginate beads and *Jatropha curcas* calcium alginate beads.

In the preparation of the beads, the optimum condition was selected by mixing 2 g of vegetable stalks powder and 6% w/v of sodium alginate and the mixture was placed drop by drop into 10% $CaCl_2$ solution to obtain biosorbent beads.

(a) (b) (c)

Figure 3: (a)calcium alginate beads, (b) bagasse calcium alginate beads (c) *Jatropha curcas* calcium alginate beads

3.2 Effect of pH on the Removal of Pb^{2+} and Cu^{2+} Ions

The pH is an important process parameter on biosorption of metal ions from aqueous solution since it is responsible for protonation of metal binding sites. Table 1 and figure 4 show the percent removal of Pb^{2+} ions by prepared biosorbent beads at different pH values. The removal of Pb^{2+} ion increased with increasing pH and the highest adsorption was observed at pH 6. Experiments were not performed beyond pH 6 because at higher pH, precipitation of metal was observed and the precipitate may be interfered with the biosorption process. The highest percent removal of Pb^{2+} ion by calcium alginate, bagasse-calcium alginate and *Jatropha curcas* –calcium alginate beads were found to be 58.3%, 75% and 83.3% respectively.

Table 1: Effect of pH on the Removal of Pb^{2+} Ion by Bisorbent Beads

Prepared beads	Initial conc. (mg L^{-1})	Percent removal (%)			
		pH 3	pH 4	pH 5	pH 6
CA	200	33.3	41.6	50.0	58.3
JCA	200	50.0	62.5	75.0	83.3
BCA	200	41.6	50.0	62.5	75.0

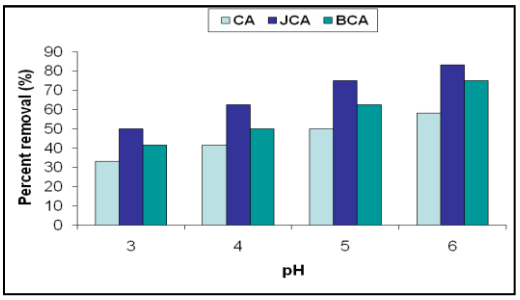

Figure 4: Removal percent of Pb^{2+} at different pH

Table 2: Effect of pH on the Removal of Cu^{2+} Ion by Biosorbent Beads

Prepared beads	Initial conc. (mg L^{-1})	Percent removal (%)			
		pH 3	pH 4	pH 5	pH 6
CA	200	45.8	50.0	54.2	45.8
JCA	200	54.2	66.7	70.8	58.3
BCA	200	50.0	54.2	66.7	50.0

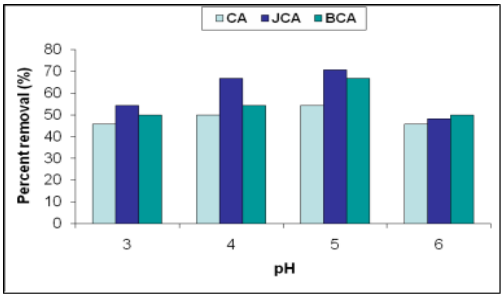

Figure 5: Removal percent of Cu^{2+} at different pH

Similarly, Table 2 and Figure 5 show the percent removal of Cu^{2+} ion by prepared biosorbent beads. In the case, the removal of Cu^{2+} ion increased with increasing pH and the highest adsorption was observed at pH 5. Above the pH 5, the precipitation of metal ion was observed and the precipitate may be interfered in the biosorption process. So the adsorption of Cu^{2+} ion by prepared beads was just done at pH 5.

The change in pH may be attributed to the nature of ions in solution and the nature of the adsorbent used. The lower the pH, the more H^+ ions competing with Pb^{2+} and Cu^{2+} ions for adsorption sites, thus reducing their adsorption. On the other hand, the higher the pH, the less H^+ ions competing with metal ions for adsorption sites, thus increasing their adsorption which explains the obtained results in figures.

3.3 Effect of Contact Time on the Removal of Pb^{2+} and Cu^{2+} Ions

The effect of contact time on the removal of Pb^{2+} and Cu^{2+} ions on the surface of calcium alginate, bagasse-calcium alginate and *Jatropha curcas*-calcium alginate beads were investigated. It was found that the maximum adsorption occurred within 30 minutes for lead and copper ions on biosorbent beads. This rapid sorption stage indicates that surface sorption on the prepared biosorbent beads. A further increase in contact time has a negligible effect for the removal of Pb^{2+} and Cu^{2+} ions. Adsorption equilibrium time is defined as the time required for heavy metal concentration to reach a constant value.

Table 3 and figure 6 show the percent removal of Pb^{2+} ions by prepared biosorbent beads with various contact time from 10 to 60 minutes. It was found that the maximum percent removal was reached within 30 minutes. After 30 minutes, the removal percent of metal ions were nearly constant. It was found that complete adsorption of Pb^{2+} ion by calcium alginate beads (CA beads), bagasse-calcium alginate beads (BCA beads) and *Jatropha curcas*-calcium alginate (JCA beads) were 58.3%, 75% and 83.3%, respectively.

Similarly Table 4 and Figure 7 show the percent removal of Cu^{2+} ion by prepared biosorbent beads with various contact time. From the above experiments, the complete adsorption were occurred after 30 minutes. The maximum percent removal of Cu^{2+} ion by calcium alginate beads (CA beads), bagasse-calcium alginate beads (BCA beads) and *Jatropha curca*-calcium alginate (JCA beads) were 54.2 %, 66.7 % and 70.8 %, respectively.

Table 3: Effect of Contact Time on the Removal of Pb^{2+} Ion by Biosorbent Beads

Contact time (min)	Initial concentration (mg L^{-1})	Percent removal (%)		
		CA	JCA	BCA
10	200	16.7	33.3	25
20	200	41.6	58.3	50
30	200	58.3	83.3	75
40	200	58.3	83.3	75
50	200	58.3	83.3	75
60	200	58.3	83.3	75

Table 4: Effect of Contact Time on the Removal of Cu^{2+} Ion by Biosorbent Beads

Contact time (min)	Initial concentration (mg L^{-1})	Percent removal (%)		
		CA	JCA	BCA
10	200	25.0	50.0	41.6
20	200	50.0	66.7	62.5
30	200	54.2	70.8	66.7
40	200	54.2	70.8	66.7
50	200	54.2	70.8	66.7
60	200	54.2	70.8	66.7

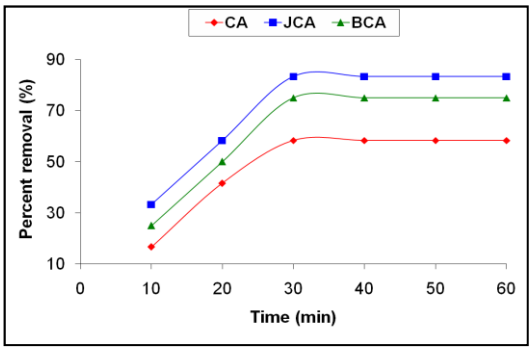

Figure 6: Effect of contact time on the removal of Pb^{2+}

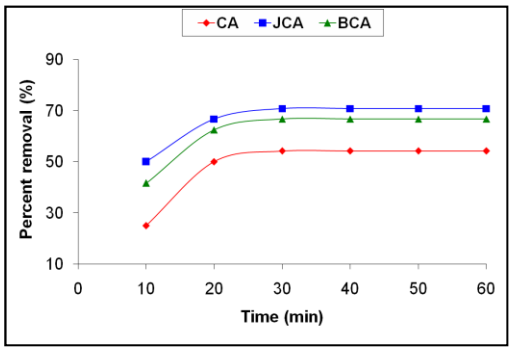

Figure 7: Effect of contact time on the removal of Cu^{2+}ion

3.4 Effect of Dosage on the Removal of Pb^{2+} and Cu^{2+} Ions

The effect of dosage on the adsorption of Pb^{2+} and Cu^{2+} ions on the prepared biosorbent beads were studied. It was found that the removal of Pb^{2+} ion from 200 ppm of model lead II nitrate solution increase from 50% to 77.5%, 55.2% to 90.3% and 64.6% to 93.8% with an increase in dose of CA beads, BCA beads and JCA beads from 10 gL^{-1} to 50 gL^{-1}, respectively. It was also found that the removal of Cu^{2+} ion increase from 45.8% to 75%, 54.2% to 81.3% and 58.4% to 83.4% with an increase in amount of CA beads, BCA beads and JCA beads from 10 gL^{-1} to 50 gL^{-1}, respectively. It was apparent that the percent removal of metal ions increased rapidly with increase in dose due to great availability of the adsorbent. Figure 8 and 9 show the adsorbent dose was increased from 1 to 5 g in 100 mL heavy metal solution, metal uptake capacity was decreased. This may be attributed to reduction of total area of adsorbent, due to probably by aggregation during adsorption of the biomass surface depending on the experimental condition such as pH, ionic strength and temperature.

Table 5: Effect of Dosage on the Removal of Pb^{2+} Ion by Biosorbent Beads

Dosage ($g\ L^{-1}$)	Initial concentration ($mg\ L^{-1}$)	Percent removal (%)		
		CA	JCA	BCA
10	200	50.0	64.6	55.2
20	200	58.3	83.3	75.0
30	200	66.7	88.6	83.3
40	200	75.0	91.9	87.4
50	200	77.5	93.8	90.3

Table 6: Effect of Dosage on the Removal of Cu^{2+} Ion by Biosorbent Beads

Dosage ($g\ L^{-1}$)	Initial concentration ($mg\ L^{-1}$)	Percent removal (%)		
		CA	JCA	BCA
10	200	45.8	58.4	54.2
20	200	54.2	70.8	66.7
30	200	62.5	79.2	72.9
40	200	66.7	81.3	79.2
50	200	75.0	83.4	81.3

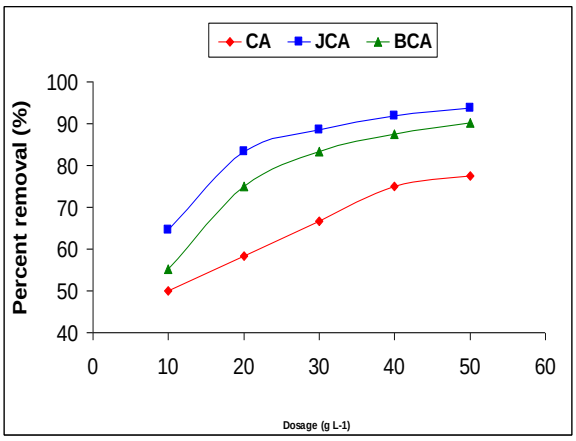

Figure8: Effect of dosage on the removal of Pb^{2+} ion

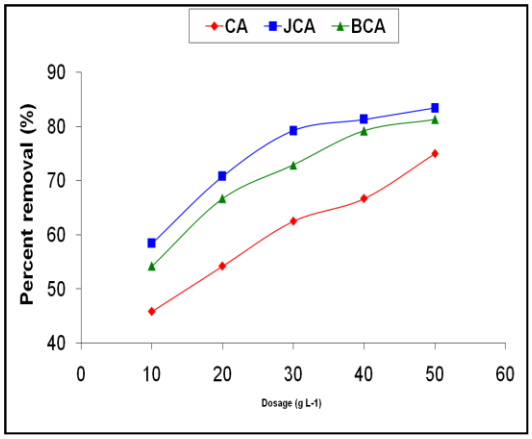

Figure 9: Effect of dosage on the removal of Cu^{2+} ion

3.5 Characterization of Metal Sorbed Prepared Vegetable Stalks Alginate Biosorbent Beads

3.5.1 On XRD Analysis

Figures 10 (a), (b), (c) and 11 (a), (b), (c) show that XRD spectra of vegetable stalk alginate biosorbent beads before and after adsorption of $Pb^{2+}$and Cu^{2+} ions. These diffractograms changed from amorphous nature to crystalline nature after adsorption of metal ions.

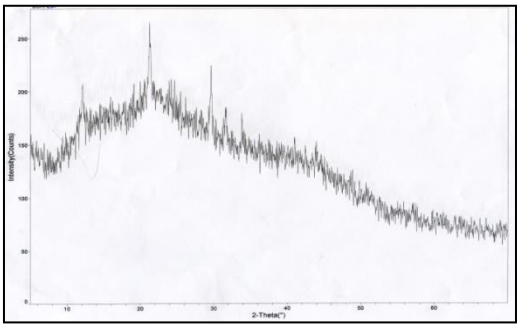

Figure 10(a) XRD diffractogram of BCA beads before adsorption

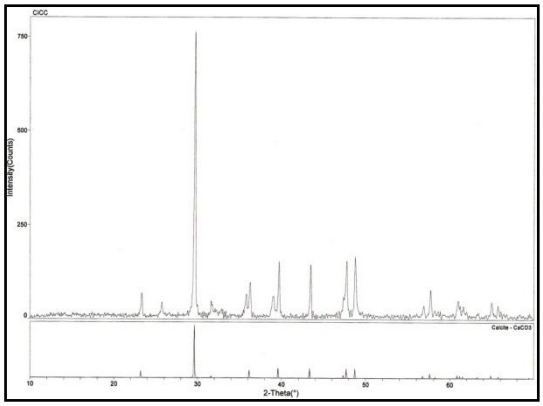

Figure 10 (b) XRD diffractogram of BCA beads after adsorption of Pb^{2+} ion

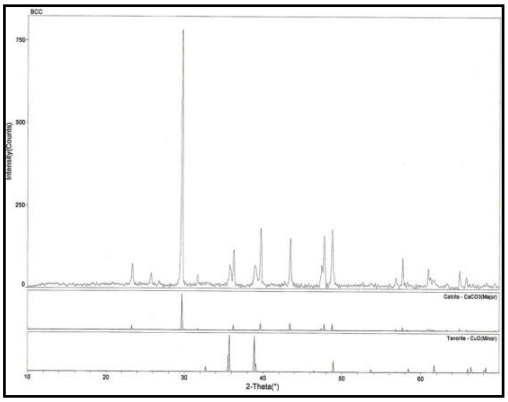

Figure 10 (c) XRD diffractogram of BCA beads after adsorption of Cu^{2+} ion

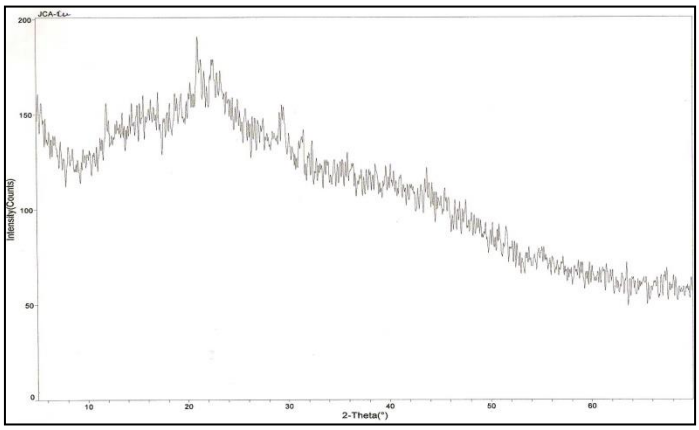

Figure 11(a) XRD diffractogram of JCA beads before adsorption

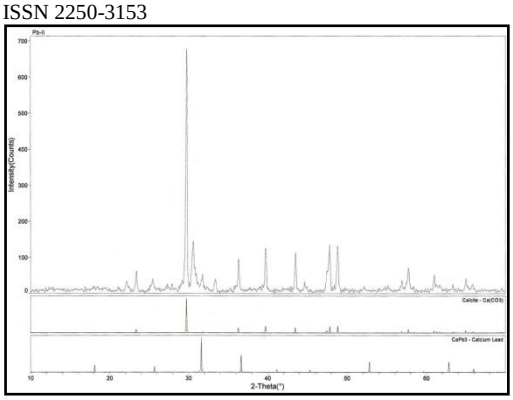

Figure 11 (b) XRD diffractogram of JCA beads after adsorption of Pb^{2+} ion

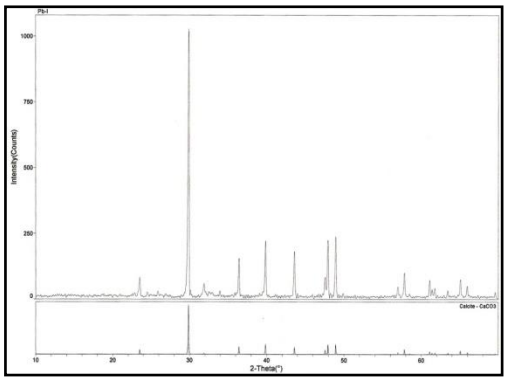

Figure 11 (c) XRD diffractogram of JCA beads after adsorption of Cu^{2+} ion

3.5.2 On SEM Analysis

Figures 12 (a), (b), (c) show the surface morphology of bagasse-calcium alginate beads before and after adsorption of lead and copper. Figure 13 (a), (b) and (c) show the surface morphology of *Jatropha curcas* calcium alginate beads before and after adsorption of lead and copper. After adsorption of lead and copper ion on bagasse-calcium alginate beads, Figure 12 (a), (b), (c) are very different from one another. In all figures cavitated pores were closed by the adsorption of lead or copper. It is one way to explain the nature of images that coprecipitation of specified metal may take place.

the SEM images of *Jatropha curcas*-calcium alginate beads after adsorption of lead (Figure 13 (a)) and *Jatropha curcas*-calcium alginate beads after adsorption of copper (Figure 13 (b)), firstly, adsorption of specified metal has taken place and secondly coprecipitation of specified meal may occur. Some channels can be seen in the images of JCA beads after adsorption of copper where as no void and channel can be seen in the images of beads and all the cavaties are blocked by sorption followed by coprecipitation of the specified metal. Furthermore, after metal uptake, the beads presented a more uniform and organized structure, specially inside (Figures 13 (a), (b), (c)).

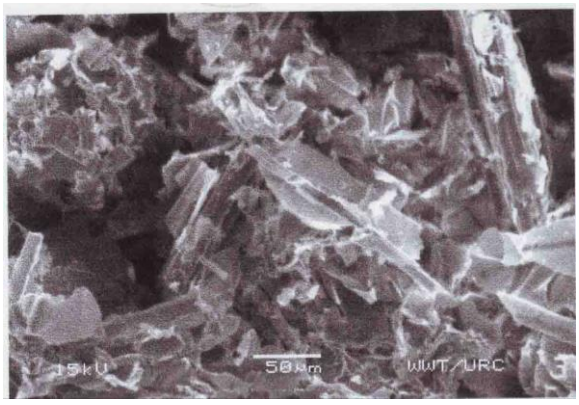

Figure 12(a): SEM micrographs of bagasse-calcium alginate beads before adsorption

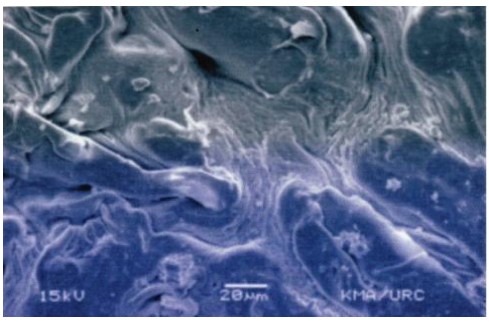

Figure 12(b) : SEM micrograph of BCA beads after adsorption of Pb^{2+} ion

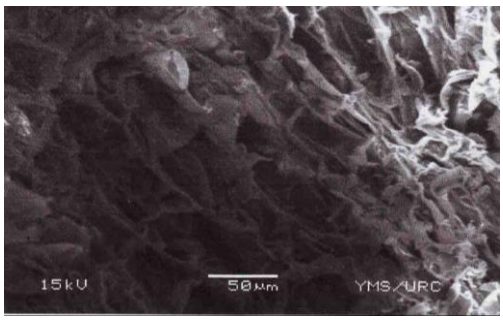

Figure 12(b) : SEM micrograph of BCA beads after adsorption of Cu^{2+} ion

Figure 13 (a): SEM micrographs of *jatropha curcas*-calcium alginate beads before adsorption

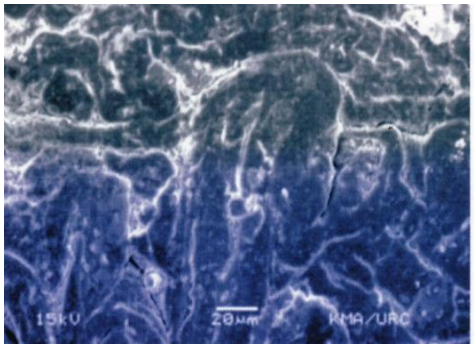

Figure 13(b) : SEM micrograph of JCA beads after adsorption of Pb^{2+} ion

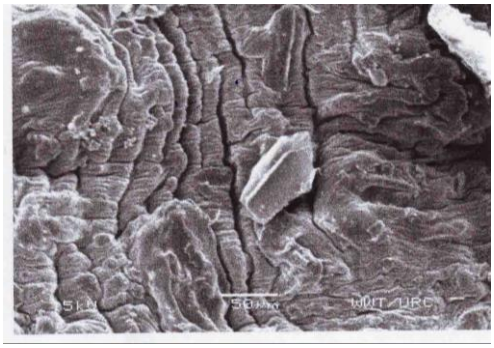

Figure 13(c) : SEM micrograph of JCA beads after adsorption of Cu^{2+} ion

3.6 Application of Bagasse-Calcium Alginate Beads and *Jatropha curcas* Calcium Alginate Beads for the Removal of Pb^{2+} and Cu^{2+} Ions from Industrial Wastewater

In this paper, wastewater samples were collected from GS battery factory, Hlaing Tharyar Industrial Zone, Yangon in 2009. The concentration of lead and copper in industrial wastewater was determined by atomic absorption spectrophotometer.

On the average of lead concentration 3.744 ppm and copper concentration 5.457 ppm were found in industrial wastewater. The contents of these metals in the wastewater sample were found to be reduced singnificantly by three types of calcium alginate beads. The results are shown in Table 7. According to the resulting data, removal efficiency of Bagasse-calcium alginate beads was 71.55% lead and 70.84% copper. Similarly, removal efficiencies of *Jatropha curcas* calcium alginate beads were 78.5% lead and74.27% copper respectively. The resulting data are consistent with that found out by working with model solutions consisting of single ionic species. Thus, the removal of lead and copper ion from wastewater sample by prepared vegetable stalks alginate biosorbent beads can be used as an effective adsorbent materials in the treatment of industrial effluents.

Table 7: Metal Removal Efficiency of Beads in Industrial Waste Water by AAS Analysis

Metal ions	Concentration of metal ions in industrial wastewater (ppm)			Removal efficiency (%)	
	Before treatment	After treatment			
		BCA beads	JCA beads	BCA beads	JCA beads
Lead	3.744	1.065	0.804	71.55	78.5
Copper	5.457	1.591	1.404	70.84	74.27

4. CONCLUSION

On the aspect of removal of Pb^{2+} and Cu^{2+} ions by three types of beads, the optimal pH for the removal of Pb^{2+} was observed at 6 and at pH 5 for Cu^{2+} ion. Sorption experiments were conducted base on the mass of adsorbent dose, it was observed that percent removal of metal ion increase with increase in mass of adsorbent dose however the mass of adsorbent increase with decrease in metal uptake capacity. So, the adsorbent doses 20 gL^{-1} were used in the whole experiments. It was found that the equilibrium time for the removal of Pb^{2+} and Cu^{2+} ions were 30 minute in contact with three types of beads and metal ion solution.

From the above experiments, the highest percent removal of Pb^{2+} ion by calcium alginate, bagasse-calcium alginate and *Jatropha curcas* –calcium alginate beads were found to be 58.3%, 75% and 83.3% respectively. The highest percent removal of Cu^{2+} ion by calcium alginate, bagasse-calcium alginate and *Jatropha curcas*–calcium alginate beads were observed that 54.2%, 66.7% and 70.8% respectively. From the above observations, it was found that sorption efficiency of Pb^{2+} was greater than Cu^{2+}. Moreover, the metal removal capacity of three types of beads were observed that *Jatropha curcas* –calcium alginate beads were more effective than bagasse-calcium alginate bead and calcium alginate beads. The trend of metal adsorption capacity of prepared biosorbent beads were in the order of JCA beads > BCA beads > CA beads.

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Development Of Scientific Teaching Materials Oriented By Saintificial Approaches To Improve Critical Thinking Of Elementary School Students

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Abstract – This study aims to produce science teaching materials products and related devices such as Learning Implementation Plans (RPP), Student Activity Sheets (LKS), and Test Sheets that are valid, practical, and effective to improve critical thinking of elementary school students. This research was carried out using the 4-D model of Thiagarajan et al., Namely the stage of defining, designing, developing, disseminating and testing in the fifth grade of Dukuhtunggal State Elementary School, Duduklor State Elementary School, Margoanyar Lamongan State Elementary School year 2018/2019 teaching 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 were students 'critical thinking and the students' positive responses. Based on the results of data analysis, it can be concluded that the development of science-oriented teaching materials scientific approach is valid, practical, and effective to improve critical thinking of elementary school students.

Keywords: Development of Teaching Materials, Scientific Approach, Critical Thinking.

I. INTRODUCTION

Science in terms can be interpreted as knowledge that includes a variety of natural knowledge. This means that science has an objective and rational nature. In line with the opinion of Djojosoediro (2010: 11) in general, the nature of science has three components, including scientific processes, scientific results, and scientific attitudes. Scientific processes include principles, concepts, laws, and theories. In this activity a high thinking process is needed in order to get new knowledge and experiences that are interesting for students.

According to Rofiah (2013), it shows the importance of thinking learning, namely: (1) thinking is needed as a way to develop perceptions and attitudes that support the creation of a class condition that is good for learning activities; (2) the thought process is needed as a way to acquire and integrate knowledge; (3) the thought process is needed to broaden knowledge; (4) actualize the meaningfulness of knowledge; (5) needed as a way to develop useful thinking behavior. With science education students will be guided to think critically, solve problems, and make decisions that can improve the quality of their lives towards a scientifically learned society.

The development of students' critical thinking skills which is very important should receive more attention in the learning process. Based on experience in the field and analysis from several sources, the inappropriate selection of models, methods and approaches has an impact on the low level of thinking skills of students. Afrizon (2012) states, high-level thinking skills are shown through several aspects, including the ability to think critically, creatively, and be able to solve a problem.

Critical thinking ability must be taught first because it relates to the analysis and evaluation of data, in line with the opinion of Hake (2008): "Science teachers are generally more at ease with critical thinking because it is closely related to analysis and evaluation of data"

Critical thinking ability is the ability of students to make an idea. The ability to think critically is a competency needed in the lives of students (Fahim, 2012). Fatimawati's research (2014) shows that the implementation of critical thinking frameworks is able to build solving life problems and effectively improve the discipline of teachers and students. If the better the orientation of critical thinking skills, the students will be able to overcome various problems in daily life. Considering that critical thinking

skills need to be taught because it is not a result obtained from generation to generation, schools should be able to create an interactive learning environment that involves students actively in learning so that they are accustomed to and trained in critical thinking, one of them by means of selection appropriate learning model or approach (Fisher, 2002). However, in reality based on the results of observations and interviews conducted by researchers at the Dukuhtunggal State Elementary School, at Duduklor State Elementary School, and Margoanyar Lamongan State Elementary School it is known that the critical thinking skills of class V students have not been fully trained and taught. This is also evident from the low level of activeness, participation and role of students in the learning process, especially when using teaching materials. Teaching materials in the 2013 Curriculum still have not implemented a scientific approach perfectly so that the development of teaching materials is needed to support the material to be taught. If the teacher is able to develop teaching materials that will be used correctly when learning, the achievement of learning objectives will be achieved well, but the reality in the field is the lack of understanding of teachers in implementing learning in accordance with teaching materials that are used to influence student learning success and student understanding. This is evidenced by the value that is still below the KKM, most students get a value less than the standard compote specified, especially on electric and magnetic material.

In improving students' critical thinking and learning capacity, it is necessary to develop 2013 curriculum teaching materials by adjusting the steps of the scientific approach to learning in honing high-level thinking skills (Erten, 2013). Because the learning approach provides opportunities for students and helps students gain an understanding of the scientific method to develop a critical thinking ability, self-regulation, and understanding of a specific topic is to use a scientific approach (Machin, 2014). By using this scientific approach, it is expected to grow critical thinking skills to understand the problems that exist in the environment around students, so that they are more sensitive to changes in the environment and can determine actions that are in accordance with the norm to address these environmental changes.

In the scientific approach to Curriculum 2013, one of the criteria is to inspire and encourage students to think critically, analytically, and precisely as a way of identifying, understanding / interpreting, solving a problem, and applying material to learning (Kemendikbud, 2013). The application of learning using a scientific approach allows students to obtain various important values in the learning process. In the scientific approach includes several activities, among others: observing, asking (questioning), reasoning (associating), experimenting (communicating), and communicating (networking), so that in carrying out some of these activities needed the help of teachers as facilitators, but the teacher in helping / guiding is increasingly minimal due to the higher class of students and the maturing age of the students' thinking. These student activities can be realized in the learning process through the use of science-oriented teaching materials in the scientific approach.

Some topics can be taught in science learning, one of which is electrical and magnetic material. In the 2013 curriculum this material has not implemented the steps of the activities carried out on the scientific approach so that it is necessary to develop teaching materials to facilitate it all. Given this material is one of the complex material for students. Understanding of electrical and magnetic material is not enough just to read the material description, but it is necessary to conduct investigative or experimental activities so that students' understanding of the material becomes more profound. Electrical and magnetic material in the fifth grade elementary school according to the 2013 curriculum includes recognizing energy sources, grouping objects including conductors and electrical insulation, assembling simple series and parallel electrical circuits, changing the shape of electrical energy into other energy and magnetism.

According to Muakhirin (2014) Three components of science learning in the Elementary School Science curriculum, namely: 1) Science learning brings intellectual growth and development of students. 2) Science learning in experimental activities must involve students. 3) Science is what brings about the formation of scientific attitudes, science skills, mastering the basic patterns of science knowledge, and stimulating the growth of a critical and rational attitude towards students in elementary school. Based on these components, the scientific approach oriented teaching materials are arranged to facilitate learning activities in the material of electric and magnetic energy. Students guided by scientific approach-oriented teaching materials can think critically from the activity of observing electricity sources, classifying objects of conductors and insulators, trying to make simple electrical circuits, trying to make a simple compass and trying to make electromagnetic.

The purpose of this study is to produce scientific approach oriented science materials that are appropriate (valid, practical and effective) and can improve critical thinking of elementary school students.

II. METHODS

This type of research uses the Four D Models development method, namely define, design, develop and disseminate. The aim of this study is the TGT game card with material for growth and development. With define stages consist of needs analysis, student analysis, task analysis, and concept analysis. The design phase consists of determining learning objectives, preparing tests, selecting the media, and designing the initial learning. The develop phase consists of the development of learning tools and the validation of the quality of science-oriented science-based teaching materials along with related learning tools and the results of trial implementation. The trial was carried out using one group pretest-posttest design with 3 repetitions, namely 18 students at

Dukuhtunggal State Elementary School, 21 students at Duduklor State Elementary School, and 16 students at grade 5 at Primary School Margoanyar for 5 meetings. The first meeting was used pretest to find out the initial ability of critical thinking of students before learning activities using science-oriented teaching materials scientific approach, the second to fourth meetings were used for learning activities using science-oriented science teaching materials, and the fifth meeting was used posttest to determine students' final critical thinking after following the learning activities. Research variables in this study are 1. validity of teaching materials, RPP, critical thinking tests validated by experts, 2. practicality seen from the results of observations / observations of the implementation of RPP and student activities, 3. Effectiveness seen from the results of critical thinking improvement tests students.

III. RESULTS AND DISCUSSION

The results of the development of science-oriented teaching materials science approach to improve critical thinking of elementary school students with supporting devices in classroom learning activities include: RPP and test results of students' thinking skills. Learning tools are said to be good if learning devices meet the criteria of feasibility, practicality, and effectiveness (Nieven, 1999. p.127). The validity of the developed learning device is declared valid or invalid using an instrument in the form of a validation sheet that will be filled by expert experts in their field, also called validators to determine the shortcomings of the devices developed and whether they are suitable for use in learning activities (Yusuf, 2016). The results of the validation of scientific approach oriented science materials developed in detail will be discussed as follows

A. Results of Device Validation

Validation of learning devices will be carried out by three Greek validators in their fields. The results obtained from the validator are used to see the level of feasibility of learning devices that have been developed before being applied in class. Devices that will be validated include learning approaches oriented to scientific approaches and related learning devices.

1. Validation of Scientific Oriented Learning Materials

Teaching material that will be developed leads to students' critical thinking skills with a scientific approach oriented by observing, asking, reasoning, trying, and communicating. Learning materials oriented to the scientific approach that have been developed are then given to the validator to be assessed. The results of the teaching material validation obtained from 3 validators are presented in table 1.

Table 1. Results of Validation of Teaching Materials

No	Assessment Aspect	Score			Average	Category
		V_1	V_2	V_3		
FEASIBILITY ASPECT OF THE CONTENT						
1	Compatibility of material with KD	4	4	4	4	Very Valid
2	Material accuracy	3	3	3	3	Valid
3	Material Update	3	4	4	3,66	Very Valid
4	Encourage curiosity	4	3	4	3,66	Very Valid
SERVICE FEASIBILITY ASPECT						
5	Presentation technique	3	3	3	3	Valid
6	Presentation support	3	4	4	3,66	Very Valid
7	Presentation of learning	4	4	3	3,66	Very Valid
8	Coherence and chaos of thought	3	4	4	3,66	Very Valid
FEASIBILITY ASPECTS OF LANGUAGES ACCORDING TO BSNP						
9	Straightforward	4	4	3	3,66	Very Valid
10	Communicative	4	4	3	3,66	Very Valid
11	Dialogical and interactive	3	4	4	3,66	Very Valid
12	Conformity with the development of students	3	3	3	3	Valid
13	Conformity with language rules	4	4	3	3,66	Very Valid
ASPECTS OF CRITICAL THINKING ASSESSMENT						
14	Giving a simple explanation	4	4	4	4	Very Valid
15	Building basic skills	4	3	3	3,33	Valid
16	Concluding	3	4	3	3,33	Valid

No	Assessment Aspect	Score			Average	Category
		V_1	V_2	V_3		
17	Providing an explanation	4	4	4	4	Very Valid
18	Setting strategy and tactics	3	4	4	3,66	Very Valid
CHART FEASIBILITY ASPECT						
19	The book size is oriented towards the scientific approach	4	3	3	3,33	Valid
20	Cover design	4	4	4	4	Very Valid
21	Content design	3	3	3	3	Valid

From the results of the validation, it can be seen that the three validators provide an assessment that the teaching material in each aspect with an average of 3-4.

2. Validation of Learning Implementation Plans

The RPP that has been developed is then given to the validator to be assessed. The results of RPP validation obtained from 3 validators are presented in table 2.

Table 2. Results of Validation of Learning Implementation Plans

No	Assessment Aspect	Score			Average	Category
		V_1	V_2	V_3		
1	Identity	4	4	4	4	Very Valid
2	Aim	4	4	4	4	Very Valid
3	Scientific approach	4	4	4	4	Very Valid
4	Means and sources of learning	3	4	3	3,33	Valid
5	Learning Steps	4	4	4	4	Very Valid
6	Cognitive aspects	4	4	3	3,66	Very Valid
7	Linguistics	3	3	3	3	Valid

From the results of the validation it can be seen that the three validators provide an assessment that the lesson plan is in each aspect with an average of 3-4.

3. Validation Test for Student Critical Thinking

The students 'critical thinking test that has been developed is a descriptive question test that is used to measure students' critical thinking skills after learning activities. Test questions that have been developed are then given to the validator to be assessed in order to find out the feasibility of the question. The results of the test validation obtained from 3 validators are presented in table 3.

Table 3. Results of Test Question Validation

Question Number	Content Validation						Bahasa dan Penulisan Soal									Average	Category
	Questions according to indicators			Measuring questions Critical thinking			Clear working instructions			Does not contain double meaning			The sentence matches EYD and is easy to understand				
	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3		
1	4	4	4	4	4	4	3	4	4	4	4	4	3	4	4	3,87	Very Valid
2	4	4	4	4	4	4	4	3	4	4	4	4	4	4	3	3,87	Very Valid
3	3	4	4	3	3	4	4	4	4	3	4	3	3	4	3	3,53	Valid
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid
5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid
6	4	4	4	4	4	3	4	4	3	4	4	4	4	3	4	3,8	Very Valid
7	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid
8	3	3	3	4	4	4	3	4	3	4	4	4	3	3	4	3,53	Valid
9	4	4	4	3	4	3	4	4	4	4	4	4	4	4	3	3,8	Very Valid
10	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid
11	4	4	4	4	4	4	3	4	3	4	3	4	4	4	4	3,8	Very Valid

Question Number	Content Validation						Bahasa dan Penulisan Soal									Average	Category
	Questions according to indicators			Measuring questions Critical thinking			Clear working instructions			Does not contain double meaning			The sentence matches EYD and is easy to understand				
	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3		
12	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid
13	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	Very Valid

From the results of the validation it can be seen that the three validators gave an assessment that the test questions were critical in every aspect with an average of 3.53-4.

B. Results of practicality of scientific approach oriented science materials

The results of the practicality of science-based teaching materials with scientific approach are seen from the results of the implementation of learning activities carried out and student activities during the learning activities taking place with observation by 2 observers.

1. Results of Implementation of Learning Activities

The results of observations on the implementation of learning activities using science-oriented science approach teaching materials that have been developed will be analyzed at each meeting described as follows: The results of observational analysis that has been done on the implementation of meeting 1 learning activities get a percentage between 83% - 92%, Results Observation analysis that has been done on the implementation of meeting 2 learning activities gets a percentage between 88% - 100%, and the results of the observational analysis that has been carried out on the implementation of the 3 meeting 3 learning activities get a percentage between 88% - 100%. In summary, the results of observing the implementation of lesson plans for 3 weeks can be shown in Figure.

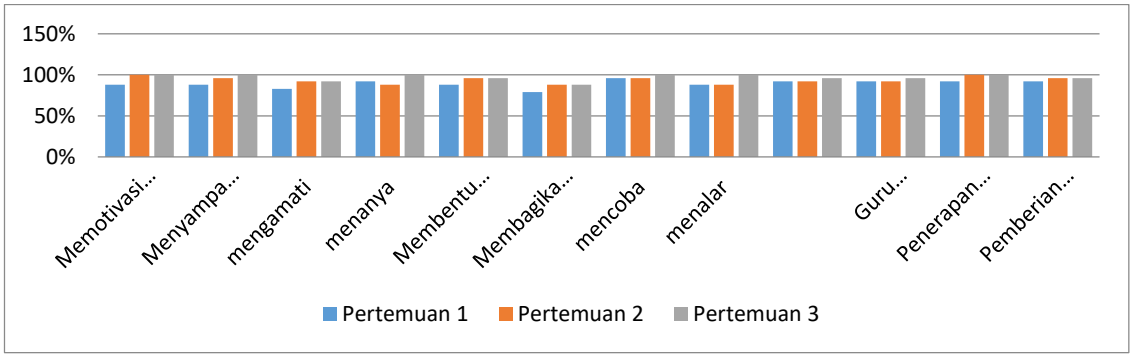

Figure 1. Diagram of the results of observing the implementation of the lesson plan

2. Results of Student Activity Analysis

The results of the analysis of student activities during learning activities were observed by two observers in each meeting consisting of 10 aspects with the discussion of the results of the assessment by the two observers as follows: the percentage between 83% - 100%, meeting 2 gets a percentage between 88% - 100%, and meeting 3 gets a percentage between 92% - 100%. In summary, the results of observing student activities for 3 weeks can be displayed in Figure. 4.5.

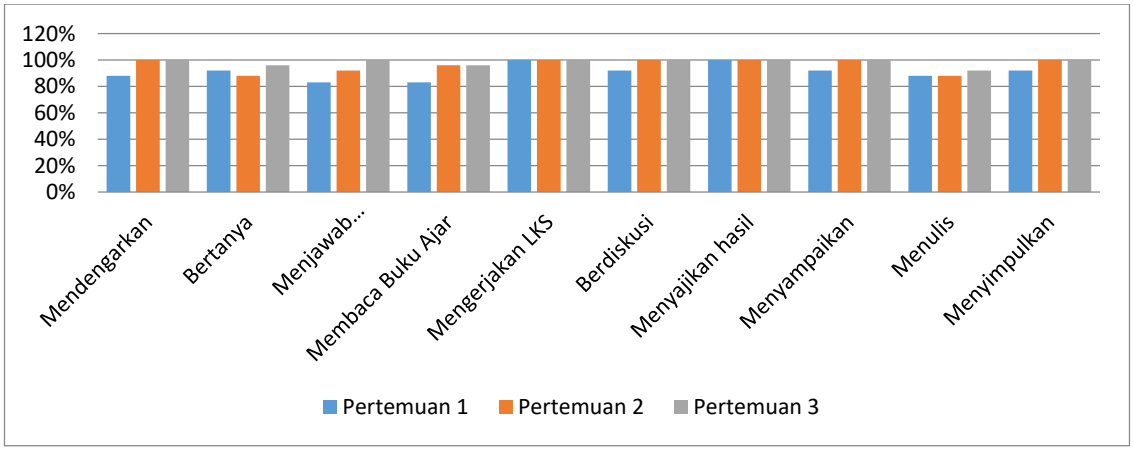

Figure 3. Diagram of observation of student activities

The observations of student activities from meetings 1-3 if related to the criteria for implementing learning adopted (Riduwan, 2011) found that the use of teaching materials oriented to the scientific approach in the category of active

assessment in learning activities. According to Suyono (2016) regarding learning to find students who support learning related to direct discovery, teachers only encourage students to have experience and conduct experiments that allow them to think critically for themselves (Nur, 2008, p. 10).

So it can be concluded that the scientific approach oriented teaching materials developed by practical researchers are used in the learning process.

C. Effectiveness of Scientific Learning Approach Scientific Approach

The effectiveness of scientific approach oriented science materials can be seen from the results of students' critical thinking tests. Tests are arranged as many as 13 questions with scoring techniques in accordance with the rubric that has been prepared previously. Arikunto Opinion (2013, p. 46) tests are skills, knowledge, abilities and talents possessed by individuals or groups that can be obtained through a collection of questions or exercises and other tools. this learning outcome test is conducted before the learning (pretest) and after learning (posttest) with the same problem. Tests conducted before learning are intended to obtain information on the level of critical thinking of students before learning using teaching materials, while tests conducted after learning aim to measure the extent to which mastery of critical thinking is mastered by students after carrying out learning. This is in accordance with Winarti (2015, p.10) stated that critical thinking is measured from the score obtained by a series of opinion learning activities in line with what Wuri stated (2014) to find out the difference in critical thinking of students obtained from the pretest and posttest from the learning done. The results of the pretest and pottest results of critical thinking learning in the trials are presented in table 4.

Table 4. Data on students' critical thinking learning outcomes

No	Name	Score		KKM	Completeness		N-Gain	Information
		Pretest	Posttest		Pretest	Posttest		
	Repetition 1							
1	AA	25	88	70	TT	T	0,84	High
2	BB	31	90	70	TT	T	0,85	High
3	CC	33	83	70	TT	T	0,74	High
4	DD	25	75	70	TT	T	0,67	Medium
5	EE	44	80	70	TT	T	0,64	Medium
6	FF	42	85	70	TT	T	0,74	High
7	GG	35	79	70	TT	T	0,68	Medium
8	HH	48	85	70	TT	T	0,71	High
9	II	73	85	70	T	T	0,44	Medium
10	JJ	38	79	70	TT	T	0,66	Medium
11	KK	75	92	70	T	T	0,68	Medium
12	LL	37	83	70	TT	T	0,73	High
13	MM	40	81	70	TT	T	0,68	Medium
14	NN	35	83	70	TT	T	0,74	High
15	OO	31	85	70	TT	T	0,78	High
16	PP	25	79	70	TT	T	0,72	High
17	QQ	31	77	70	TT	T	0,67	Medium
18	RR	33	81	70	TT	T	0,72	High
	Repetition 2							
1	AA	29	85	70	TT	T	0,78	High
2	BB	35	77	70	TT	T	0,64	Medium
3	CC	37	85	70	TT	T	0,76	High
4	DD	71	87	70	T	T	0,55	Medium
5	EE	27	79	70	TT	T	0,71	High
6	FF	73	90	70	T	T	0,62	Medium
7	GG	71	85	70	T	T	0,48	Medium
8	HH	35	79	70	TT	T	0,68	Medium
9	II	73	87	70	T	T	0,52	Medium
10	JJ	33	81	70	TT	T	0,72	High
11	KK	40	83	70	TT	T	0,72	High
12	LL	35	79	70	TT	T	0,68	Medium
13	MM	75	88	70	T	T	0,52	Medium
14	NN	35	83	70	TT	T	0,74	High
15	OO	31	85	70	TT	T	0,78	High
16	PP	25	85	70	TT	T	0,80	High
17	QQ	48	90	70	TT	T	0,81	High
18	RR	33	79	70	TT	T	0,69	Medium

No	Name	Score		KKM	Completeness		N-Gain	Information
		Pretest	Posttest		Pretest	Posttest		
19	SS	25	77	70	TT	T	0,69	Medium
20	TT	48	80	70	TT	T	0,62	Medium
21	UU	29	85	70	TT	T	0,78	High
	Repetition 3							
1	AA	33	83	70	TT	T	0,75	High
2	BB	40	81	70	TT	T	0,68	Medium
3	CC	35	83	70	TT	T	0,74	High
4	DD	31	85	70	TT	T	0,78	High
5	EE	25	79	70	TT	T	0,72	High
6	FF	31	88	70	TT	T	0,83	High
7	GG	33	83	70	TT	T	0,74	High
8	HH	35	75	70	TT	T	0,62	Medium
9	II	44	80	70	TT	T	0,64	Medium
10	JJ	46	85	70	TT	T	0,72	High
11	KK	35	77	70	TT	T	0,64	Medium
12	LL	37	83	70	TT	T	0,73	High
13	MM	77	92	70	T	T	0,65	Medium
14	NN	35	79	70	TT	T	0,68	Medium
15	OO	73	88	70	T	T	0,56	Medium
16	PP	38	85	70	TT	T	0,76	High

Based on the results obtained in table 4 that the value obtained by students between the pretest and posttest values increased. Critical thinking improvement can be seen from N-Gain which is in the medium and high category. The following is explained the recapitulation of students' critical thinking improvement in Table 5.

Table 5. Recapitulation of improvement in students' critical thinking seen from N-Gain

No	N-Gain Category	Number of Students	Precentage (%)
1	Low	0	0%
2	Medium	26	47%
3	High	29	53%

The results obtained by students when looking at table 4.14 shows that students 'critical thinking obtained after learning activities uses science-oriented science approaches with medium approach, namely 26 students with a percentage of 47% and high category ie 29 students with a percentage of 53% said to improve students' critical thinking . This is in accordance with the results of research proposed by Rusiyanti's research, E (2016) which states that a scientific approach is very effective in learning where students can reflect students' critical experiences and thoughts on an object so that they can improve critical thinking and student achievement.

IV. CONCLUSSION

The results of the data analysis and discussion of the results of the study, then linked to the formulation of the problem and research objectives, it can be concluded that:

1. The validity of scientific approach oriented learning materials and learning devices developed has fulfilled the validity criteria based on the results of evaluations from the validator so that the instructional materials developed are suitable for learning activities.
2. The practicality of scientific approach oriented science teaching material developed seen from its implementation in learning, has been carried out very well at meeting 1, meeting 2, and meeting 3, at each learning activity.
3. The effectiveness of scientific approach oriented science teaching materials that are developed seen from the results of critical thinking learning students experience improvement and excellent student responses, so that it can be said to be worthy of use in learning activities

Suggestion

1. Preparation and management of time need to be considered, because the learning used to use the project takes a long time.
2. If you want to improve critical thinking students use scientific approach oriented teaching materials that have been tested to improve critical thinking of elementary school students.
3. Teachers should make innovations in learning so learning becomes enjoyable so that they can touch meaningful learning domains.

4. This research can hopefully be used as a foundation for future researchers to be better developed to improve the quality of education in Indonesia.

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Academic Writing At Universities - A Shift Of Balance From Reproduction To Critical Analysis

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ABSTRACT

English academic writing is never an easy task for university students. This is true for both native and non-native speakers of English. Many first year students claim that the writing assignments at universities are much different from what they studied at high schools. And that, schools did not prepare them for writing assignments at universities. They may not notice that there is an enormous transition in focus of studying in these levels. This paper attempts to look for some key factors from psychological perspective that might be helpful for first year students dealing with academic writing at universities. Writing is a crucial skill in higher education, so much of academic success is dependent upon the ability to clearly communicate one's ideas through writing. In order to be a good writer, first and foremost, one must be a wise thinker and reader, the so-called critical thinker and critical reader. Another important issue is that one should be tolerance to errors made during the writing practice.

Index terms: Academic writing, psychological perspective, critical thinking, critical reader

I. INTRODUCTION

1.1. Background of the study

Writing is one of the most difficult tasks for language learners. It is the process of performing communicative task through a system of signs. Unlike speaking which is intended for face-to-face communication, writing, on the other hand, is read by readers who are separated by time and space. Schmandt-Besserat & Erard (2008) [1] refer to writing as graphic marks that represent the units of a specific language, which serve as functions of the language structure. In other words writing is an activity that puts letters, symbols, numbers or words together on paper in order to communicate, express and explain ideas in written text, there is no negotiation of meaning. Heffernan & Lincoln (1986) [2] states, writing is a mean of communication. It can be said that people can exchange information through written forms. The examples of real communication in written forms are public signs, instructions, newspaper, magazines, brochures, and so on. Harmer (2004) [3] notes that;

> "Writing is often not time-bound in the way conversation is. When writing, students frequently have more time to think than they do in oral activities. They can go through what they know in their minds, and even consult dictionaries, grammar books or other reference material to help them (P.121)".

Academic writing which is a compulsory subject for both undergraduate and postgraduate students in many educational institutions, to some extent, is more challenging because of its complexity. In order to be a good writer, one should master language knowledge and content knowledge, i.e. grammar, morphology, genres, styles and the knowledge of the world. Murray, R. & S. Moore (2006) [4] state that;

> "Becoming a writer is an important journey. It is a journey that leads us to many new discoveries about ourselves, about our ideas, about the world in which we live, and about our professional identities as academics, teachers, researchers and scholars (P.1)".

On the journey, language learners inevitably get shocks and make a lot of mistakes and errors and it is for sure that they could learn tremendously from those mistakes and by overcoming the shocks.

1.2. Problem statement

Many first year students at Thai Nguyen University claim that academic writing is the most difficult subject because what they had studied at high schools was quite different from what they are required to do at university. In other words, schools did not prepare them well for writing at universities. However, the fact is that principles of good academic writing are the same whether

you are writing as a high school student or as a postgraduate doctoral student. The difference lies in firstly, the focus of studying. Murrey (2012) [5] states;

> Schools tent to focus on training you to produce written work that will earn you good AS/A-level grades. They don't normally prepare you specifically for academic writing at undergraduate level. As a result, certain principles of writing are not covered at all or are covered only superficially, with much important detail often being left out - detail that may be crucial to successful assignment writing at university (p.7)

Secondly, philosophies i.e. the vast bulk of your education at high school consists largely of developing discipline in your approach to study and building up a body of knowledge that will prepare you for the outside world (p.9). Another difference lies in the shifting of balance. At high schools, the main emphasis is on absorbing and applying information appropriately according to context (i.e. the particular question or exercise being attempted), at university far greater emphasis is placed on analysing and thinking critically about that information. In other words, there is less stress placed on the simple reproduction of information (the displaying of), and more on the ability to evaluate or appraise it (p.9).

It is believe that first year students may not catch up with changes in the "atmosphere" at universities rather than academic requirements. This paper attempts to investigate some changes that students need to make in order to write better at universities.

II. A REVIEW OF RELATED LITERATURE

2.1. Academic writing at universities

Many students believe that a good knowledge of grammar, punctuation or sentence structure are enough to do well on academic writing at universities. However, They are not everything. Academic writing requires more than that. Academic writing is what scholars do to communicate with other scholars in their filed of study, their *disciplines.* Academic writing is what you have to learn so that you can participate in the different disciplinary conversations that take place in your courses. You have to learn to *think* like an academic, *read* like an academic, *do research* like an academic, and *write* like an academic - even if you have no plans to continue your education and become a scholar yourself (Greene, S. 2015. p1) [6].

2.1.1. Critical thinking and academic writing

Back to Murrey's discussions [3], at schools, students are trained to reproduce things rather than critical analysis of a given issue (p.9). At universities, however, the ability of synthesis and evaluation are more important and encouraged. For university students, critical thinking is the first and foremost requirement to be successful academic writing. This means that they are required to show evidence of critical thinking in their academic essays in the form an argument, and by demonstrating related skills such as evaluation and analysis. However, students are either unaware of the importance of argumentation in writing or lack understanding of what is meant by the concept of argument, evaluation and analysis (Jones, 2005; Wingate, 2011) [7] [8]. Critical thinking operates in the background of arguments, encouraging the thinker to pay attention to the social, ideological, epistemological, and historical forces that operate, often invisibly, all around us. In relationship to this conversation, critical thinking and writing operate in a specific kind of relationship. While it may sound strange, critical thinking functions not to answer a question, but to answer to the way you are asking a question (Vallis, 2010. p.24) [9]. In the context of undergraduate students, critical thinking is defined in terms of abilities or skills such as selection, evaluation, analysis, reflection, questioning, inference and judgement (Tapper, 2004) [10]. Tsui (2002) [11] concludes that critical thinking is the students' abilities to "identify issues and assumptions, recognise important relationships, make correct inferences, evaluate evidence or authority, and deduce conclusions" (p.743). When critical thinking is applied to writing these abilities are expressed through the process of argumentation, producing an argument i.e. the essay, the dissertation. Argument can be defined as a connected series of related ideas "intended to establish a position and implying response to another (or more than one) position"

2.1.2. Becoming a critical reader

People hardly ever speak without listening. We need to take in something so that we can produce something. Similarly, writing needs reading to occur. Reading is a two-way street. Readers are presented with a writer's ideas, but they also bring their own ideas to what they read (Kirszner, 2011. p. 13) [12]. However, reading as an academic is far different from reading a magazine or a novel. When you read an academic writing for the first time you may be perplexed by the vocabulary and sentence structure of many of the academic essays you read. Scholars use specialized language to capture the complexity of an issue or to introduce specific ideas from their discipline. Every discipline has its own vocabulary. You probably can think of words and phrases that are not used every day but that are necessary, nevertheless, to express certain ideas precisely [4] (p.1). The experienced readers need "some disciplines" of the reading passage or the background knowledge of the reading.

Another important issue in reading is that readers should master some basic reading strategies such as previewing which include the author, the title, the place of publication. All these clues will give you something that help you understand the text. Skimming to find the thesis is another important strategies. Read the first paragraph of an essay carefully because it may announce the

author's thesis, and it may give you some sense of how the argument for that thesis will be conducted. When you have grasped the main points of the reading run your eye over the rest, looking for key expressions that indicate the author's conclusions or other specific information.

Reading critically other people's work is the best way for you to prepare for your own writing. The benefits include (1) the writing styles and conventions employed by authors, (2) the gap of researching for your investigation to fill in and (3) you will develop a mature academic style of writing that is both fair and discerning in its accounts of others' work, and that maximizes the opportunity for others to take seriously what you have to say.

2.1.3. Acdemic writing - what a novice writer should know

The first year university students can be seen as novice academic writer. What they need to develop is the *discourse competence*. Canale & Swain (1980) [13] defined discourse competence as an ability to make larger patterns of stretches of discourse into meaningful wholes. Later interpretation of discourse competence implies that discourse competence is also concerned with language use in social context, and in particular with interaction and dialogue between speakers. In terms of academic writing, discourse competence refers to the ability to integrate a wide range of different types of knowledge in order to create extended written discourse that is both linguistically accurate and socially appropriate.

Linguistic accuracy refers to grammatical knowledge that govern one's writing which includes sentence structures, articles, punctuation, verb forms, verb tense, subject - verb agreement etc. The notion of social appropriateness refers to a more abstract idea which consists of writing genres, disciplines and registers. Eggins & Martin (1997) stated 'different genres are different ways of using language to achieve different culturally established tasks, and texts of different genres are texts which are achieving different purposes in the culture' (p. 236) [14]. In describing the relationship between register and genre, Eggins (1994) says 'genre and register are at two different levels of abstraction. Genre, or context of culture, can be seen as more abstract, more general - we can recognize a particular genre even if we are not sure exactly what the situational context is'. (p. 32) [15].

2.3. Errors and academic writing

2.3.1. Errors versus mistakes

It is important to make a clear distinction between the two confused terms an error and a mistake. Errors are considered to be systematic, governed by rule, and appear because a learner's knowledge of the rules of the target language is incomplete. Thus, they are indicative of the learner's linguistic system at a given stage of language learning. They are likely to occur repeatedly and not recognized by the learner. Thus, only the teacher or researcher can locate them (Gass & Selinker, 1993) [16]. For instant, a Vietnamese language learner may write "I do not know where does he come from". The auxiliary verb "does" he inserted is correct when he makes a question "where does he come from?" However, his interlanguage of indirect question is wrong and he does not notice of this type of error and does it repeatedly. In contrast to errors, mistakes are random deviations, unrelated to any system, and instead representing the same types of performance mistakes that might occur in the speech or writing of native speakers, such as slips of the tongue or pen, false starts, lack of subject-verb agreement in a long complicated sentence, and the like.

2.3.2. Errors in second language acquisition

It is agreed that errors made by second or foreign language learner is nothing serious. In fact, making errors is an evidence of the learning process. Corder (1967) [17] argued that what we term as "error" in L2 learners is actually a natural developmental stage, analogous to what children exhibit in acquiring a L1. Because nearly all children pass eventually through these stages to adult competence in the L1 without intervention, by extension, L2 errors should not be seen as problematic either. Willian (1981) [18] even asserted that errors are primarily in the eye of the beholder and especially in the minds of writing teachers wielding red pens - in other words, we notice errors in student writing because we are looking for them, not because they are truly bothersome. In other contexts, we might not even spot them at all. It comes to a conclusion that errors in academic writing is inevitable, especially for first year students who can be seen as novice writer. As teachers of academic writing, one should try to explain the errors in a way that can motive the learning process.

III. CONCLUSIONS

Academic writing in English is accounted as a complex process for English as a foreign language learners, especially for first year university students. There is a period of transfer from high schools where the focus of learning is on reproduction to critical analysis writing at research institutions. What tutors or instructors should do include setting them into a new "learning atmosphere" and giving them motivated feedbacks to errors that are inevitable in the journey that leads them to many new discoveries about themselves: Academic writing.

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Screening Of Different Rice Genotype Against Rice Blast (*Pyricularia oryzae*) At Gokuleshwor ,Baitadi

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Abstract- A field experiment to detect the response of different rice genotypes against rice blast disease under DSR condition at Mid hill during rainy season of 2017. Screening of different genotypes was carried out in a field against rice blast disease and checked in one factor RCBD with 3 replication and 9 genotype. The experiment was conducted to impart knowledge about the response of different genotype against rice blast disease. The disease severity, AUDPC was found high in Shankharika genotype while found low in Sabitri genotype. Thus the use of Sabitri genotype provide proper resistance against rice blast disease in rice under the hill region of Baitadi district under Direct Seeded Rice(DSR) condition.

Index Terms- Rice Blast, Screening, AUDPC, Disease Severity, Genotypes

I. INTRODUCTION

Rice (*Oryza sativa* L.) is the staple food for nearly half of the world's population. Worldwide, rice was grown in an area of 165.2 million ha with a total production of 741.0 million tons in the year 2016 (FAOSTAT, 2017). In Nepal, rice ranks the first position in terms of area and production, covering 1.49 million ha with total production of 5.0 million ton in the country with the productivity of 3.4 t ha^{-1} (ABPSD, 2014). There are indications that rice production will be further adversely affected by the biotic and abiotic stresses, caused by changing climate.

Rice blast is a serious disease and causes huge loss in rice production. It was locally known as "Maruwa Rog" in Nepali. Blast disease [*Pyricularia oryzae* (Synonym *P. grisea*)], is one of the most destructive disease in most on leaves, causing leaf blast during the vegetative stage or on nodes and panicle branches during the reproductive stage, causing neck blast (Bonman, 1992). Leaf blast lesions reduced the photosynthetic rate of leaves (Gyano Padhaya, 1992). Neck blast is considered the most destructive phase of the disease and can occur without before infection by leaf blast (Zhu *et al.,* 2005). Plant got highest disease incidence at maximum tillering stage then gradually declined, mainly due to adult plant resistance. More extended dew periods and frequent moisture stress in upland rice contribute to increase disease incidence (Gill and Bonman, 1988) and on tropical lowland rice it is found in seedling blast in nurseries and severe panicle blast (Bonman *et al.,* 1989) only.

II. MATERIAL METHODOLOGY

A total of 9 genotypes including local, improved and hybrid originating from the diverse sources were used in the study. All the genotype were collected from National Rice Research Programe, Hardinath, Dhanusha and Shankharika cultivar were used as susceptible check and Sabitri as resistant check. The genotypes details were as follows:

Treatments	Genotype
T_1	Radha 14
T_2	Cehering sub-1
T_3	Sabitri
T_4	TN-1
T_5	IR-87615-4-3-1-3
T_6	IR-09F-434
T_7	IR-87754-42-2-2
T_8	Sankharika
T_9	TOX 322-6-5-2-2-2-2

III. EXPERIMENTAL SITE AND PERIOD

The experiment was conducted in the research field of Gokuleshwor Agriculture And Animal Science College (GAASC) Gokuleshwor, Baitadi during first week of July to mid of October under rain fed conditions. Longitude: $80^0$50´ E Latitude: $24^0$75´ N, Elevations: 700 masl. A total of 9 rice genotypes including checks (resistant and susceptible) were evaluated in the blast disease screening nursery in a randomized complete block design followed with three replications.

Individual plot size was 1.5m^2. Susceptible checks were planted around each replications to check uniformity of infection.The cultivar Shankharika, were taken as susceptible check in the field to ensure presence of inoculum consisting of diverse races of the blast pathogen. Farm yard manure @10 t/ha, was mixed into soil two weeks before sowing, and chemical fertilizers were applied @60:30:0 kg NPK/ha through urea and di ammonium phosphate respectively. Heavy dose of nitrogen and no potash was used to insure adequate infection. Half dose of nitrogen and full dose of phosphorus was applied as a basal dose at the time of land preparation and remaining half nitrogen was applied at two split doses: one fourth at 15 days after sowing (DAS) and remaining one fourth at 25 DAS.

The observations on disease appearance were recorded from each screened genotypes. The resistance and susceptible check varieties were planted to check the uniformity of the inoculums distribution. Disease observation was started 14 days of seeding and a subsequent five observations were taken at an interval of 6 days by using the disease scale rating 0-9 (IRRI, 2002). Each row was scored for the disease. The details of disease scale are given in Table 1. The data obtained from the experiment were grouped into three categories as a resistant (R), moderately resistant (MR) and susceptible (S) types to determine the nature of genotypes.

Scoring was done by using the following 0-9 scale as described by IRRI (2002) and Ghazanfar *et al.* (2009). The score 0 was considered as highly resistant reaction whereas 1 as resistant, 2-5 moderately resistant, 6-7 as susceptible and 8-9 were considered highly susceptible.

Table 1 Scale for blast disease assessment (IRRI, 2002)

Scale	Infection	Host response
0	No lesions observed	Highly resistant (HR)
1	Minute brownish non-sporulating spots of pin point size under lower leaves.	Resistant (R)
2	Round, slightly prolonged necroticgray spots, of 1-2 mm in diameter, with a well defined brownish margin, little sporulating lesions mostly found on the lower leaves.	Moderately resistant (MR)
3	Spot same as in 2, but with a notable number of spots on the upper leaves.	Moderately resistant (MR)
4	Typically, heavy sporulating blast spots with 3 mm or more in length causing less than 2%infection on leaf.	Moderately susceptible (MS)
5	Typical blast lesions of 3 mm or longer infecting 2-10% of the leaf area	Moderately susceptible (MS)
6	Typical blast lesions of 3 mm or longer infecting 11-25% of the leaf area	Susceptible (S)
7	Typical blast lesions of 3 mm or longer infecting 26-50% of the leaf area	Susceptible (S)
8	Typical blast lesions of 3 mm or longer infecting 51-75% of the leaf area	Highly susceptible (HS)
9	Typical blast lesions of 3 mm or more in longer infecting more than 75% leaf area	Highly susceptible (HS)

Based on the scored value from estimation of the leaf area infestation the severity % was calculated per plot by using the following formula:

$$\text{Disease severity (\%)} = \frac{\text{Sum of all numerical rating}}{\text{Total number of samples observed} \times \text{Maximum rating}} \times 100$$

Estimation of area under disease progress curve (AUDPC)

The effect of disease severity on rice variety was integrated into area under disease progress curve (AUDPC) for the quantitative measure of epidemic development, disease severity and rate of progress which has no unit. AUDPC were computed, from the disease severities values from the formula given by Shaner and Finney (1977), Das, Rajaram, Mundt, and Kronstad (1992).

$$\text{AUDPC} = \sum_{i=1}^{n-1} \left[\frac{X_{(i+1)} + X_i}{2}\right] (T_{i+1} - T_i)$$

Where,

Xi = disease severity on first date
Ti= date on which the disease was scored
n= number of dates on which disease was scored

IV. RESULT AND DISCUSSION

Disease severity at different dates of scoring

Mean disease severity on the 15 DAS was 4.39. Lowest severity was observed in IR-87754 (0.74), while highest disease severity was observed in Shankharika (27.73) followed by Radha-14(22.22).Mean value of disease severity on the 22 DAS was 5.75. Least disease severity was seen in the Sabitri(1.11) and highest disease severity was seen in the Shankharika (32.21). It is followed by Radha-14(3.70).Mean value of disease severity on the 29 DAS was 8.06. The lowest disease severity was seen in treatment Sabitri (2.22). Highest disease severity was seen on the Shankharika (41.11), followed by Radha-14 (5.92). Mean value of disease severity on the 35 DAS was 11.07. The lowest disease severity was seen on Sabitri (4.07). Highest disease severity was seen on Shankharika (50.00), followed by Radha-14 (8.89) and TOX (8.88) respectively.

Mean value of disease severity on the 42 DAS was 20.07. Lowest disease severity was seen in the Sabitri (14.07). Highest disease severity was seen in Shankharika (56.29), followed by TOX (17.77) and Radha-14 (17.40) respectively. Sabitri was reported to be most resistant experiment by Manandhar *et al.* (1985) presented Shankharika to be most susceptible variety and established that it is adversely affected by blast pathogen. Shankharika was categorized as the most susceptible variety

which coincides with the result presented by (Manandhar *et al.*, 1985).

Table 2 Disease severity at different DAS

Genotypes	Disease severity on				
	15DAS	22DAS	29DAS	35DAS	42DAS
Cehering sub	1.85 [b]	3.33[b]	4.44[b]	5.55[b]	15.18[b]
IR-09F	1.48 [b]	2.22[b]	2.96[b]	4.44[b]	14.07[b]
IR-87615	1.48 [b]	2.59[b]	4.44[b]	7.04[b]	15.92[b]
IR-87754	0.74[b]	1.48[b]	3.70[b]	6.29[b]	15.55[b]
Radha-14	2.22[b]	3.70[b]	5.92[b]	8.89[b]	17.40[b]
Sabitri	1.11[b]	1.11[b]	2.22[b]	4.07[b]	14.07[b]
Shankharika	27.73[a]	32.21[a]	41.11[a]	50.00[a]	56.29[a]
TN-1	1.48[b]	1.85[b]	2.59[b]	4.44[b]	14.44[b]
TOX	1.48[b]	3.33[b]	5.18[b]	8.88[b]	17.77[b]
Mean	4.39	5.75	8.06	11.07	20.07
CV	30.81	38.22	33.16	25.29	20.58
LSD	2.34	3.8	4.63	4.84	7.15
Sem(±)	1.11	1.79	2.18	2.28	3.38

Treatment means are separated by Duncan's Multiple Range Test (DMRT) and the columns represented by the same letter (s) are not significantly different among each other at 5%

Effect of different treatments on Area Under Disease Progressive Curve(AUDPC)

Mean 1st AUDPC was found to be 35.54. Lowest 1st AUDPC was observed in Sabitri and IR-87754(7.77) whereas highest AUDPC was observed in Shankharika (209.82). Lowest 2nd AUDPC was observed in Sabitri (11.65) followed by TN-1(15.54). Highest 2nd AUDPC was observed in Shankharika (256.64). Mean 2nd AUDPC found was 48.38. Lowest 3rd AUDPC was found in Sabitri(29.99) and highest 3rd AUDPC was found in Shankharika (273.33). Mean 3rd AUDPC was found to be 57.4. Lowest 4th AUDPC was found in Sabitri(63.49). Highest 4th AUDPC was observed in Shankharika(372.02). Mean 4th AUDPC was found to be 109.01. Highest total AUDPC was observed in Shankharika (1111.82) whereas lowest Total AUDPC was observed in Sabitri (101.78). Mean total AUDPC was found to be 250.34.

Table 3 1st AUDPC, 2nd AUDPC, 3rd AUDPC, 4th AUDPC of different treatment.

Genotypes	AUDPC1	AUDPC2	AUDPC3	AUDPC4	Total AUDPC	Mean AUDPC
Cehering sub	18.13[b]	27.20[b]	22.21[b]	72.57[b]	147.91[b]	36.97[b]
IR-09F	12.95[b]	18.13[b]	44.45[b]	64.79[b]	118.09[b]	29.52[b]
IR-87615	14.24[b]	24.61[b]	42.22[b]	80.36[b]	153.67[b]	38.41[b]
IR-87754	7.77[b]	18.13[b]	34.45[b]	76.47[b]	132.26[b]	33.06[b]
Radha 14	20.72[b]	33.69[b]	30[b]	92.02[b]	190.89[b]	47.72[b]
Sabitri	7.77[b]	11.65[b]	29.99[b]	63.49[b]	101.78[b]	25.44[b]
Shankharika	209.82[a]	256.64[a]	273.33[a]	372.02[a]	1111.82[a]	277.95[a]
TN-1	11.65[b]	15.54[b]	21.11[b]	66.10[b]	114.40[b]	28.60[b]
TOX	16.83[b]	29.80[b]	18.87[b]	93.31[b]	182.17[b]	45.54[b]
Mean	35.54	48.38	57.4	109.01	250.34	62.58
CV	32.72	34.56	28.05	21.82	26.68	26.68
LSD	20.13	28.94	27.87	41.17	115.62	28.9
Sem(±)	9.49	13.65	13.15	19.42	5	

Treatment means are separated by Duncan's Multiple Range Test (DMRT) and the columns represented by the same letter (s) are not significantly different among each other at 5%

V. CONCLUSION

Rice blast is the major fungal disease caused by *Pyriculaira oryzae* a field experiment to determine the response of different rice genotype under DRS condition at vegetative stage during rainy season at Baitadi. Nine rice genotype were shown in randomized complete block design. The experiment was limited to vegetative stage and its purpose was to identify the resistant and susceptible genotype among the different rice genotype collected from the NRRP, Hardinath, Dhanusha.

Shankharika was found most susceptible and Sabitri, IR-09F and TN-1 were found to be resistant and other were found to be moderately resistant. As Shankharika was found to be most susceptible to the blast on the field and lab condition as NARC has describe in both Midhills and Terai, Sabitri was found to be most resistant among all genotype, further research is recommended on other genotypes above for further certainty in addition further research work such as comparison of plant yield with disease can be done and also molecular study of plant genotype is further recommended.

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Gayed Najah Yousef (G.N.Y) model for disclosure of social responsibility according to the objective of expenditure

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Abstract- Social responsibility is only a commitment of companies towards the society in which they work for, by contributing to a range of social activities such as fighting poverty, improving and providing service, combating pollution, creating employment opportunities, solving the problem of housing, transportation, etc. This commitment maximizes the positive effects of activities of companies to society and reduces the negative effects of those activities as much as possible.

This study aims at forming the "G.N.Y" model for the disclosure of social responsibility by dividing the costs of social responsibility according to the purpose of spending, by presenting the concept of social responsibility, its activities and the points of views in the ways of disclosure.

The importance of this paper lies on introducing of the "G.N.Y" model, which is easy to apply and adapt. It preserves the main objective of companies, which maximizes profits, and entirely depends on the need of users to the outputs of the accounting system.

Index Terms- (G.N.Y, Social Responsibility, Spending), Cost

I. Introduction

The social responsibility is a phenomenon that is subject to multiple perspectives that form the framework for the development of this concept. The social responsibility means a moral obligation to companies towards the society in which they work to deal with their damage resulting from the implementation of their activities, as well as contributing to the protection and development of the environment and society and improve the quality of their products (1).

II. Research Problem

The problem of the research is the divergence of views on the nature and ways of disclosure of social activities between the integration or separation of social and economic costs in the financial statements and the ways of presenting of these activities in the financial statements or in the form of descriptive reports. The problem of the research (the presented models neglect the main objective of companies and the need of users of financial statements for information that helps them in making their investment decisions).

III. Research Methodology

This study is based on the inductive method of the social responsibility cost elements as one of the methods applied in most of the studies and researches related to the subject of the study. A group of specialized scientific researches and journals, studies published in periodicals and on the internet, have been analyzed and discussed to achieve the objectives of the study and reach conclusions and recommendations to contribute enriching knowledge and guide companies in appropriate manners to disclose the social responsibility.

IV. Concept of Social Responsibility

There are several definitions of the concept of the social responsibility. The concept of the social responsibility is still developing with the development of society. There is no a final list of the areas and issues covered by it. The common denominator among most definitions is that the concept of the social responsibility that the social and environmental activities of institutions aimed at improving their image in the society.

Drucker, 1977 defined the social responsibility "it is the obligation of enterprise towards the society in which it operates", 2 and Holmos's view, 1985 " it is an obligation to the business towards the society in which it operates by contributing to a wide range of social activities, such as fighting poverty, improving health services, combating pollution, creating jobs and solving the problems of housing and transportation, etc. "(3).

Al-Shirazi, 1990 defined the social responsibility as "a set of activities that measure and analyze the social performance of a particular economic unit and transfer that information to the relevant groups in order to help them make the right decisions and assess the social performance of the unit".

Pride, 2005 identified the social responsibility as "acknowledging that business activities have an impact on society and that impact on business decision-making" where Williams, 2002 presented it as "the commitment of the business sector to pursue policies and actions that benefit society".

The World Business Council for Sustainable Development defined the social responsibility as "the continued commitment of business companies to act ethically, contribute to economic development and improve the quality of living conditions of the workforce, their families, the community and the society as a whole".

While the American Accounting Association defined the social responsibility as "the measurement and reporting of processes related to the impact of project activities on the society".

Others defined the social responsibility as "the moral responsibility of the organization towards the stakeholder group that is directly or indirectly affected by the organization works, and this definition shows that morals plays a major role in the social responsibility".(3)

Therefore, it might be defined as a process of interpreting, defining and measuring positive and negative social events of economic unit and transferring it in a form of information to internal and external parties benefiting from the operations of the economic unit of its social activities, whether these activities voluntary or mandatory and to measure that impact on the economic unit, local society and the surrounding environment.

V. Objectives of Social Responsibility Accounting

The objectives of accounting for social responsibility are as follows: (5)

First, to identify and measure the net social contribution of the organization, which includes not only the elements of the internal and external costs and benefits of the organization, but also the elements of the external costs and social benefit that have an impact on the society.

Second: to evaluate the social performance of the organization by determining whether the organization's strategy and objectives are in line with the social priority on one hand and the organization's ambitions for the individuals to achieve a reasonable percentage of profits of profits on the other hand. The relationship between the performance of the organization and its social welfare represents an essential element of the goal of the social responsibility.

Third: to disclose the activities carried out by the organization that have social impacts (the impact of the organization's decisions on the education and health of workers, the pollution of the environment and the consumption of resources).

VI. Historical Development of Social Responsibility

The historical development of the social responsibility goes through five stages: (1)

a. The stage of maximizing profits: The first phase of the nineteenth century to the first quarter of the twentieth century. The period of profit maximization witnessed the emergence of the social responsibility and is linked to the establishment of the industrial enterprises and the belief of businessmen that their sole goal is to maximize profits, regardless of their responsibilities towards the community without taking into account their positive or negative effects on the society.

b. The Industrial Revolution Stage: This phase extends from the end of the first quarter of the 20th century until the end of the Second World War. The Social responsibility emerged more during this period as a result of many factors that contributed significantly to the development of the concepts and principles of the social responsibility. The most important factors are as follows:

• Expanding industry and using machinery and equipment more.

• Changing trends, there is a growing evidence that consumers are influencing the company to carry out its responsibilities, as well as sometimes increase political influence.

• The emergence of demand streams to ensure safety and security at work, reduce working hours, and protect the rights of different parties. The idea came here to meet the needs of the society in general, and that the company should not only look at profits, but it should extend to the budget in its responsibilities towards other relevant parties represented in consumers and employees.

c. The stage of the emergence of trade unions: This period extends from the end of World War II until 1960, and witnessed the emergence of trade unions, which led to a confrontation between the administration and the trade unions. This stage is characterized by the growing strength of trade unions. It has become a significant force in terms of impact on the decisions of the company. The development of the means of communications has played a major role in educating communities in some countries such as Britain and France. This has led to an the increment of awareness of the social responsibility. It has also been characterized by the large number of cases before the courts for reasons related to important aspects of violations by companies against society, related to consumer's health, such as food poisoning cases and work injuries, in addition to various environmental violations.

d. The stage of increasing the negative effects of companies: This period extends from 1960 until 1970, as there were factors that led to increased attention to the social responsibility and the emergence of its role more like the employment of young people at work, the use of technology, environmental pollution caused by companies and caused by different causes and actions, Were accidental or intentional, as well as threats to workers' health and safety from raw materials used in production.

e. The stage of international conventions and local laws: This stage extends from 1970 until now, as this phase is reflected in the appeals and protests in the previous stages in the formation of laws and ethical constitutions. Countries have started before the companies to formulate and adopt such legislations. The social goals and the willingness to adhere to moral values, which clearly appear in corporate slogans and their messages. The Global Charter of Social Responsibility, launched at the United Nations Headquarters in New York by the Secretary-General of the United Nations on 26 July 2000, presenting a set of key principles and establishing the concepts of cooperation between communities and companies in which they operate, as the Charter contains a set of principles such as companies respect human rights in accordance with international conventions, and non-discrimination between employees, use and promote the use of environmentally friendly technologies in manufacturing, and fighting against all forms of administrative corruption.

VII. Dimensions of Social Responsibility

Many researchers have concluded that business organizations carry out a number of social responsibilities, each is trying to define the dimensions of the social responsibility in different points of view, setting different causes and reviewing the literature. We notice that the dimensions of the social responsibility of the organization are interrelated and integrated with each other to form the ultimate philosophy of the social responsibility that the organizations seek to adopt, and to achieve the desired benefits, so the dimensions of the social responsibility are in the following (8):

a. The economic dimension: It is intended to be a useful and economically viable organization, and to strive to provide safety for others, where the relationship between the economic performance and the efficient and effective implementation of works to reach the results that achieve maximum profits.

b. The legal dimension: It is intended to comply with the laws, regulations and instructions that should not be violated by the business organizations and respected by the state, and in the case of the contrary, they are subject to legal problems.

c. The moral dimension: In the sense that the organization is based on ethical principles, and that it is committed to the right actions and refrain harming others.

d. The human dimension: That is, the organization is sound, that it contributes to the development of society, and that it works to improve the quality of the welfare of society.

VIII. Benefits of the Organization's Adoption of the Social Responsibility

The benefits of corporate that the social responsibility achieve for the corporate are divided into two parts: (6)

a. Benefits to the organization are as follows:

- High productivity of employees.
- Greater loyalty of employees.
- Decrease in the number of judicial cases.
- High satisfaction of consumers.
- Improve the reputation of the organization, thus increase its sales.
- Increase in the value of the organization's shares.

b. Benefits to the communities are as follows:

- Enhancing basic rights (health, education, workers' rights, etc.).
- Contribution to development.
- Improving the environment.

IX. Social responsibility trends

The first trend: takes into account the social performance of economic unit combined with economic performance in traditional accounting reports. The trend means here (integration) to integrate economic activities with social activities in single reports to express the overall performance of the economic unit.

The second trend: Accounting of the social responsibility is considered a new view of accounting, taking into account the viewpoint of the society, and according to this trend accounting of social responsibility, in the form of a general framework of the branches of other accounting, both financial and administrative is considered.

The third trend: In this trend, accounting of the social responsibility is seen as a subsidiary theory, along with other theories of the accounting science. This trend means independence, making accounting of the social responsibility a branch of accounting such as: financial accounting - management accounting - cost accounting – human resources accounting.

X. Disclosure of social responsibility

It is the presentation of data and information on the social activities in a way that can assess and evaluate the social performance of the business organizations.

First: Separate social reports: The social responsibility reports in this way take one of three forms: (8)

1. Descriptive reports: Describe in a retell, narrative or story-telling manner of the social activities undertaken by the project and describe those activities in fulfillment of the social project obligations, which are usually voluntary commitment activities of the project, without attempting to evaluate and analyze the costs and benefits of such activities.

2. Reports on cash measurement of cost elements: Reports that disclose the costs side of the impacts of the social project activities without tackling the value of the benefits achieved by those activities. The benefits are not disclosed in these reports because they are difficult to measure. Two types of the lists of this kind of report can be presented here:

a. List of cash flows for the social activities: This list includes all the amounts spent by the project on pollution control, environmental protection, charitable donations and other benefits for employees, where all the amounts spent by the project are seen as benefits to the community. In the end of the list, the total costs of the social activities are shown as a percentage of the value of the sales or advertising expenditures. For example, to see how well the project is contributing to the social activities.

b. List of socio-economic activity: This list is prepared periodically with the traditional financial statements to provide the social information needed by various groups interested in the social and economic dimensions of the project. Social activities are also classified, in the socio-economic activity list, into three groups, each represents a key area of the social responsibility: individual activities, environmental activities, product activities of a commodity or service. The components of these three areas are divided in terms of their respective impacts into cost of improvements and subtracting the cost of damage.

3. Cash measurement reports for the cost and benefit components: These reports disclose both the costs and benefits of the project's social activities, and are known as input and output reports. They are more comprehensive because they include both the costs and the benefits of the social activities, so that those who are familiar with these reports can obtain a fairly adequate picture of the social performance of the project, although the measurement of benefits is difficult as noted above. As most of them are not achieved for the project but for the society in general. In addition to, the difficulty of determining a cash value of most benefits, unless the personal assessment is used and therefore may not rely on the results significantly. In these reports we can distinguish between the social income list and the list of impact of the social development, as follows:

a. Social income statement: This list shows the net profits or social losses, which reflects the net contribution of the project to the community. The net profits or social losses are reached by adding the amount of the value added by the project. This amount is known as external economic savings or social benefits and the costs are deducted from the product imposed by the project on the society, i.e he value of damage to society as a result of the project's economic activity. These damages are defined as negative effects of the external or social costs. This list begins with the end of the economic activity as a starting point in this list, which is the value added (net accounting profit) and this list is comprehensive.

b. List of social impact: According to this list, the benefits are determined on the basis of the value of the benefits to the community, while the costs represent the value of the sacrifices made by the community for the project or the damages caused by the project to the society. The social benefits according to this list include all the benefits that the project has provided to the community and gained something against it. As well as all the benefits for which no income has been received or for which compensation has been received but not sufficient. The social costs are any sacrifice or damage to the community or to one of its components, which include all the sacrifices made by the community to the project and the project is paid for. The social costs also represent the value of the damage caused by the project to society

II. Integrated financial and social reports: This trend is based on giving a comprehensive picture of the overall performance of the project, so that both social and financial information are integrated into a single report and integrated within the traditional financial reporting framework. So that the social information becomes part of the financial information. Supporters of this trend rely on two main arguments: (9)

• Social activities actually affect the results of economic activity and therefore should be reflected in the financial reports or else, their results are misleading.

• The project is one single, indivisible unit, and therefore both its economic and social objectives are integrated and together represent the overall objectives of the project.

Two types of consolidated reports can be presented as follows:

1. Profit list amended with the settled burdens of the social responsibility: This list aims at showing the effects of the environmental and social contributions of the project on the net profit. The impact of the environmental and social contributions imposed by the sovereign decisions on this profit, as well as the impact of optional environmental and social contributions.

2. Statement of financial position adjusted by the impact of social contribution: This list aims at providing information on resources available for use in environmental and social performance and the corresponding rights of others. This is useful in identifying the elements of wealth that generate environmental and social contributions in the future. And the corresponding funds allocated by the project for acquisition.

XI. Justifications for disclosure of social activities

By looking at and tracking of the historical development of the social responsibility, it is clear that the purpose of spending on the social activities did not stem through the moral aspect of companies. It is the result of the pressure exerted by the trade unions and professional associations concerned with the social responsibility and the obligations of the international charters to abide by the moral values of respect for the human rights and the protection of the environment.

Therefore, some of the views calling for the disclosure of the social responsibility can be criticized through several aspects:

The first aspect: The principle in the emergence of the social responsibility as the main goal of companies is to maximize profits first and last, and no doubt that the social costs are a burden on the profits and therefore do not prefer to separate them from the economic activity.

The second aspect: Some methods of disclosure address the disclosure of the social benefits, which are undoubtedly difficult to measure the financial values or determine the size of these benefits, even if estimated.

The third aspect: The separation of the economic activity from the social activity gives misleading information to the users of the lists or the decision makers as the quality of the product.

The fourth aspect: There is no doubt that the use of the social responsibility by companies has a special purpose and related to the economic activity, whether it is related to the continuity or to the futures contracts or marketing of their products.

The social activity can therefore be seen as an integral part of the economic activity and must be considered in terms of the purpose of expenditure.

XII. Division of social activities in terms of the purpose of spending

1. Self-costs: These costs arise from the company without a binding law, and can be divided into two types:

a. Non- economical-feasibility costs: They are derived from ethics to help and contribute to the society without any economic feasibility, and are considered as donations, provided that there is no announcement of the company or its products.

b. Effective costs with economic feasibility: These costs are related to improving the quality of the product in order to increase their sales, and are considered to be part of the costs of the product.

2. Advertising costs: These costs are spent by companies on the social responsibility for the purpose of promoting and advertising of the company, which show the strength of the company and its status in the community, such as support of scientific conferences, contribution to afforestation and construction. They differ from donations with an offer for the name of the company as a shareholder or supporter, and these are among the marketing expenses.

3. Compulsory social costs: These costs are of a mandatory nature and have binding laws. Companies are exposed to complaints and penalties if they violate laws, such as health, environmental protection and waste disposal laws, which are considered as costs to these companies, which led companies to establish their factories in countries where there are no laws to protect the environment or weakness of its laws, or the countries with the most administrative corruption to get rid of the burden of these costs, and the treatment varies in the income statement according to the cost centre.

The following diagram shows the breakdown of social activities in terms of expenditure target:

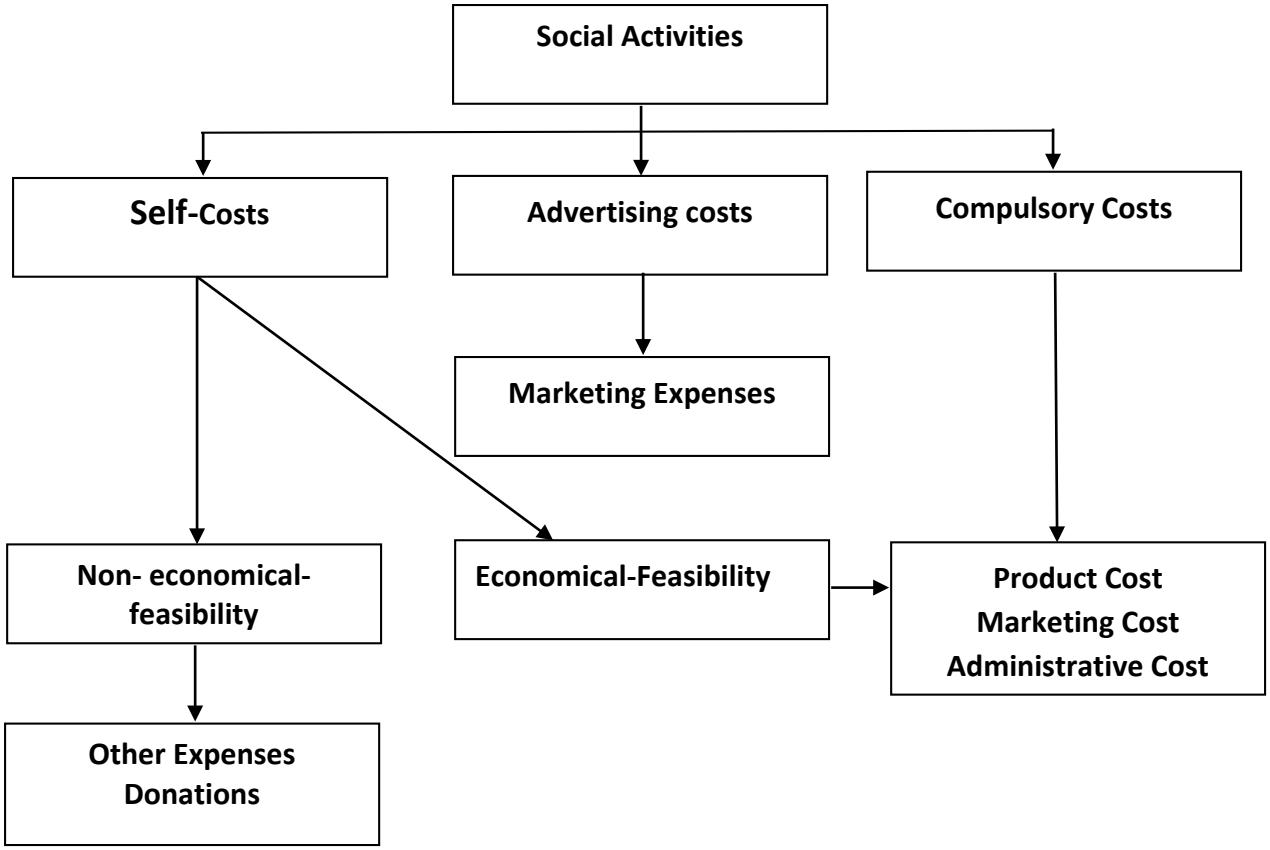

Figure (1) illustrates the division of the social activities in terms of expenditure.

XIII. Explanation of the Proposed Model

1- The model is divided into four activities:
a- For the social activities of the product.
b- For the social activities of the employees.
c- For the environmental social activities.
d- For the social activities of the community.
2- The model demonstrates the legal obligation for the benefit of the users to make decisions, as well as the voluntary obligation.
3- One of the social responsibility symbol "A, B, C, D" shall be placed on the item both in the income statement or in the statement of the financial position list.
4- The data exists in the proposed model "G.N.Y" is hypothetical.
5- The attached model only represents the general form of the model (G.N.Y) and not the final form.

Model G.N.Y

No	Social activities	Obligatory		Unit	Description
		compulsory	reality		
A	Social activities of product				
A-1	Product quality	Standards of quality of Libyan food	Standards of WHO	--	The standards of WHO are higher the quality standards of Libyan food quality
A-2	Packing	Standards of quality of Libyan food	Standards of WHO	--	The standards of WHO are higher the quality standards of Libyan food quality
A-3	Prices	--	--		The products of the company have been suitably priced to all parties and in competition prices to similar products
B	Social activities of workers				
B-1	Nature and Safety of workers	BS OHsas18001	ISO45001	--	The ISO45001 in instead of BS OHsas18001 and it is better quality
B-2	Appointing workers with special needs	7%	9%	Out of total workers	The company appointed 22 workers with special needs in equivalent salaries of normal workers considering their disability percentage.
B-3	Workers' training programs	--	20	Out of total workers	20 persons of the company personnel have been trained according to a training plan for all workers
C	Social activities of environment				
C-1	Lands	Libyan Environment legislations	Libyan Environment legislations	--	The company applies the Libyan Environment legislations binded by them
C-2	Air	Libyan Environment legislations	Libyan Environment legislations	--	The company applies the Libyan Environment legislations binded by them
C-3	Area afforestation	5000		Tree	The company raised their contribution in protecting the environment by allocating bigger area for afforestation
D	Social activities of community				
D-1	Settling income tax	3	1	Month	Payment is effected according to the Libyan legislations and within the legal period
D-2	Settling social insurance	3	3	Month	Payment is effected according to the Libyan legislations and within the legal period
D-3	Donations	--	135000	LD	The company donated as a contribution in building a health centre and the deductable amount is from the income LD 25000

XIV. Result ,Recommendations and Conclusions

First: Results

1. Not to harm the accounting system of companies or modify thereof.
2. Social costs are an integral part of the economic costs of the economic unit.
3. The "G.N.Y" model is the only form that illustrates binding and voluntary social activity.
4. Adoption of the model on the need for users of social responsibility information to ensure that the company does not violate the laws.

Second: Recommendations

1. Taking care of the social responsibility by professional institutions and organizations and issuing laws and standards binding on companies to disclose and punish those who violate them.
2. Integrate social responsibility costs into economic costs because they are an integral part of the economic unit.
3. Disclosure by marginalization in the financial statements by taking the symbols "A, B, C, D" and to be described in the "G.N.Y" model, which demonstrates the legally binding and non-binding giving the fact that companies voluntarily contribute in as a social responsibility.

4. Compelling users to apply the "G.N.Y" model for their need to see whether companies comply with laws and regulations.

Third Conclusion:

1. Maintaining of the main objective of companies "maximize profits".

2- Adopting of the model on the need of users of the financial statements and the extent of the company's compliance with the laws to avoid fines and penalties.

3. The possibility of modifying the model to modify (add and include disclosure) according to the laws of each country or to add any non-legally binding disclosure.

4. Reduction of application cost and its easiness.

5. Does not violate the accounting system and there is no need to evaluate, adjust and separate the social costs from economic costs.

6. It does not influence the decision-making process such as goods pricing because there is no separation of costs.

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Identification of Potent Inhibitors against Potential Drug Target for Schizophrenia Trough Virtual Screening Approach

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Abstract- **Background:** Schizophrenia is related with physiological condition. It affects brain sections including the prefrontal cortex, the basal ganglia as well as limbic system. There are certain neurotransmitters present in the brain such as dopamine. When level of dopamine is disturbed it causes schizophrenia. Environmental factors like stress, depression and anxiety also contribute to schizophrenia. Several drugs including first and second generation are available to provide treatment against schizophrenia. Second generation drugs have better results and fewer side effects than first generation. Clozapine is second generation drug which was recommended as best drug for schizophrenia. It rebalances dopamine and helps to treat the patients of schizophrenia as well as diminishing of suicidal thoughts. Therapies and counseling also help to overcome this disorder. Dopamine Beta Hydroxylase catalyzes the synthesis of norepinephrine. Dopamine beta hydroxylase activity was suggested as a biological marker for schizophrenia alongside other psychiatric disorders.

Objective: To identify best inhibitors for schizophrenia by using ligand and target based virtual screening with Dopamine Beta Hydroxylase as target and to predict 3D structure of the target protein.

Material and Methodology: For this study, different databases were used. Structure and potential lead molecules were identified by the help of structure as well as ligand based virtual screening. Auto Dock is used for virtual screening based on target. For ligand based virtual screening ZINC 15 database was used. Compounds were selected and further screened by using PyRx software. The ligands with less binding affinity were selected for analysis. Structure and interactions are viewed in DS visualizer tool and protein ligand explorer. Virtual screening is used for computational screening of huge library of chemicals for the compounds which supplement targets of known structure by testing them experimentally. Ligands were screened by using PyRx server and ZINC 15 server. AutoDock is used to dock ligands against drugs and display results. On the basis of binding energy and affinities, ligands were Chosen.

Results: Binding Affinity and Root Mean Square Deviation of Ligands obtained by using PyRx Virtual Screening software Binding energy of ligands with target ranges from -10.1 to -6.7. The binding affinity of ligand ZINC 000095550333 is - 9.7. ZINC 000036089409 binding energy is -9.5. Ligand ZINC 000036089465 has binding energy of -9.3. Binding affinity of ligand ZINC 000095550333 is -10.3. Binding affinity of ZINC000004292831 is -10.1. Binding affinity of ligand ZINC 000036089410 is -9.8. Ligand ZINC 000036089465 has binding affinity of - 9.3. On the basis of interactions and best ligand binding energy with target Ligand 4zl_ZINC000004292831 is consider as best. Virtual screening of ligands against target by PyRx ligands are placed in the lowest to the highest order on the bases of their Interactions and Binding Energy binding energy ranges from -10.3 to -6.7 Ligand ZINC000095550333 is shows best interaction and ligand energy with target having Binding Energy of -10.3.

Conclusion: As for computational analysis, it emphasizes diverse ligands by using different servers which can act as best target against schizophrenia. Further nature of ligand will be explored by in-vitro and vivo analysis. Interaction of ligands with lead molecules suggests that auxiliary analysis of these drugs will give a way towards the treatment of schizophrenia.

Index Terms- VS (Virtual Screening), CADD (Computer Aided Drug Design), LBVS (Ligand Based Virtual Screening), SBVS (Structures Based Virtual Screening),

I. Introduction

Schizophrenia is associated with mental illness and considered as messy thoughts with anomalous behaviors as well as anti-social behaviors (1). It affects around 1.1% of the world's population. In 19th century about 3.5 million people have been affected with schizophrenia (2). Accurate causes of Schizophrenia are unknown but researchers claim that it can be parent's genetic transfer to children. Environmental stressor, neglected home environment, disturbed level of chemicals like dopamine and changes in brain chemistry like size of brain also add up to schizophrenia (3). "Psychosis" is a common state in schizophrenia in which mental damage is marked by hallucinations. In these state conflicts of sensory perception as well as delusions occurs which affects person's ability to differentiate real from unreal experiences (4)."

II. Discovery

Kraepelin was the first person to classify schizophrenia and further forms of psychosis in 1887. The Swiss psychiatrist, Eugen Bleuler, coined the term, "schizophrenia" in 1911 transforming the name. The word "schizophrenia" originates by the Greek era where schizo (split) and phrene (mind) define thinking of people by the disorder (5). Both Bleuler as well as Kraepelin define the diverse subtypes of the disorder. Over the years, those working in this field have made continuous efforts to classify schizophrenia types. As a result five types were demarcated in the DSM-III: disorganized, catatonic, paranoid, residual, and undifferentiated (6). The first three kinds were formerly proposed by Kraepelin. Such categorizations being still engaged in DSM-IV, have not yet revealed to be supportive in expecting conclusions of the disorder (7). In 20th century four major classes of symptoms were recorded by many experts who agreed to ensure it in schizophrenia: positive, negative, cognitive and affective symptoms (8).

Genetic Variation:

Schizophrenia is also a multi factorial disorder followed by several genetic susceptibility elements. Family linkage as well as chromosomal anomalies is supplementary to schizophrenia. Genetic studies confirm that dysfunction of dopaminergic or N-methyl-D-aspartate (NMDA) receptor-mediated signaling were main donating aspects in schizophrenia pathogenesis (9). Minor deletion in the area of chromosome 22 called 22q11 might be involved in causing schizophrenia. Susceptibility for schizophrenia on loci 13q, 22q11-12 and 8p21-22T being minor deletions might count up to 2% of schizophrenia (10). More genes such as Val66, Met GAD1, DISC1 Neuroregulin 1 (NRG1), COMPT (catechol-O-methyl-transferase) [(10)] DTNBP1 (dysbindin), ALC6A3, DRD3 and SLC184 also contributed in schizophrenia (11). C4 appears to be involved in excluding connections among neurons. Variations in number of copies of C4 gene helps in predicting how the gene were arranged in the brain and could cause schizophrenia (12).

Pathophysiology:

At macroscopic level it has been founded that the brain of schizophrenia patients is different from normal person's brain so the total cerebral volume is reduced, total ventricular volume is more, the total cortical grey matter is less and the hemispheric asymmetry is reduced. The brain of schizophrenia patients has irregular distribution of neurons. Behavioral and neural system effects of computerized social cognitive training exercises in schizophrenia. Schizophrenia Research, 153, S4. In synapses, synaptic terminals show slight morphological modifications (13). Dopamine being broadly considered as a neurotransmitter which is important in the pathology of schizophrenia (14). At molecular level neurotransmitter systems seem to be affected by dopaminergic neurons (9). Dopamine being broadly considered as a neurotransmitter which is important in the pathology of schizophrenia (15).

Dopamine β- Hydroxylase:

Dopamine-β-hydroxylase catalyzes the formation of norepinephrine by dopamine (16). Mutations in such gene cause Dopamine β-Hydroxylase deficiency in patients. Polymorphisms in this gene play a part in a range of psychiatric disorders (17). Dopamine hydroxylase deficiency leads to genetic disorder that affects patients so norepinephrine, epinephrine, and octopamine cannot be synthesized in both central nervous system and peripheral autonomic neurons (18).

Treatments for Physiological Disorder:

Psychosocial treatments and antipsychotic medication will help patients suffering from schizophrenia. According to the current Diagnostic and Statistical Manual of Mental Disorders (DSM 5), there were about 400 different psychological disorders (19). Common examples of that include bipolar disorder and schizophrenia. Several forms of psychotherapy like cognitive therapy or behavioral therapy are founded to effectively treat several disorders (20). Effects of medication and psychotherapy often seem to provide long-term treatment. Psychotherapy and medication along with family members support by humility courage is advised to be the best choice. Since families will make sure their loves ones keeps their treatment as well as medications (21).

Drug Designing:

Drug designing is the innovative development of finding new medicines base on the knowledge of biological target. Such methods are used to identify novel inhibitors against Schizophrenia. Clozapine is considered as inhibitor for schizophrenia."

The Dry Lab Technique:

Dry laboratory technique de novo a drug making procedure in which the drug is designed by using computer."

Computer Aided Drug Design (CADD):

Drug discovery and emerging with a novel medicine is difficult, costly and a risky procedure. However, CADD provides numerous tools which helps in several stages of drug design thus reducing the cost of research as well as progress time (22). This is one of the reasons why computer-aided drug design (CADD) methods are being broadly used.

Importance of CADD:

1- To provides efficient and safe targets for drugs.

It determines new tools and techniques to support drug discovery process which in turn helps in reducing both cost as well as time taken for developing drug rather than the conventional methods. It also assists in improving different phases of drug [(23)].

Types of Drug Designing:

There are two major types of drug designing
1. Ligand based drug designing
2. Structure based designing

1- Ligand Based Drug Designing:

In lack of 3D structures of possible drug targets, ligand-based drug design is one of the best methods for drug discovery and lead optimization. 3D structure-activity relationships (3D QSAR) and pharmacophore modeling are significant and generally used tools in ligand-based drug designing (23). They provide decisive insights into the nature of interactions among

drug target and ligand molecule. Moreover, they also help in providing predictive models appropriate for lead compound optimization.

2- Structure Based Drug Designing:

It combines power of several scientific disciplines, such as X-ray crystallography, NMR Molecular modeling, Enzymology and Biochemistry, in a functional model of drug development (24). SBDD lies in parlaying enzyme inhibitors into drugs.

Aims of Drug Designing:

1. It provides better understanding of drug discovery and development process.
2. It covers the basic principles on how new drugs are discovered.

III. RESEACH QUESTION

How Dopamine β- Hydroxylase Causes Schizophrenia?

Dopamine hydroxylase catalyzes the synthesis of norepinephrine from dopamine in schizophrenia, tyrosine hydroxylase is overactive that results in an even higher concentration of dopamine so this causes imbalance of chemical in brain and leads to schizophrenia."

Which genes are Susceptibility Genes for Schizophrenia?

Table 1.1 Susceptibility Gene for Schizophrenia

S.NO	GENE	PROTEIN
1	DISC 1	Disrupted in schizophrenia 1 protein
2	DRD2	D(2) dopamine receptor
3	DRD3	D(3) dopamine receptor
4	DRD4	D(4) dopamine receptor
5	BDNF	Brain-derived neurotrophic factor
6	COMT	Catechol O-methyltransferase

IV. MATERIAL AND METHODS

Virtual Screening:

Virtual screening is a technique currently used in drug discovery. Millions of molecules are verified using silico (25). The main goal is to only choose the best targets for drug and testing them in later stages.

It is evaluated that an individual drug discovery cycle through lead identification passes via clinical trials and takes 14 years costing approximately 800 million US dollars. In 1990s, fast progression was made in the fields of combinatorial chemistry and HTS technologies which presented great potential to accelerate the drug designing process (26). It permitted massive libraries of compounds that were being synthesized and screened in a short period of the time. It introduced a dominant technique for identifying hit molecules as a starting point for medicinal chemistry (27). VS method is used in the area of drug designing.

Types of Virtual Screening:

VS were divided into following categories:
1. Ligand-Based Virtual Screening
2. Structure-Based Virtual Screening

1- Ligand Based Virtual Screening (LBVS):

Ligand-based virtual screening tools take existing active molecules as preliminary point for verdict novel drug candidates (28). LBVS approach employs structure-activity data by a set of known actives to identify candidate compounds for experimental evaluation (29). LBVS approach includes different methods like similarity, substructure searching, (QSAR), pharmacophore and 3D shape matching (30). Clozapine is inhibitor of schizophrenia it blocks the expression of excess dopamine and stable level of dopamine. Ligand based virtual screening was preformed via ZINC database. "

2- Structures Based Virtual Screening (SBVS):

SBVS consumes the 3D structure of biological target (determined either experimentally through X-ray crystallography, NMR or computationally through homology modeling) to dock the candidate molecules and ranked them centered on their expected binding affinity or by complementarity to the binding site .VS show the series of likely targets to deliver an account of broad approach and to expose potentials for accurate goals. DBH model is used was used for structure based virtual screening. The structure based virtual screening helps in identifying such molecules that have capability to attach with active site of Dopamine Beta Hydroxylase. Auto dock is used for structure based virtual screening."

Tools for Virtual Screening:

PyRx Based Virtual Screening:

PyRx is Virtual Screening software for Computational Drug Designing which is used to screen libraries of compounds for drug targets. It permits Medicinal Chemists to run VS from every platform. It comprises of docking wizard that marks a valued tool for CADD (31). PyRx also includes visualization engine which are vital for structure-based drug design. Library of lead molecules were screened by PyRx beside protein DHB. The molecules were docked and placed according to scores energy and RMSD. The top molecules were chosen for further study. All ligands were evaluated by docking through PyRx. The docked ligand molecule complexes were arranged on the basis of binding affinity with lowest energy to the top. In virtual screening on the basis of ligand Molecule were screened by using Dopamine beta hydroxylase as precedence model for this purpose.

Zinc 15:

ZINC 15 is a server which has publically accessible compounds for virtual screening. It encompasses about 35 million available ZINC 15 screened 140 ligands compounds in ready-to-dock; 3D formats (32). The drug binds to the protein and the binding affinity of drugs obtained by virtual screening ranges from 6.7 to 10.3.

DS Viewer (Discovery Studio):

DS permits a mechanistic sympathetic of a molecule's structure which can be viewed so clearly in sight. It also shares among computational modeling authorities and helps cooperating

team associates. It comprises Quality Graphics as well as handled huge macromolecule systems (i-e Ribosomes). It supports variety of stereo graphics selections (E.g., split screen, hardware stereo**).** The interactions of ligand and protein dopamine Beta Hydroxylase were seen along the types of boding and bond distances in DS Viewer."

Swiss Similarity:

It is a web tool designed for quick LBVS to unprecedented ultra-huge libraries of small molecules. It includes screen able compounds, drugs and bio actives. Predictions are carried out by using different screened approaches, such as 2D molecular fingerprints super positional and 3D similarity methodologies (33). It allows to do LBVS of various libraries of molecules by using several techniques. Virtual library were screened in Swiss Similarity. Its screening reference molecules form virtual screen library against target. Drug clozapine is given in Swiss Similarity. It generates possible outcomes against the target by using its virtual library.

Secondary Structure Prediction:

Dopamine Beta Hydroxylase contains amino acid having polypeptide chain. The 3, dimension model confines containing 4 helices; 41% beta sheet 44 strands 4 turns and 4 alpha helix. This observation can be done by secondary structure prediction tool. Total atoms are 8927. It can be predicted that this model have 2 disulfide bonds.

Ramachandan Plot:

For the assessment of the predicted model quality, several validation tools have been used. It is a way to visualize energetically allowed regions for backbone dihedral angles ψ against φ of amino acid residues in protein structure. According to the Ramachandran plot statistics of Dopamine Beta Hydroxylase, total number of residues are 1094 including end residues, non-glycine and proline residues. Disallowed regions having 2 (0.2%), generously allowed regions having 11(1.2%), additional allowed regions having 66 (7.1%) and favored regions having 856 (91.6%) number of residues." "

Dopamine β- Hydroxylase Model:

Dopamine Beta Hydroxylase is used for structure based virtual screening. The structure based virtual screening provides assistance to recognize molecules and has competence to attach the active site of Dopamine Beta Hydroxylase protein. Library of lead molecules is made for screening by PyRx so that it is energy minimized can be further analyzed and examined in Discovery Studio Visualizer.

Docking: "

Drug clozapine was docked with the protein molecule by using Auto dock. It was chosen as a best drug due to its large number of interactions and fewer side effects. Interaction of ligands by protein is evaluated by Auto dock with PyRx. It can be done on particular pocket that are predicted by different software and literature studies. AutoDock is set of automated docking tools. It intends to predict how small molecules, such as substrates or drug candidates, bind to a receptor of identified 3D structure. It screened more than 200 drugs. A library of all lead molecules was created for screening with PryR. Library of lead molecule was energy minimized. Auto dock is use with PyRx software to dock the drug with target and analysis result. Top 10 models were docked as the result of that docking score given clear idea about their interaction with dopamine beta hydroxylase."

Analysis of Interaction:

To analyze interaction between docking ligand and protein, Ligplot software was used. This software helped to view type of bonding between protein and ligands**.** Ligand was docked with dopamine beta hydroxylase to check for hydrogen bond interaction with LEU B: 424 LYS B: 452, SER B: 455 and VAL B: 456.

V. Results

To analyze interaction between docking ligand and protein, Ligplot software was used. This software helps to view type of bonding between protein and ligands**.** Ligand was docked with dopamine beta hydroxylase to assess for hydrogen bond interaction with LEU B: 424 LYS B: 452, SER B: 455 and VAL B: 456. CADD tool was used to explore new ways to design the cost effective drugs more rapidly via computer technology. Through conventional method, a drug takes 10-15 year to be released in the market. However, virtual screening is vital step in early-stage drug discovery. It encompasses 10 million accessible compounds Library of lead molecules which are made for screening by PyRx. Swiss similarity and ZINC15 servers are used to perform virtual screening of molecules where ZINC 15 can screen 140 ligands. The drug binds the protein where the binding energy ranges from 6-6.7 to 10.3. The binding energy of ligand ZINC 000095550333 is -10.3. The binding energy of ZINC000004292831 is -10.1.The binding energy of ligand ZINC 000036089410 is -9.8. The binding affinity of ligand ZINC 000095550333 is - 9.7. ZINC 000036089409 binding energy is -9.5. Ligand ZINC 000036089465 has binding energy of -9.3. Binding affinity of ligand ZINC 000095550333 is -10.3. Binding affinity of ZINC000004292831 is -10.1.Binding affinity of ligand ZINC 000036089410 is -9.8. Ligand ZINC 000036089465 has binding affinity of - 9.3. On the basis of hydrogen bonding interaction which were analyzed. Dopamine Beta Hydroxylase combined with ligand showed interaction with residues VAL B: 456 having bond length 4.18 and Leu B: 424 having bond length of 1.48 and SER B: 456 having bond length of 2.27 and VAL B: 454 having bond length of 5.36. Ligand ZINC 000036089409. It also showed hydrogen bond with residue ASP B: 163, TYR B: 67, LEU B: 450, LYS B: 452, PRO B: 592, LEU B: 589 and ASN B: 435 with bond distance of 4.60. Ligand ZINC000036089410 showed interaction with ASN B: 435, LYS B: 452, ASP B: 163, MET B: 449, LYS B: 453, LEU B: 450, PRO B: 592 and GLN B: 436 having bond length of 4.61. Ligand ZINC 000095550333 showed hydrogen bond with HIS B: 493, GLN B: 445. GLU B: 265 TYR B: 491, VAL B: 298 and ILE B: 364 with the distance of 5.03. Ligand ZINC 000004292831 showed interaction with GLU B: 366, ARG B: 296, VAL B: 298, ILE B: 364, TYR B: 491, ARG B: 243 and LEU B: 502 with the bond distance of 5.01. Ligand ZINC 000004292831 showed interaction with ligand PRO B: 442 at bond length of 2.10 HIS B: 412 showed interaction having a distance of 4.95. GLU B: 265 showed interaction with

bond length 4.63 VAL B: 298 showed interaction having bond length of 5.25. HIS B: 414 showed interaction with bond length of 5.14. TYR B: 491 showed interaction having a distance of 4.56. HIS B: 493 showed interaction having bond length of 3.91. ARG B: 296 showed interaction having bond length of 5.45. PHE B: 267 having bond distance 4.63. ILE B: 483 showed interaction of ligand with receptor having bond length of 5.05. The results of system biology might vary in lab situation but most results were approximately good under appropriate circumstances. As for computational analysis, it emphasizes diverse ligands by using different servers which can act as best target against schizophrenia. Further nature of ligand will be explored by in-vitro and vivo analysis. Interaction of ligands with lead molecules suggests that auxiliary analysis of these drugs will give a way towards the treatment of schizophrenia.

VI. Discussion

The name schizophrenia, as discussed earlier, is derived from Greek which implies "split mind" Schizophrenia is a disease characterized by a complex symptomatology, affecting most aspects of cognition, emotion and behavior. Schizophrenia affects approximately 1% of the population worldwide and is a chronic, severe disorder, lacking curative treatment. The suicide rate is as high as 9-13%, with the incidence of suicide attempt reaching 50% of diagnosed patients over a lifetime. The onset of schizophrenia usually occurs around 18- 25 years of age and is often preceded by premorbid behavioral deviations, such as social changes (34).Schizophrenia encompassing the different factors including several different susceptibility genes, multiple neurochemical system implications, and diverse clinical symptoms. Current understanding of the molecular, functional, and pathophysiological nature of schizophrenia, group of symptoms of illness and new pharmacological and treatment approaches which target specific stages of pathogenesis may prevent illness progression at different stages of schizophrenia. Making it is essential to develop community-based and clinical strategies. Dopamine β-Hydroxylase primarily contributes to catecholamine and helps trace amine biosynthesis. It also participates in the metabolism of xenobiotic related to these substances. Dopamine Beta Hydroxylase has been implicated as correlating factor in conditions associated with decision making and addictive drugs. Catecholamine storage vesicles provide a convenient biochemical marker for subcellular fractionation work and studies of the cellular regulation of catecholamine synthesis, storage, and release. It also plays an essential role in catecholamine synthesis. Schizophrenia includes a relative block or dysfunction at the Dopamine Beta Hydroxylase step in norepinephrine (NE) synthesis. Increased level of dopamine can cause schizophrenia.

For the assessment of the predicted model quality several validation tools are being used. According to Ramachandran plot contain total 1094 residues. Out of 1094 residues 856 residues lie on the Most favored region of plot with 91.6 %, 66 residues are present in additional allowed regions having percentage of 7.1, 11 residues are present on the generously allowed regions of the plot with 1.2%, 0.2% are disallowable regions of plot having 2 residues, Non-glycine and Proline residues are 935, end residues 12 whereas glycine are 71 and Proline residues are 76 in number. The measure of standard distance between the backbone atoms of obligatory protein is called the root mean square distance. Secondary structure prediction helps in identifying secondary structural elements i.e. α-helices, β-sheets coils. Analysis of binding site can be made through COACHs software. Ligand Explorer is used to study the proteins and ligands interactions. The interactions are hydrophilic, hydrophobic, metal interactions and water molecules interactions. Ligand explorer was used to show interactions. Discovery studio visualizer tool and Milagros molecular viewer were used to study the protein-ligand interaction. Discovery studio tool was used to visualize the structure that identify and analyze protein-ligand interactions. It monitors the hydrogen bonds, ligand binding sites. (23).Method of molecular docking in the process of drug discovery uses computational approach to dock small molecules into huge structured molecules with targets concerning docking algorithms. The aim of molecular docking program is the exact positioning of small molecules within the binding sites of protein and also the biological inferences of this process. There are several other software's used for docking as well. The drugs screened by virtual screening might resemble Dopamine Beta Hydroxylase through its interactions. Top 10 models are docked as the result of that docking score gives clear idea about their interaction with dopamine beta hydroxylase. These interactions were further viewed by ligand explorer. There are 14 different drugs for treatment of schizophrenia including first and second generation. First generation drugs have more side effects than second generation drugs. Clozapine is a second generation drug considered as best drug for schizophrenia because of its less side effects. Clozapine rebalances dopamine and serotonin to improve thinking, mood and behavior. Clozapine is observed as the "gold drug" for treatment against schizophrenia. This is merely appropriate for treating the 20 - 30 % of those patients who are not able to give response to other medications and mainly those who have suicidal or violent thoughts.

VII. Conclusion

As for computational analysis, it emphasizes diverse ligands by using different servers which can act as best target against schizophrenia. Further nature of ligand will be explored by in-vitro and vivo analysis. Interaction of ligands with lead molecules suggests that auxiliary analysis of these drugs will give a way towards the treatment of schizophrenia.

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Diversity and Abundance of Macro-invertebrates in Rice Field of Faisalabad

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***Abstract*- Background:** Agricultural sector plays an important role in the economy of Pakistan. In the field of agriculture Rice is an important cereal crop after wheat. Rice grains are big source of carbohydrate. Rice grain has, 3.5% iron, 8.5% protein, 4.9% fiber and highest amount of antioxidants. The diversity and abundance of macro-invertebrates in agro-ecosystem depend on providing the basic survival needs.

Objective: Current study was conducted to check out the abundance and diversity of macro-invertebrates in rice crop.

Material and Method: The data was collected from district Faisalabad. Collected samples were preserved, identified and analyzed. All the specimens were studied and identified by the using of keys as provided Borer and Delong.

Results: A total of 5 orders of macro-invertebrates were identified including 9 families and 17 species. Shannon Weiner Diversity index (H) was used to analyze the data. These were the values which were calculated. There were 115 specimens, 17 species and value of Shannon index (H 2.383) calculated.

Conclusion: Shannon Wiener diversity index was applied to find out the overall diversity of macro- invertebrates in rice field. It shows high diversity H”=2.383 and Dominance D = 0.8913. Abundance and diversity of macro-invertebrates was not much different in different selected sites of rice field of Sargodha road Faisalabad. All the comparisons made between different selected sites show non-significant differences in distribution of macro-invertebrates.

I. Introduction

Rice, a yearly grass (Germaine), has a place with the sort *Oryza* that incorporates twenty wild species and two developed species, *Oryza sativa* (Asian rice) and *Oryza glaberrima* (African rice). *O. sativa* is the most generally developed species throughout the rice-developing world today. In Asia, O.sativa is separated into three subspecies in light of geographic conditions; *indica*, *javanica* and *japonica*. Indica alludes to the tropical and subtropical assortments developed all through south what's more, Southeast Asia, southern China. Javanica assigns the bulu (awed) and gundil (aweless) rice’s with long panicles and intense grains developing close by of lists in Indonesia. Japonica alludes to the short and roundish grained assortments of the calm zones of Japan, China and Korea (1).Rice farming is main way for the income of millions people in the world. It is a most cultivated crop worldwide and has main activity. About 11% of world’s cultivated land is occupied by rice field. As the cultivation of rice has positive value it has also negative impacts on the areas where it is grown. In the East rice are used as basic diet, but overall in the world 50% people use rice as a diet. 5, 86,787 thousand tons of rice produced in 1999-2000 in the world but it is affected by macro-invertebrates which reduces the production of rice in the world. Different kinds of invertebrates occupied the area of rice ecosystem which badly affected the vegetation of rice plants (2).

In Pakistan, rice occupies an essential position in harvest farming. The reason is that it has brief period for development and gives higher yield. The world wise rural extension is suspected to debilitate biodiversity world wise in following couple of decades. Biodiversity is a constriction of term natural differences which alludes to the assortment inside of the living scene. The word lavishness demonstrates the quantity of species present in an assigned zone for the wealth of different species (3).In spite of the fact that rice fields do not have the basic and floristic differences of regular wetlands, they can be vital for protection activities, especially in regions where regular wetlands have declined. For illustration, rice fields in California are consistently overflowed to help the deterioration of rice straw, and these winter flooded fields shape critical natural surroundings for some water bird species (4) Rice stem borers having a place with two Lepidopteran groups of Pyralidae and Noctuidae can plague rice plants from seedling to development. Pyralid borers are the most normal and damaging of every stern borer and generally have a high level of host specificity. The noctuid borers are polyphagia and as it were every so often cause monetary misfortunes (5).The white stem borer is additionally a noteworthy bug of rice in Pakistan. The grown-up WSB is like the YSB in appearance. The grown-up moths of WSB are comparable in appearance. The white moth with an orange butt-centric tuft is generally found in the field particularly in the early phases of the yield. The grown-up female has a wingspan of 26-30 mm what's more, the male of 18-24 mm. Female moth normally laid eggs in group of 70-260 on the underside of youthful clears out. The egg mass is secured with luxurious hairs from the butt-centric bit of the female moth and is like that of the yellow stem borer. Hatchlings incubate from the eggs in 4-9 days. The youthful hatchlings enter the leaf sheath and drills down into the stem. Hatchlings are smooth white and develop to a length of 25 mm. The larval stage changes from 19-31 days. The full-

developed hatchling pupates inside the stem in the wake of making a leave gap for the moth to develop (6).Yellow stem borer are nighttime, emphatically phototropic and solid fliers, are diurnal and rest in the shade when not effectively flying. Moths more often than not develop in the early hours of night. The female moth is greater than male and its forewings are splendid yellowish darker with particular dark spot in the inside. The guts are wide, the tip being secured with tufts of yellowish hairs (7).The male moth of yellow stem borer is light yellow; the mid-region is slim and the back end has a thin shaggy covering dorsally. Spots on male moth wings are not discernible. Mating for the most part happens between 7 to 9 p.m. The sex of yellow stem borer in view of light trap gets has been accounted for as for the most part more females than guys. The female moths lay eggs early during the evening in little masses close to the tip of leaf edge. A female moth is fit for laying 100-150 eggs (5).Moths are nighttime and in splendid sunshine cover up themselves under surface of leaves and on stems. Amid the early morning hours, moths are regularly dynamic but their movement goes down as light spreads. The moths are pulled in to light. Grown-up moths are yellowish darker ii shading, little and are 10-12 mm long with a wing growing to 13-15 mm. The wings take the state of an equivalent side triangle when very still. The forewings have three oblique lines of differing lengths. The rear wings have an expansive a range. The tibiae are tufted with dark hairs, which are unmistakable in the male moth however not in female (8).The pink stem borer is for the most part the slightest harming stem borer species. The grown-up moth is stoop, the forewings being tan with dull dark colored markings from a focused point in the forewings. Dim dark lines transmit at the wing tips finishing in a thin terminal line of dim spots. There are tufts of hairs on pronotum. The rear wings are white. The wing range is 30-35 mm in female and 20-30 mm in the male. Female moth laid around 400 eggs. Eggs are rich white to dull and are stripped and bring forth in seven days' opportunity. The hatchling has an orange-red head case furthermore, its body is purplish pink dorsally and white ventrally. The head is moderately substantial contrasted with whatever remains of the body. Hatchlings regularly leave one stem and drill into extra stems, subsequently obliterating a few plants. The hatchling turns out to be full-developed in 4-5 weeks, experiencing 5-7 sheds. At this stage, it is 20-26 mm long. Pupation happens inside the larval passage inside the stem yet every so often happens outside the stem between the leaf sheath and the stem (6).

Normally chose development rehearses and safe assortments accomplished the conventional types of rice development adjustment to bothers. In late decades the requirement for improved rice generation in Pakistan and worldwide has cleared out to the selection of more serious generation frameworks. It has created increments in irritation assault and a more noteworthy dependent on substance pesticides as the real type of control. Achievements in novel approaches of control as could be expected under the circumstances be that as it may, their effect on rice creation is dubious are surely dubious. At present, there is much more potential to make strides bother administration by completely using the control systems and practices at present accessible. Pesticides and different agrochemicals utilized as a part of traditional rice developments can change the common physical–chemical conditions of water, which may change macro invertebrate population (Viale *et al*., 2012).

For the control of harmful organisms which attacks the rice crop and reduces its productivity agrochemicals are used. These chemicals support the production of rice. As these chemicals have benefits but in same case they usually cause huge problems. Because these are very toxic they have an adverse effect on human health (9).

Materials and Method

Faisalabad is situated in Rechna Do-aab, located between the Chenab and Ravi rivers, 73.08’E, 31.25’N and at an altitude of 214m above mean sea level. The mean annual maximum and minimum temperature of the area is 48±2oC and 10± 2oC respectively and average annual precipitation is 550 mm. The city is densely populated district of Punjab with a population of more than 4 million and an area of about 1280 Sq. Km. Faisalabad District, covering an area of 5,856 km2 in the Central Punjab, Pakistan, was the study area (31.4180° N 73.0790° E) where mixed cropping pattern is dominant. Rice, sugarcane, maize, fodders (alfalfa and sorghum), vegetables (cauliflower, cucurbits, and tomato), and a few citrus orchards are the major agronomic and horticultural crops. Present study was carried out from October to December (2016).

Sampling Sites:

Three separate rice growing areas at Sargodha road Faisalabad were selected as experimental sites in the wet season. Three villages were selected named as Ram Diwali, Chak No.2JB, Arfa krimabad for the sampling from rice field. There are 2, 2 samples were collected from every village.

Sampling method:

Sampling of macro-invertebrates fauna was done in a rice crop from October to December 2016. Rice field was divided into five equal plots. Sampling was done fortnightly by installing two pitfall traps 10 m apart in the center of each divided plot, totaling ten pitfall traps per crop field. The pitfall traps were plastic containers 10 cm in diameter and 15 cm in depth, buried in the soil with its upper end leveling the ground to allow uninterrupted fall of macro-invertebrates in the pits.

Preservation:

The specimens were preserved in the glass jars containing 10% formalin with few drops of glycerin and were brought to Bio control laboratory, Department of Zoology, Wildlife and Fisheries, University of Agriculture, Faisalabad. Each specimen was studied in controlled condition of temperature of 25.

Identification:

The specimens were identified with the help of available literature and keys given fauna of British India, as well as already identified specimens which are preserved in the insect Museum, Department of Entomology, and University of Agriculture Faisalabad.

Analysis of data:

The relative abundance of every specie was determined to check their abundance in respective crop.

Shannon Diversity index:

Research was often driven by the need to develop management strategies for such insects. However, many utilized indices of diversity to measure biodiversity richness. In many such studies, specimens are sorted based on phenotypes (termed recognizable taxonomic units) to obtain diversity indices for different study.

While this method allows for the comparison of plants and animal richness, it does a little to enable the understanding of biological and ecological system. Data were analyzed statistically to determine species diversity H, species richness and species evenness with Shannon Weiner diversity index Shannon. Diversity index was calculated using the following equation:

$$H = \frac{NlnN - \sum nlnn}{N}$$

The magnitude of H is not affected by the distribution of the data but also the number of categories. Evenness is calculated as:

$$E = H/lnS$$

II. Results

There are a lot of differences in paddy fields of the significant rice creating nations. Most prominent differences of rice nuisances were seen to be in Faisalabad in view of their tremendous land territory. Plant containers (Brown plant container and white-upheld plant container) furthermore, leafhoppers (green leafhopper, crisscross leafhopper) were observed to be generally appropriated in paddy fields of real rice makers. These bugs are in charge of tremendous monetary misfortunes to rice yields. Faisalabad being the greatest maker has sufficiently grown genomic techniques to keep their rice bugs beneath limit level in their rice fields. During sampling period 3 months the total no. of specimens collected were 115, 9 families and 17 species were identified in rice field. Richness and diversity of macro-invertebrates was significantly higher in the rice crop at the edge even in the center of the field.

Table No.1: Diversity of macro-invertebrates in rice field during first sample

Sr.	Order	Family	Species	Sample 1
1	Lepidoptera	Pyralidae	*Scirophaga incertulas*	2
2			*Scirophaga innotala*	1
3			*Chilo suppressalis*	2
4			*Chilo partellus*	1
5			*Cnaphlocrocis medinalis*	1
6		Noctuidae	*Spodoptera litura*	3
7			*Spodoptera cilium*	1
8	Homoptera	Cicadellidae	*Sogetella furcilera*	5
9			*Cofana spectra*	4
10			*Nephotettix nigropictus*	4
11			*Cicadulina bipuntella*	6
12		Acriididae	*Oxya multidentata*	3
Total	2	4	12	33

This table shows the diversity and abundance of macro-invertebrates in first sampling. In this table 12 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 33. The most abundant specie observed *C. bipuntella* belonging to the family Cicadellidae has 6 specimens and least abundant specie is *S. innotala* belonging to the family Pyralidae has only 1 specimen.

Table No.2: Diversity of macro-invertebrates in rice field during second sample

Sr.	Order	Family	Species	Sample 2
1	Lepidoptera	Pyralidae	*Scirpophaga incertulas*	1
2			*Chilo suppressalis*	2
3		Noctuidae	*Spodoptera cilium*	1
4	Homoptera	Acriididae	*Oxya multidentata*	3
5		Cicadellidae	*Sogetella furcilera*	2
6			*Cofana spectra*	3
7			*Nephotettix nigropictus*	4
8			*Cicadulina bipuntella*	2
9		Pseudococcidae	*Ripersia oryzae*	1

10	Hemiptera	Alydidae	*Leptocprisa acute*	1
Total	3	6	10	20

This table shows the diversity and abundance of macro-invertebrates in second sampling. In this table 10 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 20. The most abundant specie observed *N. nigropictus* belonging to the family Cicadellidae has 4 specimens and least abundant specie is *S. incertulas* belonging to the family Pyralidae has only 1 specimen.

Table No.3: Diversity of macro-invertebrates in rice field during third sample

Sr.	Order	Family	Species	Sample 3
1	Lepidoptera	Pyralidae	*Scirpophaga incertulas*	1
2			*Chilo suppressalis*	2
3	Homoptera	Acriididae	*Oxya multidentata*	4
4		Cicadellidae	*Sogetella furcilera*	2
5			*Cofana spectra*	2
6			*Nephotettix nigropictus*	2
7			*Cicadulina bipuntella*	2
8		Pseudococcidae	*Ripersia oryzae*	1
Total	2	4	8	16

This table shows the diversity and abundance of macro-invertebrates in third sampling. In this table 8 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 16. The most abundant specie observed *O. multidentata* belonging to the family Acriididae has 4 spcimens and least abundant specie is *R. oryzae* belonging to the family Pseudococcidae has only 1 specimen.

Table No.4: Diversity of macro-invertebrates in rice field during fourth sample

Sr.	Order	Family	Species	Sample 4
1	Lepidoptera	Pyralidae	Scirpophaga incertulas	1
2			Chilo suppressalis	2
3		Noctuidae	Spodoptera cilium	1
4	Homoptera	Aphididae	Rhopalosiphum maidis	1
5		Cicadellidae	Sogetella furcilera	2
6			Cofana spectra	3
7			Nephotettix nigropictus	4
8			Cicadulina bipuntella	2
9		Pseudococcidae	Ripersia oryzae	1
Total	2	5	9	18

This table shows the diversity and abundance of macro-invertebrates in fourth sampling. In this table 9 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 18. The most abundant specie observed *N. nigropictus* belonging to the family Cicadellidae has 4 specimens and least abundant specie is *R. maidis belonging* to the family Aphididae has only 1 specimen.

Table No.5: Diversity of macro-invertebrates in rice field during fifth sample

Sr.	Order	Family	Species	Sample 5
1	Lepidoptera	Pyralidae	*Scirpophaga incertulas*	2
2			*Chilo suppressalis*	1
3		Noctuidae	*Spodoptera cilium*	1
4	Homoptera	Acriididae	*Oxya multidentata*	2
5		Cicadellidae	*Sogetella furcilera*	1
6			*Cofana spectra*	2
7			*Nephotettix nigropictus*	2
8			*Cicadulina bipuntella*	1
Total	2	4	8	12

This table shows the diversity and abundance of macro-invertebrates in fifth sampling. In this table 8 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 12. The most abundant specie observed *C. spectra* belonging to the family Cicadellidae has 2 specimens and least abundant specie is *S. cilium belonging* to the family Noctuidae has only 1 specimen.

Table No.6: Diversity of macro-invertebrates in rice field during sixth sample

Sr.	Order	Family	Species	Sample 6
1	Lepidoptera	Pyralidae	*Scirpophaga incertulas*	1
2		Noctuidae	*Spodoptera cilium*	1
3	Coleoptera	Chrysomelidae	*Dicladispa armigera*	1
4	Homoptera	Acriididae	*Oxya multidentata*	3
5		Cicadellidae	*Sogetella furcilera*	2
6			*Cofana spectra*	3
7			*Nephotettix nigropictus*	2
8			*Cicadulina bipuntella*	2
9		Pseudococcidae	*Ripersia oryzae*	1
10	Diptera	Muscidae	*Atherigona aoryzae*	1
Total	4	7	10	17

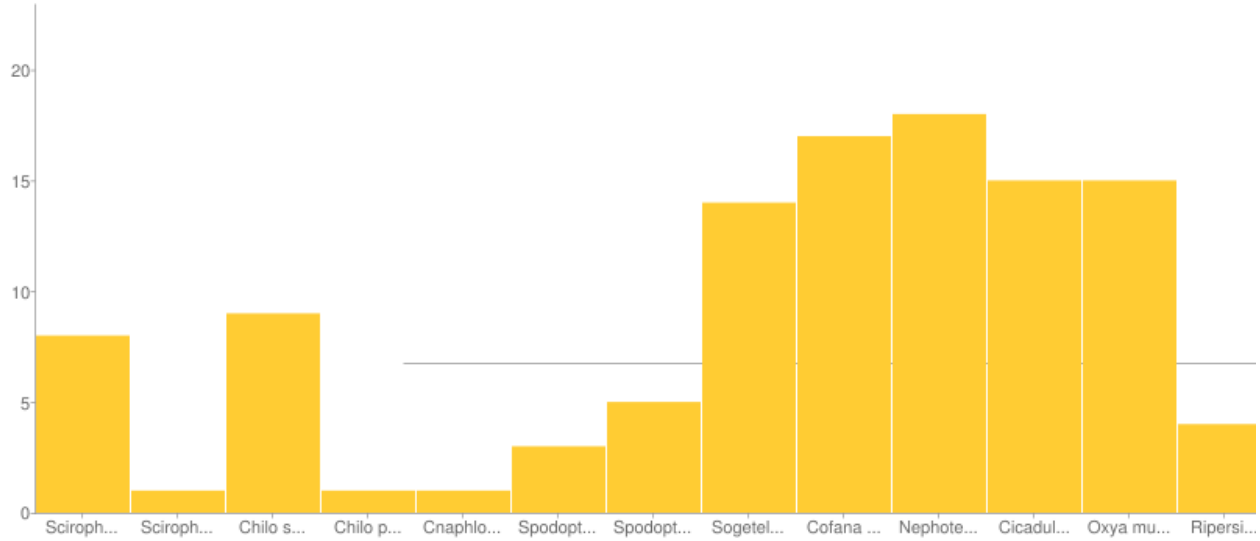
This table shows the diversity and abundance of macro-invertebrates in sixth sampling. In this table 10 species of macro-invertebrates are showed, which were identified. Total specimens which were collected in this sampling are 17. The most abundant specie observed *C. spectra* belonging to the family Cicadellidae has 3 specimens and least abundant specie is *A. aoryzae belonging* to the family Muscidae has only 1 specimen.

Table No.7: Shannon Diversity Index, Evenness and Dominance for micro-invertebrates abundance

S	N	Shannon Index	Simpson Index	Dominance
17	115	2.383	0.1105	0.8913

This table shows that the total no of specimens collected from rice fields of Faisalabad were 115. All specimens were studied and identified which were belongs to 17 species. The Shannon Index of macro-invertebrates is 2.383 and the evenness is 0.1105. Macro-invertebrates in rice field have dominance of 0.8913.

Graph no: 01 Graphical Representation of Species Population



Static chart for all species population which were identified

III. Discussion

The world rice product is assaulted by more than 100 types of creepy crawlies; 20 of them can bring about monetary harm. Creepy crawly bothers that can bring about critical yield misfortunes are stem borers, leafhoppers also, plant hoppers (which cause coordinate harm by nourishing and also by transmitting infections); rankle midges, a gathering of defoliating animal varieties (main1y lepidopteron); and a grain-sucking bug complex that sustains on creating grains. In present study the total collected specimens were 115, belonged to 17 species, 9 families and 5 orders. Out of the total 17 species observed, the most abundant specie was *Nephotettix nigropictus* with 18 specimens. This specie was highly abundant in rice crop of Faisalabad. This specie was also reported by many other authors (10).A total of 19 specimens of the family Cicadellidae were sampled from rice crop of Faisalabad during first sampling. It is also written in the collected table (1). Many specimens belongs to this family were reported by (11).

A total of 84 specimens of the order Homoptera were sampled from rice crop of district Faisalabad. There is great similarity of collecting specimens of this order by another researcher Karim and Riazuddin, 1999. The present study shows that all the comparisons made between different selected sites show non-significant differences in distribution of macro-invertebrates. And this study will be helpful for agronomists in providing the basic information about the macro-invertebrates of rice crop in Faisalabad. This can be helpful in designing the biological control program to control insect species in the sustainability of agro-ecosystem. The measurements can be taken for the production of crop yield.

IV. Conclusion

Shannon Wiener diversity index was applied to find out the overall diversity of macro- invertebrates in rice field. It shows high diversity H”=2.383 and Dominance D = 0.8913. Abundance and diversity of macro-invertebrates was not much different in different selected sites of rice field of Sargodha road Faisalabad. All the comparisons made between different selected sites show non-significant differences in distribution of macro-invertebrates

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Environmental Management and Auditing; Kenyan Public Sector Perspective

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Abstract- Environmental auditing is currently one of the requirements that have been adopted by nations because of the rising awareness of the need for sustainability to protect the earth from the risk of failing to replenish natural resources in a sustainable manner. The issue of global warming has particularly played a major role in influencing the international community to adopt rules that govern the utilization of natural resources and conservation activities. Following this, developed economies have stepped in with their vast resources to develop entities and mechanisms through which environmental auditing will be actualized. This research was conducted through a systematic analysis of documents and semi structured interviews. The results of the research conducted revealed that; nearly all companies that have carried out environmental audits intend to continue the practice in the future. Secondly, there are no generally accepted auditing standards on Environmental auditing that have been developed and thirdly the accounting profession is only slightly involved in environmental audit due to the fact that this type of audit is an activity that is not mandatory, being used for the entity's own use as opposed to financial audit, which is mandatory. Developed nations like the United States have effective policy enforcement processes, but developing economies like Kenya lack the resources to effectively conduct environmental audits. The lack of experts in the accounting field with knowledge in the scientific and technical areas associated with environmental auditing makes it difficult for nations like Kenya to accurately report on company activities, as well as the local government initiatives toward facilitating audits.

Index Terms- *Environmental audit, environmental management, office of auditor general, accounting regulations.*

I. Introduction

One of the negative consequences of the modern industrial technology is the fact that it has influenced a high level of environmental degradation; thus, fostering undesirable economic, social, and health outcomes. This is one of the reasons that many organizations have embarked on a course to align their corporate social responsibility (CSR) programs with the requirement for sustainable development in technology. Governments are also actively focusing on the development of policies that are geared toward compelling companies to focus on sustainable business process to safeguard the environment. Following this, many entities have embraced the need to provide voluntary disclosure of their initiatives toward protecting the environment, especially in their annual corporate reports and through their websites and social media avenues.

The Kenya national Audit Office focuses on evaluating the environmental impact of various entities by focusing on their business processes, in terms of the direct and indirect impacts to the environment, using an international standard checklist. This approach can be effectively leveraged to ensure that the nation is being steered toward a paradigm where economic and social growth attains parallelism with environmental health. Corporations in Kenya are constantly being compelled to ensure that their activities consider the environmental impact. This can be attained through the adoption of management approaches that focus on sustainable use of the locally available resources.

The National Environmental Management Authority (NEMA) is an institution charged with the responsibility of implementing laws that focus on conservation. NEMA emphasizes on the development of regular documentation of the evaluations made by entities on their management practices focusing on the environment. This approach is appropriate for ensuring that companies are regularly reminded of their role in solving the environmental crisis in the region. All audits concerning the environmental impact of business processes in corporations have to be impartial, objective, and within the relevant standards at the national and international levels.

It is apparent that the Kenyan administration has been relying on self-reported audits from the corporations operating in various industrial sectors. The companies reveal that the audits are mainly focused on providing clarity on their approaches toward embracing sustainability for the positive effects on their reputation, finding a basis for competitive advantage, and highlighting the gaps that need to be sealed to achieve a higher level of compliance to the existing environmental laws. Previous studies looking into the matter have also traditionally utilized primary data provided by the companies, but this study looks into the engagement with the Kenya Office of the Auditor General (OAG) as an independent function with its reliable data. The study looks into identifying the approaches used by the government to influence auditing standards and their application within different industries. This approach is relevant because there are no clear auditing standards for environmental factors within the nation.

The prevailing issue in this field is that many developing nations like Kenya do not have nationally accepted standards of auditing for environmental factors. The nations rely on the

international standards, which are mainly influenced by the developed economies in the international community. Nations like Kenya also lack the financial basis required to execute objective environmental auditing on a regular basis, which implies that there is likelihood that the governmental agencies charged with the responsibility only utilize data reported by corporations in their annual corporate magazines. This paper looks into the experience of the small developing

nations, in terms of environmental auditing approaches, using Kenya as the mirror for this information.

Current Trends in Environmental Auditing

Most of the developed economies across the world have embraced environmental auditing as an information-based approach toward developing laws to protect the environment. The United States is one of the leading nations in the application of environmental auditing, and this is facilitated by the availability of resources, knowledge, and the relevant technology for the process. Other developed and developing nations have attempted to embrace this tool for highlighting activities that are environmentally hazardous. However, there is a clear picture that the international standards are yet to be properly edited because environmental auditing is a relatively new practice, which many nations apply without the enforcement of strict laws. Current trends also reveal a certain commitment by nations to continue enhancing professionalism in the application of relevant laws. The result will be the adoption of standardized approaches toward enforcing environmental laws across the world. Corporations will require a higher level of adherence to the laws that are going to take effect in both the developing and developed nations as standardization occurs in environmental auditing.

Need for Automation

Growth in technology has influenced the development of the capabilities to automate the collection of data in organizations and across governmental agencies. This has presented a unique opportunity for companies to and governments to pursue the automation of auditing. This is particularly feasible because it is based on the enhancement of the control systems, as well as boosting quality control in organizations that have traditionally provided doctored information on their audit reports. Automation also eliminates the need to send many professionals to the field for the purpose of data collection.

Auditors have benefited from the presence of numerous data collection and analytical tools. Current systems not only facilitate data collection on an automated platform, but they are also linked to databases that facilitate regular reporting and ad hoc analysis and reporting needs for the associated entities. The governmental agencies charged with the responsibility of auditing companies should set up these tools in the relevant positions to increase the accuracy of data collection.

The elimination of the interruptions by humans in the auditing process is likely to have a positive impact on the validity of the results because there is limited bias in data collection and analysis, as well as in the reporting process. The automated systems collect data objectively according to specific parameters set by the users. The standardization of auditing approaches will be reliant on the ability to facilitate automated systems that transmit data to specific databases for unbiased analysis of the performance of the concerned entities in their environmental management processes.

The current approaches in auditing for environmental management have focused on the production of reports that are relatively general and only useful to the entities charged with the development of policies. This implies that the data being used is only being processed through a one-sided analytical model that benefits the law enforcers. It is imperative to focus on the adoption of analytical models that are beneficial to different entities, and this will be facilitated by technology, whereby companies could benefit from audit reports that objectively highlight their strengths and weaknesses. The databases developed through the automated data collection systems should be analyzed using different models that will be instrumental in the application of relevant changes at the organizational level for future improvements in environmental sustainability.

Environmental auditing is a requirement for the mitigation of risks in the developing economies. This is because the cost of pollution and the destruction of the environment for economic development has been established to be unsustainable in some of the developed economies. It is necessary for the developing states to actively embrace this approach toward regulating growth and ensuring that the environment is conserved to prevent future costs. Most importantly, the current issues associated with the degradation of the environment, such as global warming and adverse climatic changes needs to be addressed through preventive avenues like the control of pollution. The integration of the relevant databases will enhance the capabilities of the respective nations to manage compliance on the part of the corporations in different industries.

Scope of Environmental Auditing

The traditional approach of running environmental audits entails the adoption of keen scrutiny on the compliance to national laws. This has been the case in most developing nations; hence, there is a limited focus on matters like environmental management systems efficiency in corporations, as well as sustainability. There is a need for nations across the world to actively embrace the need to focus on sustainability issues and to adopt policies that streamline the decision-making process of companies in their adoption of environmental management systems.

The role of legislation

Social and environmental sustainability is gradually becoming a legal requirement for companies across different nations because of the globalization concept. The availability of information to the society has led to communities requiring companies to use natural resources in a sustainable manner, and the consumers across different markets are showing loyalty to companies that demonstrate a high level of respect for environmental conservation. In this light, many nations have developed legal requirements that compel the investors to concentrate on sustainable business processes. This provides a platform through which environmental auditing should be applied. However, in the developing economies like Kenya, the presence of legislations to guide corporations in environmental management does not translate to a higher compliance level. This is mainly caused by the fact that the agencies enforcing the law are ineffective and unaccountable. Nations should focus on developing laws that compel the adoption of positive behavior in

environmental management, rather than the traditional legislations that compel corporations to look for ways to avoid penalties.

The Role of Accountants

The accounting profession has only recently been involved in the development of environmental auditing. The traditional process only entailed general audits that could be easily executed by professionals from other fields. However, the current system has seen accountants playing an integral role in the collection of data, manipulating it, and tabulating it for recommendations to the law enforcers and the corporations in question. The inclusion of these professionals in the auditing processes has further increased the accuracy of the findings in EMS reports and the recommendations are grounded in accounting frameworks that are evidence-based.

The main role for accountants in the field is to provide financial auditing, but they are actively being used by corporations and the governmental agencies to conduct environmental auditing. While this is plausible, there is a clear indication that the accountants require help from experts in the field of environmental science and actuarial science to establish reasonable reports and recommendations for the concerned entities. As the world shifts to a period where environmental auditing will be a major requirement, there is a need for scientific experts in the environmental field to learn the technical processes that entail auditing so that there will be accuracy and reliability in the data collected and the findings from the auditing process.

It is apparent that there is a need for the auditing process to include technical and scientific experts when it comes to environmental management. The entities providing these audits ought to have multi-disciplinary platforms so that the process can be objective and reliable. The accounting field could also provide curriculums that steer toward providing professionals with the scientific and technical skills to boost the efficiency of handling environmental auditing. Accountants can provide labor in the auditing process while other experts in environmental science help in the implementation of relevant solutions.

Required Standards

Current accounting standards do not align with the role of environmental auditing in Kenya. The ICPAK has not been successful in the provision of guidelines for accounting auditors to provide the service in the environmental management field. The cost of environmental degradation can only be highlighted by an expert with scientific knowledge and accounting skills. Accounting firms that have been actively involved in the provision of services for environmental auditing need to improve their professional basis to handle the task comprehensively. Moreover there is a need for the firms to have the relevant expertise to embrace the standardized environment auditing paradigms that are gradually being developed. Current general standards incline toward embracing accounting guidelines, which lack substance from a scientific perspective.

II. THEORETICAL FRAMEWORK

The legitimacy model and the institutional theories seem to provide the main framework on which environmental auditing is transforming. From legitimacy perspective, lobbying to change and pushing the government to focus on the adoption of stricter policies that have to be considered by corporations seems to be a favorite approach by the society in both the developing and developed economies (Angwenyi, 2004). Governments seem to be inclined toward facilitating guidance and platforms that encourage corporations to volunteer information about their social and environmental sustainability initiatives. The concept of globalization has forced entities conducting business in the emerging markets to consider giving back to the society and being responsible because their scores in environmental and social responsibility determine the sizes of their market share.

Moreover, there is a high inclination toward the institutional theory in environmental sustainability mechanism. The society has actively embrace requirements for sustainability as a norm that is propagated from the knowledge that the society has more power than corporations. The development of environmental auditing at a local level is based on the discovery that the society expects corporations to be sustainable. Many entities are yielding to the demand for the embracement of sustainability to enhance their competitive power. The initiative is based on the need to achieve partisan interests (Angwenyi, 2004). As far as the institutional theory is concerned, the environmental auditing process has no clear general standards that should be used, but as the current approaches become the norm, governments are embracing them as the required standards. This means that as more rules start being observed by the companies voluntarily, the stronger the legal framework will get. This is because the standardization of environmental auditing relies on the generation of routines and schemes that will be voluntarily embraced by the concerned entities.

Institutional theory affirms that rivalry for political influence and institutional legitimacy stimulates organizations to acclimatize norms that attain parallelism. This creates institutional isomorphism, which may be coercive, normative, or mimetic. Coercive isomorphism arises when more powerful establishments force the smaller corporations to embrace general standards of operation. Being dependent on the financial support of the larger companies influences a higher likelihood for the smaller ones to comply with their rules (Akech, 2006).

Mimetic isomorphism is mainly seen in situations with a high level of uncertainty. It is apparent that organizations are actively involved in the development of responses to environmental challenges based on the lead of other companies. This leads to all companies embracing similar changes and observing similar laws in the quest for competitive advantage in cases where uncertainty takes over the market. The best practices emerge from this type of response to uncertainty. This is one of the reasons that nations across the world seem to be adopting the same approach toward developing the standards of accounting auditing.

Normative isomorphism is dependent on the development of professionalism. There is no doubt that the training and development programs associated with professionals in the same field is similar in different companies; hence, they are likely to embrace similar approaches toward handling their tasks (Angwenyi, 2004). The interactions between the professionals yields new schemes of handling tasks, and this gradually becomes the rules of engagement in the profession. This is seen in environmental auditing as more accountants encounter similar challenges in handling the technical and scientific work. Their

attitude toward the challenges and their chosen approaches toward solving the challenges are similar.

While many companies seem to be embracing the norms and schemed of environmental auditing, it is also apparent that decoupling is rampant, especially in the developing economies. This refers to a scenario where companies seem to be actively engaging in applying mechanisms to support their responsibility to protect the environment, while in essence they are not implementing the ideas they present to the society. This is one of the ways that companies have been getting away with doctored environmental audit reports. For this reason, governments should continue pressing for the standardization of the process, while also increasing the strictness of the enforcement of laws and ensuring that accountability prevails.

Office of the Auditor General

Section 29(i) of the Public Audit Act 2003 gives the Kenya National Audit office (KENAO) stipulates that the agency has the right to conduct audits on sustainability of the economic growth processes in the nation. This applies to the corporations in the nation, as well as the local authorities. The focus on the economy, the efficiency of utilizing resources, and the effectiveness of management or the environment enhance the sustainability function of the nation. KENAO is committed to continuously enhance its capabilities to compel the society and the corporations to embrace sustainable growth.

The main role of the KENAO is to audit the strategies being used by the government in the quest for controlling the risks associated with the environment. The agency also audits the available standards of practice within the local government in the control of environmental risks. All the mechanisms placed by the government, with respect to the enforcement of accountability frameworks are also reviewed by this agency to ensure that policy development aligns with the existing gaps. Non-compliance on any of the parties involved in the process is reported to the environmental agencies that enforce policies to ensure that the relevant targets are attained. The agency is also charged with the responsibility of reviewing the work of the environmental auditors to determine their efficiency in handling their tasks.

National Environment Management Authority

The National Environment Management Authority (NEMA) has been placed in charge of reviewing matters concerning the environment (Okello, Beevers, Douven, & Leentvaar, 2009). The agency was commissioned as a strategy to ensure that there is a party that is constantly reviewing the activities of various corporations and local government agencies to mitigate environmental risks as soon as they are detected.

NEMA has traditionally been responsible for undertaking scrutiny of the environmental management systems adopted by corporations and entities that need to assume a high level of compliance with the government laws because of the nature of their business processes. For instance, the transportation and manufacturing industries in the nation are highly monitored by NEMA to ensure there is a high compliance on the standards of environmental management. NEMA also conducts regular surveys on the ground in the quest for identification of new environmental issues that should be addressed by the law enforcers (Mwenda, Bregt, Ligtenberg, & Kibutu, 2012). The agency reviews all the projects that are bound to have an impact on the environment, with the aim of ensuring that there is risk mitigation. The agency has numerous technical and scientific experts whose main role is to provide guidance and recommendations to project managers so as to have the minimum negative impact on the environment, especially in the mega projects. The agency is also keenly involved in reviewing the use of natural resources across the nation, and its primary aim in the involvement is to build a nation that embraces sustainability in the exploitation of resources.

III. RESEARCH METHODS

This research was conducted through a systematic analysis of documents and semi structured interviews. The sources of primary and secondary data included corporation's data charts, the applicable laws (mainly the Environmental Management Act and the Public Audit Act), Corporate, agency, and local government websites and publications. These facilitated information on the mandate of various entities in environmental auditing. The websites also highlight the international standards that are gradually being developed. A semi structured interview was conducted with participants from the OAG (Angwenyi, 2004).

The focus of the interviewer was to engage with participants in senior positions in the OAG, as well as the experienced experts. Senior government officials (Cabinet Secretaries) were part of the interview as it was necessary to focus on retrieving information from the management functions involved in the implementation of policies and auditing the performance of various entities in terms of compliance to the law (Angwenyi, 2004). The selected participants were adequately versed with the complexities of the financials, and resource development in the respective entities. The experience held by the participants was instrumental in instituting historical standpoints and chronological processes. The majority of the participants had served in their respective agencies for more than a decade. Experts from the Institute of Certified Public Accountants of Kenya (ICPAK) provided an analysis of the standards of auditing in use.

IV. FINDINGS

Human resource capacity

The office of the auditor general has established a separate unit of Environmental Audit consisting of five senior auditing professionals to handle the relevant tasks. Two of the professionals trained with INTOSAI development initiative (International Organization of Supreme Audit Institutions) and AFROSAI-E (The organization of English Speaking African Supreme Audit Institutions) are fully engaged in environmental audit (the branch head and sub-divisional head).

In-house environmental audit training is being provided to four other professionals by INTOSAI development initiative trained experts.

Two staff members contributed in a meeting held for working group on environmental audit (WGEA) in Moscow in November 2005, and they actively contributed to the environmental audit. Two members of the staff have been involved in collaborative audit involving five African countries whose findings were presented on a meeting of AFROSAI-E Auditor General's in Cape Town in 2005.

The OAG has been forced to train the professionals because there are no current educational programs that are developing experts in the field of environmental auditing. The situation requires the agencies to train accountants and other experts so that they can help in producing relevant reports.

Establishing legislation

The OAG is empowered by the Public Audit Act 2003. Section 29 bears the power to conduct performance audits to define compliance levels. Public Audit Act (2003) highlights precise powers associated with the handling of environmental audits. Section 29 (i) empowers the auditor general to carry out audits on economy, efficiency and effectiveness with which the various entities handle their processes.

Audit topics and scope

Table 1 highlights recent OAG audits.

Hospital waste management	Management of medical waste	Main government hospitals
Water bodies	Causes and effects of water hyacinth	Lake Victoria
	Nairobi river Athi river	Nairobi City

Standards

The ICPAK is yet to highlight the relevant standards of environmental auditing; hence, the OAG has relies on INTOSAI standards for the task. These are general guidelines that are applicable in a wide range of fields.

External constraints

Several external constraints were identified through interviews:

Effective audits are crippled by the lack of documentation from the clients. Globally, insufficient data on the state of the environment was the second barrier identified by SAIs, while deficient controlling and reporting systems ranked third (INTOSAI-WGEA, 2007a).

The efficacy of Public Audit Act (PAA) is constrained by the lack of regulations to make it operative. For instance, the Act denotes a system of National Resource Accounting, which is yet to be designed. Interviewees were unclear on how it will be actualized and there is a little global guidance on the challenge (Omanga, Ulmer, Berhane, & Gatari, 2014). Several government departments have committed the required human resources to create Environmental Management Units (EMUs). This is challenging because effective EMUs are indispensable for the formulation and implantation of environmental policies; without them, the process will be crippled. It is also apparent that the initiatives for lobbying are relatively low in Kenya.

V. DISCUSSION

The development of environmental auditing in Kenya is influenced by the current trends across the world. The OAG has witnessed this (through the INTOSAI and WGEA). It is apparent that the adoption of environmental auditing enables government to maintain legitimacy within the nation, while OAG maintains lawfulness within INTOSAI.

The OAG must utilize its global networks for bearings and standards because the current situation reveals that it cannot rely on ICPAK for guidance for environmental auditing. For example, WGEA guidance have been used to conduct environmental audits. Another example refers to South African audit on medical waste, which was regarded as the best practice.

INTOSAI has established several mechanisms, which perpetuate best practices. This include meetings, training workshops and knowledge sharing through case studies and detailed audit reports. These media have exposed OAG staff to the importance of environmental auditing and equipped them with the necessary skills to conduct such assignments. Therefore, they are likely to espouse the same values and display similar behavior to their colleague in other SAIs. This illustrates normative isomorphism.

On Capacity building; There is an urgent need to fortify the capacity of Environmental Audit Unit (EAU) by recruiting additional staff. This is critical for several reasons. First, it will enable more audits to be conducted each year. Second, without steering follow-up audits it is problematic to assess the impact and effectiveness of previous audit. Third, previous studies suggest that implementation of EAU will necessitate and increase the number of annual audits. This demand cannot be met through the available human resources.

Conclusions

The current research looked into identifying the reasons for establishment of EAU within OAG. The research has highlighted some limitations, which are influenced by issues like the fact that reports revealing the required environmental audits are not available in the public domain. Therefore, it was challenging to authenticate the scope of the audits, expansively assess audit findings, and to gauge audit opinions. There was also no basis to conduct follow-up interviews with audit clients.

It is apparent that audits are not inspired by the OAG or the organizations being audited. In its place, the adoption of environmental auditing is strongly motivated by membership of INTOSAI. This shows that the reasons, which inspire environmental auditing in the public sector, may be very different to those which apply in the private sector. Nevertheless, there is some common ground insofar as audits enable organizations to manage their public image.

The current research also looked into the standards and measures engaged in the environmental audits. In this concern, the OAG has relied on standards developed by INTOSAI while ICPAK has not presented any direction. This reveals how accounting technology is conveyed to small developing countries through mimetic and normative means.

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Demand on Working Abroad of Students in Nam Dinh University of Nursing

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Abstract- This paper investigates the need of working abroad among students in Nam Dinh University of Nursing and related barriers. The questionnaire was used to find out about the need to work abroad of the first, second and third year students and difficulties as well as challenges in exporting labor. Multiple-stage random sampling was performed by stratification, sampling size, and then sampling for each stratum by means of cluster sampling to ensure the objectivity for the study. Results from the study show that 42.4% of students have demand to work abroad. Germany and Japan are the two countries where they want to work most with the rate of 52.88% and 32.46% as a nurse in the hospital and the purpose is to earn money for themselves (64.4%), for family (58.6%) and for developing profession and foreign language (> 50%). As many as 81.7% of students said that the biggest barrier for students when working abroad is foreign language, there is not enough money to deposit taking up 41.4% % and the low self-esteem is 39.8%. It can be concluded that Providing complete and accurate information on overseas study programs and counseling for students, introducing the German and Japanese as an official languages in the training curriculum, recommending students to learn more information about work programs in abroad

Index Terms- Labour export, labour market, labour, nursing, oversea study programs.

I. INTRODUCTION

The trend of integration and globalization has required Vietnamese university education step by step to integrate the curriculum and to compete the quality, in which focusing on and promoting labor export as an essential need to solve outcome problem for students. Decree No. 152/1000 dating on September 20th, 1999 by the Government stated: "Labor export is a socio-economic activity contributing to manpower development, job creation and income provision, professional skill improvement, and foreign currency increase for the country. Bui (2014) has emphasized three important roles of labor export are contributing to job creation; training for employees; Creating national revenue, increasing accumulation for the national economy. [6] In the context of shortage of high-quality nursing resources in many countries around the world such as, the US expects to be lack of 434,000 nurses; In Australia, according to a survey on February 2, 2012, they needed 12,000; According to Canada's Nursing Association, in 2016 they needed 113,000 nurses. Especially in Japan, according to Mr. Nimonjima, the director of Asian human resources network, the country lacks about 40,000 nurses and 150,000 medical workers. Therefore, the Japanese Government opened the door to receive nurses from Vietnam, the Philippines and Indonesia under the EPA economic agreement.

Nam Dinh Nursing of University has the mission of training and providing nursing resources to Vietnam, aiming to train high quality nursing resources to catch up with the world market, creating stable and high-income jobs for students after graduation. The survey results in 2012 showed that the proportion of regular University students with immediate jobs was 35.9%, 73.7% of university students and 82.0% of college students had an average income of only 1 million to 3 million VND / month [1]. Therefore, it is very important to direct career for students during the time they are in university in order to prepare them well for the professional skills, knowledge and language competence. The questions are: what are the students'? Do they wish to work abroad and what difficulties can they encounter? How can the university support them? To answer the above questions, the authors selected the topic "**Survey the demand on working abroad of students in Nam Dinh university of nursing** with two objectives as follows: Survey the need to work abroad of students in NDUN and some related barriers.

II. SUBJECTS AND METHODS OF RESEARCH

1. Object, Time and Place of the Research

Selection criteria: Being the first, second and third year regular bachelor students of Nam Dinh University of nursing. Exclusion criteria: students do not agree to participate in the study; students are not at school at the time of the study and last year students who no longer have the time to resolve the difficulties that may be encountered when having demand to wrrk abroad.

Research period: 6/2016 -3/2017

Research location: Nam Dinh University of nursing.

2. Research Methods

Research design: describing quantitative cross-section method.

Sample size: Applying the formula for calculating the sample size for research describing a ratio in the community

$$n = Z^2_{1-\alpha/2}\frac{p(1-p)}{d^2}$$

In which:

[$Z^2_{1-\alpha/2}$]: The value of Z obtained from table Z corresponds to the value α; in this study we took Z = 1.96 with α= 0.05:

- p: estimation of the main research variable ratio in the population, in this study, p = 0.5 was selected for the largest sample size
- d: The expected error range between the rate obtained from the sample (p) and the proportion of the population (P). In this study, d = 0.05.
- Applying the above formula to calculate n = 384, it is estimated that about 10% of subjects refused to participate, so the minimum sample size is 423. Actually, more than 450 students were surveyed

Sampling method: Multi-stage random sampling method:
Stage 1: Stratify and calculate sample size for each floor. A total of 1709 regular students are divided into 3 floors: Year 1, 2 and 3. Sample sizes of each floor are calculated according to the non-equal sample size as follows
Stage 2: Select a sample for each floor by using a cluster sampling method. First, make a list of all layers of each floor, each class is considered as one beam, randomly draw out the number of beams of each floor and take all. The number of students of the cluster has been chosen to represent students of each floor.
Tools and methods of data collection: A set of questions is designed according to the objectives including 3 parts:
- *Part 1* contains general information;
- *Part 2* needs to work abroad;
- *Part 3*barriers to working abroad.

Methods of information collection: self-filling
Data collection process includes 4 steps:
Step 1: Investigators arrive at each selected class to state clearly the purpose and content of the study to receive consent to participate.
Step 2: Deliver the questionnaire and guide how to fill out the form
Step 3: Research objects fill out the form at the class
Step 4: Collect all forms after the research objects finish filling the forms
3. Methods of processing and analyzing data
The data after being collected will be cleaned and imported by Epidata 3.1 software and analyzed by SPSS 16.0 software. The study will use tables and charts to describe the data. The percentages are used to calculate the output indicators of the study.

III. RESEARCH RESULTS

1. General information about the objects of the study
Of the 450 students participating in the study, the proportion of female students accounted for the majority (93.6%), only 6.4% of male students participated in the survey. Most students come from rural areas accounting for 86%, the birth rate from urban areas only accounts for 8.4%, especially 5.6% of students are in mountainous areas.
2. Needs to work abroad
Of the 450 students participating in the study, the proportion of female students accounted for the majority (93.6%), only 6.4% of male students participated in the survey. Most students come from rural areas accounting for 86%, the birth rate from urban areas only accounts for 8.4%, especially 5.6% of students are in mountainous areas.
Tables 1, 2 and 3 show that 42,4% of the students has the intention of going abroad to work and more than half of the surveyed students want to work in Germany (52.885) and followed by Japan (32.46%). The most reason for not having demand to work abroad is because they don't want to live far from home (73%). 31,7% of them said they don't have language capacity to work abroad, followed by they don't have interest in working abroad (22.4%) and they don't have money to prepare for working abroad.

Table 1 Student's need to work abroad after graduation

Intention	Frequency	Rate %
Yes	191	42,4
No	259	57,6

Table 2 The countries where students would like to work in

Name of countries	Frequency	Rate %
Germany	101	52,88
Japan	62	32,46
Korea	23	12,04
Taiwan	1	0,52
Others	4	2,09

Table 3. The reasons for not having demand to work abroad

	The reasons for not working abroad	Frequency	Rate %
1	Don't have money to prepare for working abroad	52	20,1
2	Don't like working abroad	58	22,4
3	Don't want to live far from home	189	73
4	Don't have language capacity	82	31,7
5	Others	3	1,2

Table 4 below reveal 64.4% of respondents who wanted to work abroad due to the desire to save money for the future; 58.6% of the subjects want to send money home; 58.1% of the study subjects said that they want to improve themselves; 50.3% due to the chance of learning advanced nursing skills and learning languages (47.6%). Only 7.35 of the respondents want to work abroad because they have relatives who are living abroad.

Table 4. The students' purposes to work aboard

The purposes of working abroad	Frequency	Rate %
1. Sending money home	112	58,6
2. Saving money for the future	123	64,4
3. Learning advanced nursing skills	95	50,3
4. Learning language	91	47,6
5. Improving yourselves	110	58,1
6. Having relatives who are living abroad	14	7,3

As can be seen in Table 5, knowing a foreign language is the biggest barrier for students to work abroad (81.7%). 41.4% of the respondents noted money for security or deposit is also a barrier to prevent them from working abroad, whereas, 39.8% of them considered qualification is a barrier, 27.7% don't have enough information to go abroad. Family agreement and personal health are the two least barrier for the students to work abroad (15.75 and 15.2%).

Table 5. Barriers prevent students from working abroad

No	Barriers	Frequency	Rate %
1	Foreign language	156	81,7
2	Qualifications	76	39,8
3	Family agreement	30	15,7
4	Personal Health	29	15,2
5	There is no money (Security, deposit)	79	41,4

6	Information accessed to work aboard	53	27,7
7	Others	5	2,6

Table 6 below reveal that 66% of the respondents want to be invited to the recruitment business to share information to have information to work abroad. 48.2% thought organizing job seminar would be necessary to provide information. Inviting former students to share information (46.1%) and sharing experience from teachers are also needed activities (46.1%). Organizing

Table 6 Necessary activities to provide information

	Necessary activities to provide information	**Frequency**	**Rate %**
1	Organizing job fairs	66	34,6
2	Organizing job seminars	92	48,2
3	Inviting recruitment business to share information	126	66,0
4	Being shared experience from teachers	81	42,4
5	Inviting former students to share information	88	46,1
6	Others	6	3,1

IV. DISCUSSIONS

1. Students' demand to work aboard

Survey results show that the percentage of students who want to work ab after graduation is up to 42.4%. One of the many reasons for this high number is that it is difficult for them fo apply a job in their country after graduation. It is estimated that each year in Vietnam there are more 200,000 bachelors and masters who are unemployed. Besides the influence of the thought that it is necessary to have money (even a lot of money) to get a job, even the salary is not as high as expected if you are accepted to work. In addition, information of job opportunities in foreign countries such as Germany, Japan and some other countries is now accessible.

Students can access this information from various sources such as the internet, television, from the University's Employment Advisory Board, and even labor export companies who consult directly at the University. There is no evidence of this issue, however, in the scope of this study, the research team proposed the above factors that directly affect psychology to work aboard after graduation of students in Nam Dinh University of Nursing. This can be a right way to contribute to solving the current employment problem: to ensure the goal of settling jobs and creating a strong source of foreign currency for domestic socio-economic development.

When learning deeply the purpose of students to work abroad, the study found that 64.4% of students want to save money for themselves and 58.6% want to work to send money for family. This data is quite reasonable when there are over 90% of students who were born in rural and mountainous areas. Besides, most of their parents are also farmers, so it is perfectly natural for them to want to work abroad to earn money for themselves and their families. Therefore, it can be seen that labor export will contribute to creating more jobs, creating revenue for the country, increasing accumulation for the national economy.

Besides the reason for earning money, the purpose of developing yourself, developing career skills is also chosen a lot by students. Previous studies on this issue have proved these statements. Author Bui (2014) said that labor export is contributing to the skill training for workers, improving the quality of human resources for the country. The author Nguyen (2010), when studying the development of Vietnamese labor export in international economic integration, also came to the conclusion that labor export (labor export) contributes to the development of the country's human resources. Thanks to Labor export is concerned by the state and there is a policy of training and retraining for a part of the labor force, the quality of human resources has improved.

Research results on labor export locations show that Germany and Japan are the two countries that most students choose with respectively 52.88 and 32.46%. The reason why students choose these two countries might come from information on labor export in these two countries appears on the mass media. These two countries also have formal cooperation agreements with Vietnam on labor export as nursing. The agreement between the Department of Overseas Labor Management and the German International Cooperation Agency (GIZ) signed on May 4, 2016 piloted bringing Vietnamese nurses to study and work in the Federal Republic of Germany in the field of caring for patients.

The working position which most students want to work as nurses at hospitals (71.9%). This is a legitimate desire of students, but to achieve this desire is not a simple matter. Because Vietnam's nursing training program is still not up to international standards, especially in developed countries like Germany and Japan, the standards are even higher. Therefore, in order to meet the labor export demand and the demand for students' working positions, it is necessary to have the effort of the learners and the renovation of the training program. This is both a driving force and a challenge for the education sector in the current period.

About the working time, most students only need to work less or 5 years then they come back to the country. The majority of students who want to work longer than 5 years are mostly male students. With the monthly salary (theoretically), only about 5 student working abroad can earn about 1 billion VND (minus expenses). This amount is relatively large for most people who have just graduated from the university for 5 years in Vietnam. For female students they need to return early to be able to get married and soon find a stable job with the available money. As for male students, due to low pressure on marriage, they need to stay longer than women.

2. Barriers for students when they need to work abroad

There are a lot of barriers to students to work abroad, but there are two biggest barriers identified by students: foreign language ability and professional qualifications. In early 2017, a survey of 27,000 expats (temporary translator: who is working in a foreign country, not where they were born and grew up) is given a list of countries and territories by HSBC Bank. When being asked about having confidence in "trying" in a foreign working environment, Nguyen Quang Dung (21 years old, Polytechnic University – Ho Chi Minh city) as well as some other young people are quite shy because they are afraid of "culture shock" and language barrier. "We can communicate well in English but when entering a pure international working environment, we will meet many difficulties. In addition, I found myself a different "minus" of

myself as a bad teamwork spirit. Lack of skills leads to difficulties for students to get the employers' agreement and that is the cause of unemployment for new graduates.

Another barrier that many students mention is that there is no money to deposit (41.4%). As mentioned in section 3.1 the percentage of students living in rural and mountainous areas is nearly 90% and most of their parents are farmers, the monthly support for studying is very low, so the huge amount of money (about 100 million) is unimaginable. In order to create conditions for disadvantaged students to work abroad, competent agencies need to develop necessary support policies. Besides barriers to cultural shock, many students are also concerned about work pressure when working abroad, especially in Japan. Statistics show that the number of workers in Japan seeking death to free up the pressures of increasing work. According to Japanese government statistics, in 2016 there were more than 21,000 successful suicides in Japan. Compared with previous years, the rate of suicides increased: in 2008, this rate was 19.1%, in 2012 there was 23.4% and in 2016 this rate increased to 23.6%. Therefore, it is very important to provide psychological training as well as the way to arrange and plan the work so that students who work abroad can limit the pressure of work happening to them.

To overcome these barriers, students also made many suggestions to overcome. The solution that students choose the most is inviting recruitment businesses to share accounting for 66%. These companies have a lot of experience in labor export activities, they can answer most of the students' questions and they can also give advice to increase their motivation to work aboard. Besides, organizing seminars on employment, sharing experiences of teachers and formers as well as organizing job fairs are also mentioned by students. In addition to the above solutions, to help students to work and adapt to the new work environment, it is necessary to organize national cultural, psychology and life-saving classes

V. CONCLUSION

The percentage of students wishing to work abroad is 42.4%. There is no difference in the needs of gender, place of birth and the number of years of training at school. Germany and Japan are the two countries students want to work most with the proportion of 52.88% and 32, 46%. The job position students want to do when working labor is as a nurse in hospitals. The main purpose of students working abroad is to earn money for themselves (64.4%) and families (58.6%) and the percentage of students who want to work abroad to develop professional qualifications subjects and foreign languages are also quite high, it is more than 50%.

Up to 81.7% of students said that the biggest barrier for students going to work abroad is foreign language. Without money to deposit, make sure to go to work abroad is also a huge barrier (41.4% of students choose). The next barrier is not having high qualification (39.8% of students choose).

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Parents Attitude Towards Inclusive Education

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Abstract- The success of inclusive education largely depends on the support from the parents of the children with disabilities. Sometimes it is seen that some parents are reluctant to bring their children with disabilities out into the open. such types of attitude turns into a barrier in implementing inclusive education. Parents play the most significance role in their children's life, therefore to know their attitude towards inclusion of children with special needs is very important. Present paper is designed to study the attitude of parents towards inclusive education. A sample of 200 parents from five Urban and five rural area of Dhemaji district of Assam are used to conduct the study. The result showed that there is no significance difference between the town and village parents and have significance difference in male and female parents in their attitude towards inclusive education.

Index Terms- Attitude of parents, Inclusive education.

I. Introduction

A parent is child's first teacher and remain the best teacher throughout their life. Parents are the one who mould a child into a good man or woman of future. Parents play important role in encouraging and motivating their child to learn. Basic role of the parents are take care of their child's biological needs, provide a safe, nurturing and supportive environment, provide guidance, direction, assistance and help them in all round development of their personality(Elkins, Christina 2003).

Parents of differently able children are more responsible about their child's life activities. They always take complete care to up bring their children. They help their child to overcome his or her depressing, insufficiency or difficulty. Parents always try to give a conducive environment to their disabled children where every member of the society accept him equally as the normal children. They tried to educate their child in an inclusive educational setting.

In inclusive education all children attend and welcomed by their neighborhoods schools in age appropriate regular classes. They are also supported to learn, contribute and participate in all aspects of school life. It brings all students together in one classroom and community regardless of their strength or weaknesses in any area (Mahanta,Bora, Adhikary).

The success of inclusive education largely depends on the support from the parents of the children with disabilities. Some parents are reluctant to bring their children with disabilities out into the open. such types of attitude turns into a barrier in implementing inclusive education. Generally the benefit of inclusion is mostly for the families. This approach welcome their children with special needs to the regular education providing equal worth as the other non-disable children of their age. Parents play the most significance role in their children's life, therefore to know their attitude towards inclusion of children with special needs is very important.

II. Objectives

1. To study the difference between urban and rural parents attitude toward inclusive education.
2. To study the difference between male and female parents attitude toward inclusive education.

III. Method

Sample: By using simple random sampling technique, a sample of 200 parents are selected from five urban and five rural area of Dhemaji district of Assam having equal representation of male and female.

Measures: The study involved a self administrated questionnaire having 30 questions which contains items for demographic data and items regarding inclusive education. The items related to inclusive education provided information regarding the knowledge and attitude towards
Inclusive education, differently able children, integrated education, special education, practice of inclusive education etc.

Procedure:The data for the present study are collected personally by the investigator from selected areas. The data was calculated, scores, tabulated and then subjected to statistical analysis. The responses of parents are analyzed using SPSS.

IV. Result and Discussion

Mean, median and mode of the total sample for the variables are obtained to ascertain the nature of distribution of the scores. Results are given in Table -1

Table -1 Mean, Median ,Mode scores on the variable of parents attitude towards inclusion.

Variable	Mean	Median	Mode
Parents attitude towards inclusion	110	108.50	106.00

Table -1 shows that the values of mean, median, mode for the variable are 110, 108.50, 106.00. The small difference in these

value depict that the distribution is nearly normal. The calculated value of the mean is 110. Norms for interpretation of level of attitude towards inclusive education indicate that the level is above average favorable as the value is lies between 105-115.

Table-2 : t' ratio between mean scores of urban and rural parents on the variable of attitude of parents towards inclusive education.

Variable	Area	N	Mean	SD	Std error Mean	DF	T ratio
Attitudes of parents	Urban	100	110.97	12.14	1.21	198	0.372
	Rural	100	110.35	11.40	1.14		

Table -2 shows that the calculated t-ratio is 0.372 which is less than the table value(1.97) at 0.05 level of significance. Hence, it is significant at 0.05 level. Therefore from the table we can able to know that there is no significance difference between rural and urban parents towards inclusion.

Table 3: t' ratio between mean scores of male and female parents towards inclusion.

Variable	Gender	N	Mean	SD	Std error Mean	DF	t ratio
Attitude towards inclusion	Male	100	108.26	10.40	1.040	198	2.942
	Female	100	113.06	12.57	1.257		

Table 3 shows that the calculated t' ratio is 2.942 which is more than the table value of 2.60 at 0.01 level. From this table we know that there is significance difference between male and female parents attitude towards inclusion of children with disability in general school setting.

V. CONCLUSION

The present study reported that the parents have a positive attitude towards inclusion of children with disability in general school setting. But it is important to note that , it is slight positive attitude, just above average. Therefore there is a need to spread the awareness regarding inclusive education. Awareness programmed, media, posters, conferences, meetings, training etc should conduct on it.

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New Trends in Internet Marketing

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Abstract: The main trends that influence development of new internet marketing approaches in mobile business include: mobile social media, mobile games, mobile TV and Internet intelligent devices.

Mobile games are often used mobile applications, so they have a good advertising potential. Although in practice, dynamic advertising is often present, where the message displayed within the game changes according to defined criteria, the choice and manner of displaying marketing messages is not always appropriate or tailored to the characteristics of users, so more personalized advertising is necessary. The delivery of television content to mobile devices has brought innovations to traditional television advertising.

Keywords: E-marketing, mobile, business, web-site, internet

Introduction

Mobile TV commercials can be customized to each individual viewer, with innovations in billing models for advertisers. Intelligent device Internet technologies have made it possible to connect the physical and virtual world. In the context of internet marketing, Internet intelligent devices influence the development of new models of mobile store in physical and online stores (Nedeljković-Valić, D., 2014). There is a growing need and a trend for small and medium-sized enterprises to become active users of the web search for certain solutions.

E-marketing- A new form of marketing

Intelligent e-marketing processes must be designed to take into account the necessary relationships between e-marketing trends and data mining techniques in developing specific marketing strategies.

At the very beginning, the focus is on marketing campaigns and they are oriented towards the needs of consumers. If the needs of e-customers were to be recognized as the needs of most e-commerce customers, the reliability of knowing the relationship between the E-commerce actors (consumers and retailers) could be achieved, so e-marketing tendencies would be closer to reality than the theoretical concept supported literature.

Providing tools that add value to e-marketing campaigns, such as a digital fingerprinting tool, should be integrated in the web mining process to increase control. (Gerrikagoitia J et al., 2015).

The e-commerce strategy primarily relates to techniques, technologies and organizational prerequisites, which direct users to the business with the advertising company. Marketing activities mean that all channels of communication with users are integrated.

The marketing strategy in e-commerce is a complex job that implies that all activities by communication channels are directed to building a company and product only. This is achieved by the quality of the product being offered and providing information that is true, accurate, and describes in detail what users should be aware of in the product, the company and the conditions under which the product will deliver optimal results. This ensures that customers are satisfied. The acquisition of new users represents an investment in marketing campaigns. The goal is to reach as many interested users as possible (targeted campaigns). Marketing via the Internet is a good communication channel, but it has one limit, which is that not all users of mobile devices can access the Internet from anywhere. This deficiency can be overcome by a combination of technologies that are applied on the Internet, the real environment and mobile services. The basic task of the marketing strategy in e-commerce is to get in touch with the users, to communicate to them and to focus on the channels through which they will obtain a product or service.

Marketing activities in the electronic environment are determined by a large amount of data on consumers and their behavior, the interaction of marketing activities, and a high degree of measurability of their performance due to direct consumer response. Internet marketing activities are generally carried out in combination with traditional marketing activities and enable their improvement through the advantages provided by technology. The concept of internet marketing is based on focusing attention on personalized advertising. Careful consumers are identified who adapt products and services of the company. The Internet is a convenient medium for the application of various marketing strategies, various forms of trade and advanced relationships with consumers. The next type of consumer activity in the electronic environment is the creation and sharing of fun and creative content, which contribute to popular culture. Even before the emergence of Internet marketing has influenced popular culture, the Internet has allowed this impact to be even more pronounced. Internet users use technology to express their creativity by creating interesting, fun, witty and useful content that they want to share with others.

One of the most important activities of consumers in the electronic environment today is participation in virtual communities. The basis for connecting members of these communities is shared interests such as profession, hobbies, entertainment, etc.

Community members exchange digital content (text, images, audio and video files), publish articles (blogs), evaluate and comment on other digital content, build knowledge bases and develop professional networks. The concept of virtual communities is very similar to the concept of social networking sites, but it is broader and includes all forms of virtual networking, through all kinds of social media (blogs, digital content sharing sites, etc.). Businesses can encourage the creation of virtual communities or support existing ones, communicate directly with community members, advertise on virtual community platforms, and more. (Deighton and Kornfeld, 2009).

Web site as a form of e-marketing

The website is part of the organization's online presence. It is possible, for example, to design a special mobile app. It is necessary to create the look of a YouTube channel, a Twitter account, etc. The organization's organization on the Internet combines all activities on its own and other media, including communication through various Internet services (such as e-mail, chat, etc.). (Varagić D., 2012) Internet marketing combines all the activities that enable the creation of a high-quality organization on the Internet. These outcome activities should have the organization's competitive advantage and survival on the online market.

In order to define how to achieve high-quality online performances of the organization:

- It is necessary to know the possibilities of online organization (human, technical and financial resources); It is necessary to determine the relationship between the organization's needs in the online environment and its ability to carry out defined online activities.
- Familiarize yourself with the goals of online performances The business goals of the organization in the online environment are achieved by defining the following specific characteristics:
    - ✓ brand development via internet
    - ✓ reaching potential customers (pre-sale, sale, after-sale)
    - ✓ generating revenue
    - ✓ lowering costs
    - ✓ customer Support
- Determine how the projected objectives are realized and implemented within given time frames
- Redefine goals in relation to existing resources. (Varagić D., 2012)

The website is a collection of hyperlinked documents related to the advertised product. Trust increases satisfaction, because if users believe service to the provider means that clients believe that they will get a promised service and feel a reduced level of risk. Since trust depends on the quality of the site, managing all dimensions of quality-meeting needs, security, and responsibility, as well as the functionality of the website - are crucial for loyalty. (Gummerus J., 2004)

A company promoted through a website should regulate the actions of its partners and advertisers and ensure consistent privacy and security policies in order to protect its reputation. Changing the safety rules can be fatal, as it can provoke vicious customer reactions (Gummerus J., 2004)

Well-designed website should increase sales. Particular attention is paid to the design of the site as well as to the design of the product, as organizers and Internet sales companies are aware that an attractive website can attract more users and potential customers and that it is very important to enable its easy use. Companies compete who will do a better designed website, including any additional content that goes with that site.

After positioning the site on the Internet and advertising campaigns, it is necessary to measure the effects of an eb-siteonline campaign. Measuring the effects of the campaign is done by statistical analysis of site visits and financial indicators.

By registering domains and placing a site on a server, each owner of the presentation has the ability to monitor the results of his campaign on the Internet daily. Software that tracks all visits to the site provides great opportunities for statistical analysis (FON, 2014). It is possible to get information about the total number of visits to each site's website, the length of the visit during the day, the number of computers from which access was accessed, the country from which the site was visited, whether it is a visit to a direct presentation or from another presentation.

Mobile business

Mobile telephony, as we know it today, is beginning to develop in the late 1970s, and its first experiments began in Chicago in 1978. The system utilized the technology called Advanced Mobile Phone Service (AMPS) and ran on the 800 MHz band. For many reasons, including AT & T decay, it's been a few years before the first commercial system started operating in America. The system was first released in Chicago in 1983, and shortly thereafter in other US cities.

In Europe, it also actively worked on the development of mobile telephony, and in 1981, mobile telephony began operating in Sweden, Norway, Denmark and Finland. The first GSM network was launched in 1991. GSM has been experiencing a growing and

greater success as one country has introduced this system into use. GSM has expanded beyond Europe, so it has reached even Australia. It was clear that GSM would be not only a European but also a global system. For this reason, the abbreviation GSM has also received the new meaning of Global System for Mobile Communications (Global System for Mobile Telephony).

Mobile business is the application of mobile technologies for business purposes, for the provision of services, marketing and trade, as well as making payments in order to increase business efficiency, lower operating costs and better competitive position in the market. Mobile business is a new concept of modern business. The advantage of this business is that it enables consumers and customers to order products or services from anywhere in the country and abroad, as well as the ability to pay in the same way with the use of Internet technologies.

There are a number of different definitions of mobile business:

- M-Business is the use of mobile devices for communicating, informing, informing and conducting transactions using text and data via a public or private network. (Lehman Brothers)
- Mobile shop represents any transaction with monetary values over the mobile telecommunication network. (http://archiv.iwi.uni-hannover.de/lv/seminar_ss03/Maluche/main/issues.html)
- Use of mobile devices for communication and interaction by means of connection to the Internet (Forrester Research)
- Use of wireless technologies to provide conventional, personalized services to its customers, employees and business partners (Mobilocity).

In development of mobile business, according to Forrester Research, the following barriers have emerged:

- Lack of information,
- Fear from bad experience of other users,
- Security of the transaction,
- Ignorance of the use of the technology necessary for the operation of mobile devices and others.

According to Anckar and D'Incau (2000), mobile marketing (m-marketing) is defined as any form of marketing communication that is delivered to a mobile phone, while offering potential opportunities for creating additional value for consumers. It includes: advertising and geolocation marketing.

Despite the fact that there is potential added value, marketing people need to respect the fact that mobile phone users use their own devices for private purposes and are not willing to make them available for marketing activities. In the market, there must be an understanding of how users perceive the value of their mobile phones in terms of the function they take in their everyday life, and find ways to match the best possible extent to the ways in which m-marketing can create added value for them. (Andrews L. et al., 2012).

Within this practice, it is possible to identify elements of the social value of an individual, and his system of values by observing his or her membership or membership. Ropke (2003) has expressed the mobile phone as a means of avoiding uncertainty, coordinating daily activities for rationalizing the time that helps to coordinate daily activities because it ensures the performance of obligations on the move.

It is therefore very important that marketing people understand how mobile phone users set a value system in order to meet their needs accordingly (Andrews L., et al.2012). Mobility provided by these devices form the application of mobile marketing and trade in business. Information to the end-user is available at any time, anywhere, and from any wireless device.

Success of using mobile devices depends on the ease of use and delivery of information at the right time. The value of the services is based on the manufacturer's offers and consumption by consumers. They determine the dependence between the success of selling products or services and meeting customer needs.

Benefits of Mobile Marketing

One of the main advantages of marketing through mobile communication devices is the personalization of messages sent to the target group. The advantage of mobile marketing is the large range of mobile phones, which is the consequence of their omnipresence, that is, the increasing penetration of mobile phones as the main means of communication, penetration is higher than in the Internet. The mobile phone has become inseparable from its user, it is always with it and it is turned on almost always, 24 hours a day.

This is a great advantage for those who use mobile telephony capabilities to market relationships with the target population, which, in contrast to the traditional media that has one-way relationships, will be bi-directional and interactive in real time. Through social networks, by creating special groups with the same interest, there has been great interconnection of mobile phone users. Entertainment content that is available through mobile phone games, prize games, quizzes provide space for marketing activities. The results of mobile-phone campaigns are precisely measurable, which helps to select the target audience well.

Smart phones have the ability to transform consumers' purchasing habits namely, users can quickly and easily buy through multiple channels (classic stores, web stores and mobile devices) with considerable degree of comfort, flexibility, efficiency and personalization. Smartphones offer consumers a wide range of options, including mobile internet browsing, thousands of applications, e-mail, instant messaging, photo-sharing, video and audio playback, GPS games, video cameras, images and video editing, and more.

Benefits of mobile marketing are:

- Mobility-the user uses mobile store services from different locations.
- Localization of products and services-regardless of the time and location of the user's location, will be forwarded to the information it has previously requested.
- Convenience - the ability to store more data and access from any mobile device.
- Personalization - information is tailored to the needs of the individual user
- Connectivity-Easy access to the Internet, Intranet, etc.
- Wide availability-information is available at any time, from anywhere.
- Lak pristup informacijama u realnom vremenu.

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Management Practices of School Principals to Enhance Teacher Excellence in Cordillera Administrative Region

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Abstract-The effectiveness of educational management practices employed by school principals have been extensively documented for several decades. However, most of the studies had concentrated on the improvement of students' outcomes. The focus of management for teacher excellence as perceived by the school managers and teachers have remained unexplored. The study aimed to determine the extent of effectiveness of the educational management practices employed by school principals to improve teacher excellence and intended to find out if there is a significant difference between the perceptions of school heads and teachers on the extent of effectiveness of the educational management practices employed by the school principals. The data were collected through the use of a survey questionnaire research instrument which had been answered by 150 school heads and 850 public secondary school teachers in the Cordillera Administrative Region. Findings of the study revealed that the school heads and the teachers perceived that the extent of effectiveness of the educational management practices employed by the school principals to grow teacher competence had been very effective as manifested by the over-all mean of 3.50. Hence, there was a significant difference between the perceptions of the school heads and teachers on the extent of effectiveness of educational management practices employed by the school principals in the Cordillera Administrative Region, Philippines as revealed by the computed t value of 2.667 which was higher than the tabular value of 2.101 at 0.05 level of significance for 18 degrees of freedom. Therefore, this rejected the null hypothesis, "There is no significant difference between the perceptions of school heads and teachers on the extent of effectiveness of the educational management practices employed by the school principals.

Index Terms- Management Practices, School Principals, Teachers, Teacher Excellence

I. Introduction

Globally, teacher excellence has become one of the main issues and concerns of education since this has been linked with the school management practices and the students' outcomes. Studies have shown that the principals' instructional leadership and school management practices have influenced the performance of the teachers and the learners emphasizing that a performing principal produces excellent teachers and excellent teachers produce quality graduates.

The purpose of the study has been to examine the extent of effectiveness of the educational management practices employed by school principals to grow teacher excellence and to determine the significant difference between the perceptions of school heads and teachers on the extent of effectiveness of the educational management practices employed by the school principals.

The rationale behind this study has been on the fact that management, teaching and learning are all interconnected for the attainment of excellence and quality education. Studies have shown that poor management practices of the school principals have resulted to the teachers' poor teaching performance and students' poor learning outcomes; whereas effective management practices have influenced effective teaching and excellent learning.

Among the educational management practices being explored in this study have included the constant observation and assessment on the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials; initiation of innovations, resourcefulness, optimism and creativity to cope with new situations and changes; salary increase for teachers to meet their needs and demands; provision of quality professional development that is research-based, consistent, convenient, relevant and differentiated; use of varied motivational techniques and expect the best among teachers; provision of adequate school facilities; strengthen home school and community relationship; model expectations among teachers; trust on teachers and serve as facilitators; and implementation of educational policies.

Hence, the effectiveness of educational management practices of the school principals has been one of the important topics to be explored since education has been found out to be suffering from deterioration for several decades and one of the factors leading to such issue has been on the management practices employed by school leaders that have influenced both the teachers and students' performance.

Literature Review

1. Classroom Observation and Assessment

Among the educational management practices of the principals is the constant observation and assessment on the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials. Singh et al. (2017) mentions in his study that classroom assessment practice has received a lot of attention in recent years as it is an inseparable aspect of the teaching and learning process. Assessment provides a record of how much new skills and knowledge have been absorbed by the students facilitated by the teachers. The literature on classroom assessment has shown that the content domain in which lecturers are required to develop the assessment skill would encourage educators to focus on the process as well as the products of learning. When a principal conducts regular assessment with teachers, their strengths and weaknesses would be assessed and the result may be used for remediation measures to address their needs.

2. Transformational Leadership

The educational management practices concerning initiation of innovations, resourcefulness, optimism and creativity to cope with new situations and changes have been associated with transformational leadership. Burkus (2010) states that transformational leadership pioneered by James MacGregor Burns is a relatively new approach to leadership that focuses on how leaders can create valuable and positive change in their followers. He says that transformational leadership theory is supported by nearly 30 years of research correlating transformational leadership to positive performance outcomes including individual, group, and organizational level variables.

3. Remuneration

One of the offshoots of management best practices of school administrators has been on such campaign for the salary increase for teachers to meet their needs and demands. Studies show that teachers' salaries in developed countries have higher wage than those in developing countries as mentioned by Born (2015). "Teachers all over the globe have something in common: they share a great responsibility for the future of young people. But what about fair and just remuneration," the vast difference in teachers' salaries are a great source of worry, particularly for poorer countries," he says. Thus, he suggests since the teaching profession is a demanding one, the teacher must impart skills and knowledge, help in character development, manage school routine, and counsel parents and children.

4. Teachers' Professional Development

The educational management practice of providing quality professional development that is research-based, consistent, convenient and relevant as well as differentiated has become an essential part of the teachers' professional development. In education, research has shown that teaching quality and school leadership are the most important factors in raising student achievement. For teachers and school and district leaders to be as effective as possible, they continually expand their knowledge and skills to implement the best educational practices. Educators learn to help students grasp the highest levels. Many people may not be aware of their local school system's methods for improving teaching and student learning. Professional development is the only strategy school systems have to strengthen educators' performance levels. Professional development is also the only way educators can learn so that they are able to better their performance and raise student achievement Mizell (2010).

5. Motivation

One of the educational management practices employed by school principals to raise teacher excellence has been on the use of varied motivational techniques and expect the best among teachers. Juneja (2019) defines motivation as the process of stimulating people to actions to accomplish the goals. In the work goal context, the psychological factors stimulating the people's behavior include the desire for money, success, recognition, job-satisfaction, team work and other related factors. One of the most important functions of management is to create willingness among the employees to perform in the best of their abilities. Therefore, the role of a leader is to arouse interest in performance of employees in their jobs. The process of motivation consists of three stages: a felt need or drive, a stimulus and the satisfaction or accomplishment of goals. It is expected that school managers need to use varied motivational techniques as those taken from Abraham Maslow's Theory of Motivation, Alderfer's ERG Theory, McClelland's Achievement Motivation, Herberg's Two-factor Theory including Skinner's Reinforcement Theory, Victor Vroom's Expectancy Theory, Adam's Equity Theory and Lockes' Goal Setting Theory and many other theories of motivation which are applicable in managing the school's human resources.

6. School Facilities

The school management practice of ensuring that facilities are complete, relevant and up-to-date has been one of the issues and concerns in the school for the attainment of quality education. School facilities include the school library, science and ICT laboratories, multi-purpose hall, audio-visual facilities, sports facilities, art room, music room, cafeteria, books and uniform store and Medicare.

Hence, facility quality is an important predictor of teacher retention and student learning. The physical and emotional health of students and teachers depend on the quality of the physical location, which makes establishing safe, healthy buildings essential (Center for Evaluation and Education Policy, 2015).

7. Home, School and Community Partnership

Strengthening home school and community relationship has been one of the most essential practices to become successful in the school management. According to the Ministry of Education, Guyana (2017) home-school partnerships help teachers develop strong relationships with their students and motivate parents to cooperate with teachers to improve academic performance. Parents also can learn basic teaching concepts, learn with their children and get to know others in the community while contributing to schools by volunteering in various activities for the development of the school.

8. Participative Management

Participative management has become the trend in the educational management. Modeling expectations among teachers is a kind of participative management that involves the upper and lower levels of the educational system. Among the benefits of participative management as Juneja (2019) have enumerated are as follow: innovation and increased efficiency; timeliness; employee satisfaction and motivation; product quality; less supervision requirements; better grievance redressal; and hiring flexibility.

9. Trust and Confidence

Educational management practice of promoting trust on teachers and serving as facilitators can influence teacher excellence. Trust and confidence according to Dickinson (2016) is an implied obligation on both employer and employee not to act in any way that is calculated to, or likely to, breach trust and confidence. The concept of trust and confidence has developed over time through case law and can encompass a wide range of factors. While it is a mutual duty, allegations that trust and confidence have been breached are more commonly raised by an employee about the actions or behavior of their employer. On the other hand, Modoono (2017) has emphasized that trust is the foundation for collaboration, and collaboration is what makes organizations excel. He believes that trust is the most important factor in building a collaborative and positive school culture. Teachers who are trusted take risks and collaborate with their colleagues. They work longer hours. They are committed to maintaining a healthy culture—a place where everyone looks forward to coming to work and most of all, they build on this foundation of trust and collaboration to create engaging, rigorous learning opportunities for their students.

10. Educational Policies

The implementation of educational policies has been one of the educational management practices used by school administrators to improve the performance of teachers. The role of the principal in the implementation of educational policies particularly in relation to teachers' development has become important sine teachers cannot give what they do not have. Supportive school heads can create a school culture of excellence between and among the teachers and students. Reform Support Network (2015) states, "Leadership matters. Principals are the primary drivers of school improvement and the best long-term investment to ensure effective teaching and learning at scale." There are vast state policies supporting the principals improve the education system. State policies prioritize school leaders' roles as instructional leaders, promote models of shared leadership that enable principals to spend their time on the most important activities and build a pipeline of future leaders, encourage better and more targeted professional learning and support for school leaders and state policies are improved through ongoing engagement with the principals who are responsible for implementing reforms.

Research Questions:

1. What is the extent of effectiveness of educational management practices employed by school principals to enhance teacher excellence as perceived by school heads?
2. What is the extent of effectiveness of educational management practices employed by school principals to improve teacher excellence as perceived by the teachers?
3. Is there a significant difference between the perceptions of school heads and teachers on the extent of effectiveness of educational management practices employed by school principals in improving teacher excellence?

II. METHODOLOGY

The research design of the study was the descriptive-normative survey since it was subjected for the modification or description of some extent the effectiveness of educational management practices employed by school principals to grow teacher excellence. This study used the collection of data through the constructed questionnaire checklist in order to test the hypothesis formulated. The comparative treatment of data was utilized to prove the null hypothesis. Hence, this study has been normative in design because it statistically treated the data gathered using an established formula.

This study was conducted in the Cordillera Administrative Region where the selected number of respondents have currently residing. The Cordillera Administrative Region has been located in the Northern portion of Luzon. It is bounded on the North by the provinces of Ilocos Norte and Cagayan, on the West by Ilocos Sur, on the East by Cagayan Valley and on the South by the province of Pangasinan, Nueva Ecija and Nueva Vizcaya, Abra, Apayao, Benguet, Ifugao, Kalinga and Mountain Province and the chartered City of Baguio all within the Cordillera Mountain range. These provinces are composed of twenty-six municipalities and one thousand one

hundred seventy four barangays. The total land area of the region is seven hundred sixteen thousand eight hundred twenty two and two tenths square kilometers.

The Cordillera Administrative Region is composed of nineteen tribes of ethno linguistic groups. However, other dialects commonly spoken in the region are Ilocano, Tagalog, Pampagueno, and Pangasenenses. Moreover, this study involved 850 Basic Education Teachers and 150 Secondary School Administrators in the public sector or a total of 1,000 respondents. The distribution of the number of respondents was in every school division.

In this particular study, the questionnaire was used as the primary data-gathering tool in order to arrive to the maximum perception of the 1, 000 respondents.

The questionnaire used specifically the fixed alternative or closed-ended questions as a form of restructured type of data-gathering tool, in which each of the respondent has been required to simply select one or more of the specific categories provided by the researcher (Bailey, 2014). The items in the questionnaire were actually based on the specific questions that had been formulated for the study.

The questionnaire dealt with the main inquiry of the study consisting of two categories in providing information on the: (1) extent of effectiveness on the educational management practices employed by school principals to grow teacher excellence in the Cordillera Administrative Region, Northern, Luzon, Philippines and (2) the perceptions of school heads and teachers on the extent of effectiveness on the educational management practices employed by school principals to grow teacher excellence.

The author constructed the questionnaire and allowed the panel of experts to check it carefully. Then, the questionnaire was administered to 30 teachers who were not part of the research. The respondents answered all the items correctly thus, the questionnaire was then finalized after some modifications based on the suggestions of the validators. Eventually, the researcher asked the assistance of some people concerned for the floating of said questionnaire after it has approved valid for administration. Ninety percent of the questionnaire checklists had been efficiently floated and retrieved.

The Likert-type of point scale according to Downie and Heath (2012) has been used to quantify the perceptions of the respondents.

The extent of effectiveness on the educational management practices employed by the school principals to grow teacher excellence as perceived by the school heads and teachers was quantified and interpreted as follows:

Relative Value	Statistical Limit	Verbal Description	Symbol
5	4.21-5.00	Very Effective	VE
4	3.21-4.20	Moderately Effective	E
3	2.61-3.40	Slightly Effective	ME
2	1.81-2.60	Least Effective	LE
1	1.00-1.80	Not Effective	NE

The average weighted mean, frequency and percentage were used in presenting the descriptive statistics. In the computation of the weighted mean, the following formula was used:

$$\boldsymbol{X} = \frac{\text{Wi fi}}{\text{fi}}$$

Where:

$\boldsymbol{X}$= weighted mean
Wi fi = the summation of the weighted frequencies
fi = the summation of observations

The pre-tested questionnaire checklists were floated to the respondents. The data were gathered, tabulated, analyzed and presented in both textual and tabular forms.

The null hypothesis was tested using the t-Test. This was used to compare significant differences of means between the two groups of respondents.

The statistical tool used in this study was the t-Test intended for independent or uncorrelated data since two independent groups were compared (Emory and Cooper, 2013). This has the following formula:

$$t = \frac{X1 - X2}{\sqrt{s^2/n1 + S^2/n2}}$$

Where:

X = mean
n = number of cases
S^2 = standard error

$$S^2 = \Sigma X^2 - \frac{(\Sigma X)1^2}{n1} + \Sigma X1 - \Sigma X2^2 - \frac{(\Sigma X2)^2}{n2}$$

$$n1 + n2 - 2$$

III. FINDINGS AND DISCUSSIONS

A. Extent of Effectiveness of Educational Management Practices Employed by School Principals to Enhance Teacher Excellence as Perceived by School Heads

Table 1 presents the extent of effectiveness of educational management practices employed by school principals to grow teacher excellence as perceived by the school heads.

As reflected on the table, the management practice of school principals of increasing teachers' salary and incentives to meet their needs and demands obtained the highest weighted mean of 4.48 interpreted as very effective. This implies that salary and incentives have played an important role to increase teacher excellence. The reason behind this has been obvious, since the financial capabilities of teachers can influence their excellence particularly in executing their obligations. For instance, teachers who are compensated highly would likely increase their competence by all means since they are financially stable as compared to teachers who have low salary in which they need to make use of their extra time in looking for other means to increase their wage such as engaging in various enterprises which can affect their time in preparing their lessons and instructional materials. As a result, they manifest poor teaching quality. Temin (2019) argued in his article, "Low Pay, Low Quality" saying that, "For decades the nation has been able to school its children on the cheap by exploiting a trapped workforce of educated women. Those days are long gone." He agreed that most teachers' salaries are set by the government in a noncompetitive environment. The market for teaching has failed—in the sense that we are paying low salaries for low-quality teachers when we would prefer high-quality teachers. This is the result of two main flaws in the market: the difficulty of identifying who will be a good teacher and the reliance on an obsolete conception of the pool of potential teachers, "he argued.

On the other hand, the management practice of providing adequate school facilities gained the second weighted mean of 4.47 described as very effective. This implies that the working environment has very great impact to teacher excellence. A growing body of research has discovered that the quality of school teaching environment can affect the teachers' teaching performance. In a research conducted by the Center for Evaluation and Education Policy (2015) concerning the importance of school facilities in improving student outcomes, it was concluded that school facilities impact teaching and learning in profound ways. Yet state and local policymakers often overlook the impact facilities can play in improving outcomes for both teachers and students. While improving facilities comes at a financial cost, the benefits of such investments often surpass the initial fiscal costs. Policymakers, thus, should focus greater attention on the impacts of facilities and adopt a long-term cost-benefit perspective on efforts to improve school facilities.

Both the management practices of initiating innovations, resourcefulness, optimism and creativity to cope with new situations and changes as well as strengthening home, school and community relationships garnered the third highest mean of 4.46 interpreted as very effective. This indicates that the school managers' competence in dealing with innovative strategies and their capabilities in terms of fostering collaboration among the school stakeholders have a very great effect on teacher excellence. The reason for this is that when there is a very strong support from the administration, parents and the community, it is most likely that they can boost the performance of teachers and even the students.

Likewise, both the management practices of providing quality professional development that is research-based, consistent, convenient, relevant and differentiated as well as trusting teachers and acting as facilitators gained the fourth highest weighted mean of 4.45 described as very effective. This means that the professional growth and training development including the attitudes of the principals in dealing with their teachers have a great impact on their achieving teaching excellence. This is due to the fact that the higher the educational attainment of the teachers and the more intensified their training involvement, the greater excellence they are in their teaching performance. Also, when there is a trust and confidence of their immediate superiors with them, there is a greater chance that they can excel due to the positive atmosphere in the working place.

The use of varied motivational techniques and expect the best among teachers garnered a weighted mean of 4.43 interpreted as very effective. This implies that motivation and empowerment are some effective tools to be used in heightening excellence in the performance of teachers. Motivation is the process of stimulating people into action to accomplish goals (Juneja (2019); while employee empowerment is a management strategy that aims to give employees the tools and resources necessary to make confident decisions in the workplace without supervision. Empowerment is a long-term, resource-intensive strategy that involves significant time and financial investment from the organizational leaders (n.a., 2019).

Observing and assessing constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials also garnered a weighted mean of 4.43 or very effective. This signifies that regular conduct of classroom observation and evaluation of teachers' performance that would help them enhance their knowledge, skills and attitudes have a very strong influence on the development of excellence among teachers.

Modeling expectations among teachers was the second lowest rated among the management practices of principals obtaining a weighed mean of 4.42 described as very effective. This means that participative management has still been one of the most effective practices to be used by school leaders.

The lowest weighted mean of 4.40 interpreted as very effective was obtained by the management practice of implementing educational practices. This implies that the school principals need to improve their skills and commitment in adhering to policy implementation since educational policies serve as instruments in the curriculum design and as guides on management processes.

As a whole, the extent of effectiveness of educational management practices employed by school principals to grow teacher excellence as perceived by the school heads was very effective as revealed from its total average weighted mean of 4.45. This finding implies that the management practices of classroom observation and assessment, initiation of innovations, creativity and optimism, teachers' salary adjustment, professional growth and training development, motivation and empowerment provision of adequate school facilities, strong collaboration among stakeholders, setting good examples, promoting trust and acting as facilitators not as dictators as well as policy implementation have strong influence to teacher excellence based on the perceptions of the school heads. Hence, the school managers may adopt these practices and continue improving and sustaining other best management practices to enhance the performance of teachers since according to research, excellent teachers beget excellent students.

Table 1
Mean Value on the Extent of Effectiveness of Educational Management Practices employed by School Principals to Enhance Teacher Excellence as Perceived by the School Heads
n=150

	Management Practices	Extent of Effectiveness Weighted Mean	Interpretation
1.	Observe and assess constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials	4.43	Very Effective
2.	Initiate innovations, resourcefulness, optimism and creativity to cope with new situations and changes.	4.46	Very Effective
3.	Increase teachers' salary and incentives to meet their needs and demands	4.48	Very Effective
4.	Provide quality professional development that is research-based, consistent, convenient, relevant and differentiated	4.45	Very Effective
5.	Use varied motivational techniques and expect the best among teachers	4.43	Very Effective
6.	Provide adequate school facilities	4.47	Very Effective
7.	Strengthen home, school and community relationship	4.46	Very Effective
8.	Model expectations among teachers	4.42	Very Effective
9.	Trust teachers and act as facilitators	4.45	Very Effective
10.	Implement educational policies	4.40	Very Effective
	Total Average Weighted Mean	**4.45**	**Very Effective**

Legend

Arbitrary Value	Statistical Limit	Verbal Description/Interpretation
5	4.21-5.00	Very Effective
4	3.41-4.20	Moderately Effective
3	2.61-3.40	Slightly Effective
2	1.81-2.60	Least Effective

1	1.00- 1.80	Not Effective

B. Extent of effectiveness of Educational Management Practices employed by School Principals to Grow Teacher Excellence as Perceived by the teachers

Table 2 expresses the extent of effectiveness of educational management practices employed by school principals to improve teacher excellence as perceived by the teachers.

As reflected in Table 2, the educational management of increasing teachers' salary and incentives to meet their needs and demands gained the highest weighted mean of 4.62 described as very effective. As revealed from the weighted mean, the teachers have shown more eagerness to salary increase which is because they have lower salaries than their school heads. Similar with the perceptions of the school heads, the teachers also agreed that the salary has become the most influential in helping them achieve excellence in their field of specialization due to obvious reasons.

The educational management of providing school facilities gained a weighted mean of 4.60 described as very effective. This indicates that the teachers know very well how important are the teaching facilities for them to become effective and efficient teachers particularly through the use of technology in teaching.

Trusting teachers and facilitating their activities as educational management practices garnered a weighted mean of 4.55 described as very effective. This indicates that teachers who have been managed through trust and confidence and leaving them freely to improve their competence under the supervision of the principals who prefer to use participative not dictatorial management style have a great chance to achieve teaching excellence. Also, this signifies that teachers would really love that their principals trust their capabilities while they act as facilitators not as dictators.

As perceived by the teachers, the educational management practices of modeling an implementing policies have been very effective as revealed from the weighted mean of 4.54. This finding implies that unlike the principals who rated policy implementation as the lowest, the teachers claimed that the principals serving as good examples and implement policies have greatly influenced their teaching performance.

Strengthening home, school and community relationship as management practice was rated as very effective with its weighted mean of 4.51. This indicates that the collaboration of the administration, faculty, parents and the community have strong effect to the achievement of teachers' excellence. In addition, the use of varied motivational techniques and expect the best among teachers gained a weighted mean of 4.48 described as very effective.

Both the management practices of observing and assessing constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials as well as initiating innovations, resourcefulness, optimism and creativity to cope with new situations and changes obtained a weighted mean of 4.47 interpreted as very effective.

The management practice of providing quality professional development that is research-based, consistent, convenient, relevant and differentiated gained the lowest weighted mean of 4.34 described as very effective. This finding implies that the principals need to enhance their schemes for the professional growth of teachers through attendance to trainings and seminars as well as in post graduate studies.

Generally, the extent of effectiveness of educational management practices employed by school principals to grow teacher excellence as perceived by the teachers was very effective as revealed from its total average weighted mean of 4.51. The implication of this finding is that the educational management practices used by the school principals in terms of classroom observation and assessment; innovativeness, resourcefulness, creativity and optimism; salary increase; professional growth and development, motivation and empowerment; school facilities; home, school and community relationship; participative management; modeling; facilitating and implementing policies have a strong influence toward excellence in the performance of teachers.

Table 2
Mean Value on the Extent of Effectiveness of Educational Management Practices employed by School Administrators to Enhance Teacher Excellence as Perceived by the Teachers
n=850

Management Practices		Weighted Mean	Extent of Effectiveness Interpretation
1.	Observe and assess constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials	4.47	Very Effective
2.	Initiate innovations, resourcefulness, optimism and creativity to cope with new situations and changes.	4.47	Very Effective

3.	Increase teachers' salary and incentives to meet their needs and demands	4.62	Very Effective
4.	Provide quality professional development that is research-based, consistent, convenient, relevant and differentiated	4.34	Very Effective
5.	Use varied motivational techniques and expect the best among teachers	4.48	Very Effective
6.	Provide adequate school facilities	4.60	Very Effective
7.	Strengthen home, school and community relationship	4.51	Very Effective
8.	Model expectations among teachers	4.54	Very Effective
9.	Trust teachers and act as facilitators	4.55	Very Effective
10.	Implement educational policies	4.54	Very Effective
	Total Average Weighted Mean	**4.51**	**Very Effective**

Legend

Arbitrary Value	Statistical Limit	Verbal Description/Interpretation
5	4.21-5.00	Very Effective
4	3.41-4.20	Moderately Effective
3	2.61-3.40	Slightly Effective
2	1.81-2.60	Least Effective
1	1.00- 1.80	Not Effective

C. Comparison of Perceptions between the School Heads and Teachers on the Extent of Effectiveness on the Educational Management Practices employed by School Principals to Enhance Teacher Excellence

Table 3 presents the comparison of perceptions between the school heads and teachers on the extent of effectiveness on the educational management practices employed by the school principals to grow teacher excellence in Northern Luzon, Philippines.

As revealed in Table 3, the perceptions of the two groups of respondents were different. To determine their significant difference, this was subjugated to the t-Test. As a result, the computation yielded a value of 2.101 at 0.05 level of significance with eighteen (18) degrees of freedom as expressed in Table 3a. This rejected therefore the null hypothesis stating that, "There is no significant difference between the perceptions of school heads and teachers on the extent of effectiveness of the educational management practices employed by school principals to grow teacher excellence.

The table had reflected that the extent of effectiveness of the educational management practices employed by school principals to improve teacher excellence as perceived by the school principals and teachers was very effective as shown from the combined weighted mean of 4.50 signifying that the intervention measures of the school principals as reflected on their managerial practices have strongly affected the performance of teachers. However, this does not mean that teachers would just rely on the support of the school principals; instead, they also need to do something to sustain their excellence in the academe to sustain quality education.

Table 3
Comparison of Perceptions between the School Heads and Teachers on the Extent of Effectiveness on the Educational Management Practices employed by School Principals to Enhance Teacher Excellence
n=150 School Heads
n=150=Teachers
1000 Respondents

Management Practices	Extent of Effectiveness		
	School Heads	Teachers	Combined

		WM	DE	WM	DE	WM	DE
1.	Observe and assess constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials	4.43	VE	4.47	VE	4.46	VE
2.	Initiate innovations, resourcefulness, optimism and creativity to cope with new situations and changes	4.46	VE	4.47	VE	4.47	VE
3.	Increase teachers' salary and incentives to meet their needs and demands	4.48	VE	4.62	VE	4.60	VE
4.	Provide quality professional development that is research-based, consistent, convenient, relevant and differentiated	4.45	VE	4.34	VE	4.36	VE
5.	Use varied motivational techniques and expect the best among teachers	4.43	VE	4.48	VE	4.47	VE
6.	Provide adequate school facilities	4.47	VE	4.60	VE	4.58	VE
7.	Strengthen home, school and community relationship	4.46	VE	4.51	VE	4.50	VE
8.	Model expectations among teachers	4.42	VE	4.54	VE	4.53	VE
9.	Trust teachers and act as facilitators	4.45	VE	4.55	VE	4.53	VE
10.	Implement educational policies	4.40	VE	4.54	VE	4.52	VE
	Total Average Weighted Mean	**4.45**	**VE**	**4.51**	**VE**	**4.50**	**VE**

Legend

Arbitrary Value	Statistical Limit	Verbal Description/Interpretation
5	4.21-5.00	Very Effective
4	3.41-4.20	Effective
3	2.61-3.40	Moderately Effective
2	1.81-2.60	Least Effective
1	1.00- 1.80	Not Effective

Weighted Mean (WP)

Descriptive Equivalents (DE)

t comp = 2.667 Result: Significant

t, 0.05, 18 degrees of freedom (df) = 2.101 Decision: Reject Null Hypothesis

Table 3a
Computation for the Value of T for Table 3
n=150 School Heads
n=150=Teachers
1000 Respondents

	Extent of Effectiveness			
Management Practices	School Heads	Teachers	D	D^2

1.	Observe and assess constantly the interests and progress including shortcomings of teachers with the purpose of helping them enrich their skills, attitudes and potentials.	4.43	4.47	0.01	0.0016
2.	Initiate innovations, resourcefulness, optimism and creativity to cope with new situations and changes.	4.46	4.47	0.01	0.0001
3.	Increase teachers' salary and incentives to meet their needs and demands	4.48	4.62	0.14	0.0196
4.	Provide quality professional development that is research-based, consistent, convenient, relevant and differentiated	4.45	4.34	-0.11	0.0121
5.	Use varied motivational techniques and expect the best among teachers	4.43	4.48	0.05	0.0025
6.	Provide adequate school facilities	4.47	4.60	0.13	0.0169
7.	Strengthen home, school and community relationship	4.46	4.51	0.05	0.0025
8.	Model expectations among teachers	4.42	4.54	0.13	0.0169
9.	Trust teachers and act as facilitators	4.45	4.55	0.09	0.0081
10.	Implement educational policies	4.40	4.54	0.14	0.0196
	Total Average Weighted Mean	**4.45**	**4.51**		
	Summation			**0.67**	**0.0999**

t comp = 2.667 Result: Significant
t (0.05, 18df) = 2.101 Decision: Reject Ho

Moreover, the findings imply that the management practices of the school principals to enhance teacher excellence specifically to improve the performance of the teachers in the Cordillera Administrative have been very effective as perceived by both the school heads and the teachers. Their similar perceptions indicate that the aforementioned managerial practices have been proven very effective in the improvement of teacher excellence leading to the efficient attainment of educational vision, mission, goals and objectives.

IV. CONCLUSION

The school heads and the teachers perceived that the extent of effectiveness of the educational management practices employed by the school principals to grow teacher competence had been very effective as perceived by the school heads and teachers as it was supported by the over-all mean of 3.50. Hence, there was a significant difference between the perceptions of the school heads and teachers on the extent of effectiveness of educational management practices employed by the school principals in the Cordillera Administrative Region, Northern Luzon, Philippines as revealed by the computed t value of 2.667 which was higher than the tabular value of 2.101 at 0.05 level of significance for 18 degrees of freedom thereby rejecting the null hypothesis of the study. In this view, it is highly recommended that the principals' managerial practices may be used as baseline study for the construction of educational policies and even the government to extend their support for the continuous enhancement of the principals' competence, teacher excellence and students' academic excellence, efficiency and effectiveness and productivity leading to global competitiveness. Likewise, it is suggested that further study using qualitative design focusing on the lived experiences of school principals in relation to their managerial practices may be conducted to dig deeper into the realities of the enumerated practices and to bring out the best practices which could be used ad basis by school leaders for the sustainable improvement of instruction, research, extension services and production.

V. ACKNOWLEDGMENT

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Relationship between Fuel Cost and Other Cost Components - Bench Drilling Phase of Diamond Wire Sawing Technique of Stone Extraction

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Abstract:

In current times mining companies across the globe have to deal with mine mechanization associated cost increments for the sustainable growth of their projects. It has become necessary to anticipate the operational cost and the relationship and impact of various cost components on each other. Unfortunately, dimension stone mining companies and investors in Pakistan have least knowledge about the costs related to diamond wire sawing technique of stone extraction. There is scarcity of literature on the relationship of different cost components associated with this technique. This paper deals with hypothesis testing to prove the relationship of fuel cost with other cost components such as labour cost, consumables cost and maintenance cost. For this purpose Pearson correlation is chosen as the test statistic. The magnitude of correlation ≥ 0.50 and significance level of $\leq 0.01$are set as standard values to prove the hypothesis. The data was taken from dolerite mine of Indus Mining (Private) Limited. It is observed that fuel cost has a highly significant and very strong correlation with labour cost, maintenance cost and consumables cost.

Keywords:

Bench drilling, fuel cost, Pearson correlation, hypothesis testing, diamond wire sawing, dimension stone mining,

I. INTRODUCTION

Mechanization in Dimension stone mining has brought uplift in mining sector across the globe. Modern technologies have caused huge increase in production and more utilization of the valuable mineral deposits. Diamond wire sawing technique is one of the modern mechanized techniques of dimension stone mining. In Pakistan, the introduction of this technique has improved the product value and international acceptability. As compared to blind or semi-blind boulders produced by wedge and feathers technique or drill and blast technique, diamond wire sawing yields squared cut blocks of known features and cut boulders of irregular shape. Production cycle of this technique consists of five phases i.e. bench drilling, bench cutting, bench dropping, block squaring and product loading. Sometimes bench drilling phase is an auxiliary phase can be skipped.

Although diamond wire sawing technique has improved the production and productivity, still investors are unfamiliar about the financial aspects of this technique. Mine planners and technical staff have insufficient data to perform cost-benefit analyses of this technique. There is a misperception that this technique is not cost effective because of high capital cost of machinery and accessories. They have limited fiscal data about this technique to anticipate the improved financial value of the products obtained through diamond wire sawing.

There is a need to assess the financial aspects of this technique and to have a better understanding of the amount and impact of costs incurred during the production cycle of dimension stone mining through diamond wire sawing technique. This paper aims to find relationship between different cost components incurred during bench drilling phase to improve the awareness about financial parameters of diamond wire sawing technique.

A lot of research has been conducted to analyze the operational parameters associated with the diamond wire sawing technique (Mikaiel et al., 2019). Researcher analyzed the impact of diamond wire saw machine performance (e.g. Mikaeil et al., 2018; Jain and Rathore, 2011), and diamond bead wear rate on operational cost incurred in this technique (Careddu and Marras, 2015). Mining companies across the globe have been facing one of the most critical problems associated with high cost trends in their direct mining costs and associated costs (Afum and Temeng, 2014; ICMM, 2012). There is a lack of literature on in-depth description of the financial aspects of each phase of production cycle of diamond wire sawing technique.

II. MATERIALS AND METHOD

The purpose of this paper is to test a relationship between fuel cost and other cost components such as labour cost, consumables cost and maintenance cost, all incurred during bench drilling phase of the production cycle of dimension stone extraction through diamond wire swing technique. The data of incurred costs for the four and a half years was taken from the dolerite (commercial name: black granite) mine of M/s Indus Mining (Private) Limited, one of the prominent dimension stone mining companies of Pakistan. The mine is located in district Mansehra. The company utilized Italian brand DTH drill machine of Marini during the referred time frame. A compatible compressor of Airman Brand (PDS-390S) was used to operate the DTH drill machine.

Bench drilling operations were performed during two shifts of 8 hours each. Fuel cost includes the monthly expenses incurred for fuel consumption and lubricants' consumption. Labour cost is the monthly expenses incurred as salary and other incentives provided to the workers and workers related taxes (recruiter.com, viewed on 1st March 2019) e.g. Employees Old age Benefit Fund and Social Security Fund etc. Consumables cost is the monthly expenses incurred as purchase price DTH bits and other drilling accessories e.g. drill extension rods, pneumatic air pipelines etc. Maintenance cost is one of the major cost component associated with production (Lee and Wang, 1999) and includes the monthly expenses incurred for both reactive and proactive maintenance of the machineries associated with bench drilling.

Hypothesis testing approach is used in this paper. Hypothesis testing is a well-defined procedure which helps in deciding objectively on the basis of available data whether to reject or accept the hypothesis. If r_1 is the correlation between fuel cost and labour cost, r_2 is the correlation between fuel cost and consumables cost, r_3 is the correlation between fuel cost and maintenance cost while the significance level is set at p-value of 0.01 null and alternate hypotheses are stated as follows:

Null Hypothesis (H_0): *There is no significant, strong and positive correlation between fuel cost and other cost components including labour cost, consumables cost and maintenance cost, i.e.* $r_1 < 0.50$; $r_2 < 0.50$; $r_3 < 0.50$ *and p-value > 0.01.*

Alternate Hypothesis (H_1): *There is significant correlation between fuel cost and other cost components including labour cost, consumables cost and maintenance cost, i.e.* $r_1 \geq 0.50$; $r_2 \geq 0.50$; $r_3 \geq 0.50$ *and p-value* ≤ 0.01.

If there is correlation of 0.50 or more and *p*-value (significance level) is less than 0.01, null hypothesis will be rejected. Figure 1 show the parameters selected in this research study to test the strength and significance of relationship between different cost components. In case of results other than that null hypothesis will be accepted thereby leading to the rejection of alternate hypothesis. SPSS [version 17] is used in this research to find the Pearson correlation.

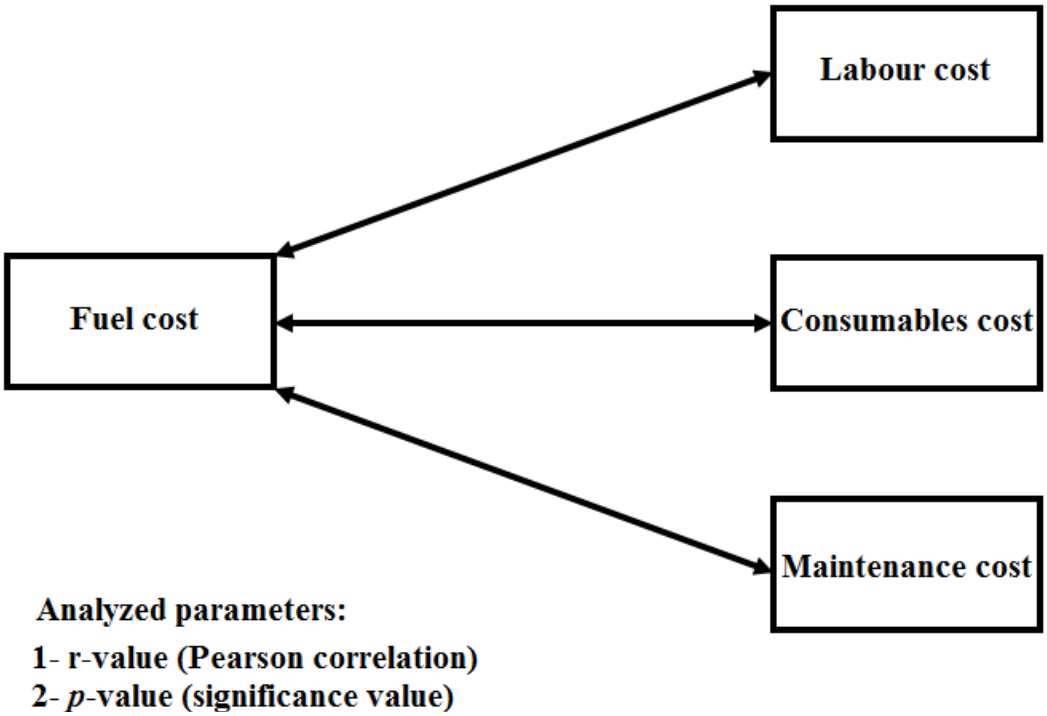

Figure 1: Relationship between different cost components- Analyzed parameters.

III. Analysis and Results

1.1. Correlation:

Table 1 shows the correlation of fuel cost with other variable costs and significance level of each of these correlations. In order to remove any biases from the data, all outlier entries were removed and correlation between different cost components was calculated thereafter.

In table 1, the *p*-value of correlations of fuel components with other cost components is 0.000 in each case which is far below the set significance level of 0.01. This suggests that all the correlation of fuel cost with labour cost, consumables cost and maintenance cost each is highly significant.

Table 1: Correlation of fuel cost with other variable costs (bench drilling phase of diamond wire sawing technique of dimension stone mining (N= 43)

		Fuel Cost (PKR)	Labour Cost (PKR) (r_1)	Consumables Cost (PKR) (r_2)	Maintenance Cost (PKR) (r_3)
Fuel Cost (PKR)	Pearson Correlation	1	0.876**	0.862**	0.874**
	Sig. (2-tailed)		0.000	0.000	0.000
**. Correlation is significant at the 0.01 level (2-tailed).					

Note: All outlier entries removed.

It can also be inferred from table 2 that fuel cost has nearly equal and very strong positive correlation with labour cost (r_1= 0.876) and maintenance cost (r_2= 0.874). Fuel cost has also very strong correlation with consumables cost (r_3= 0.862). The results can be interpreted as an increase in either of the labour cost, consumables cost and maintenance cost also cause an increase in the fuel cost and vice versa.

Figure 2 to 4 graphically represent the correlation of fuel cost with labour cost, consumables cost, and maintenance cost respectively.

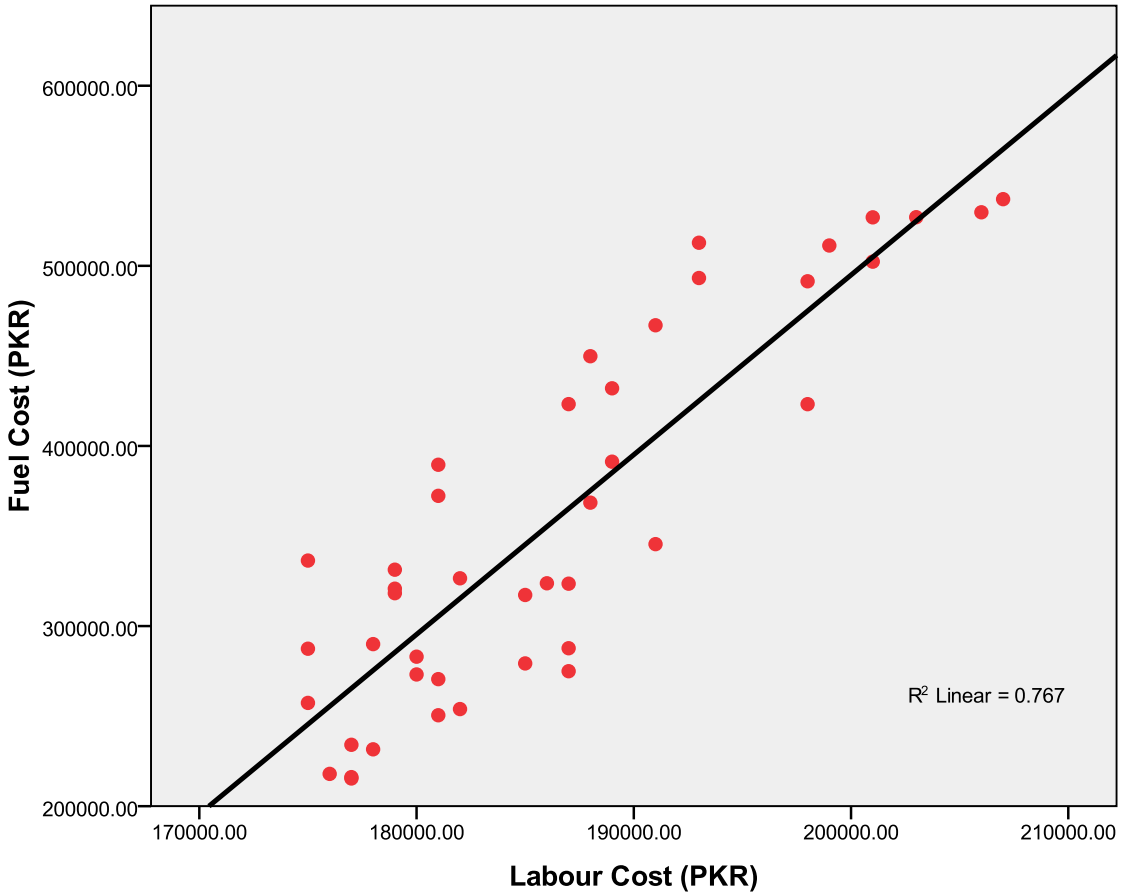

Figure 2: Correlation of fuel cost with labour cost.

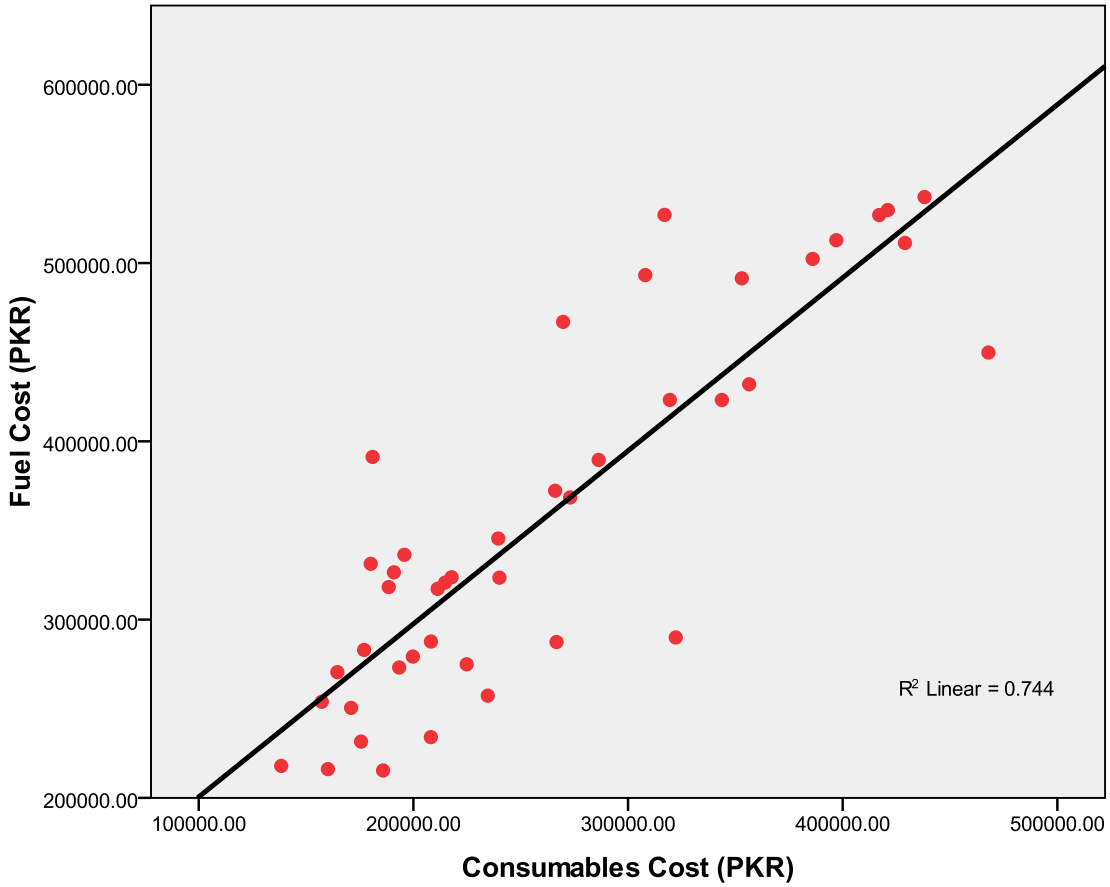

Figure 3: Correlation of fuel cost with consumables cost.

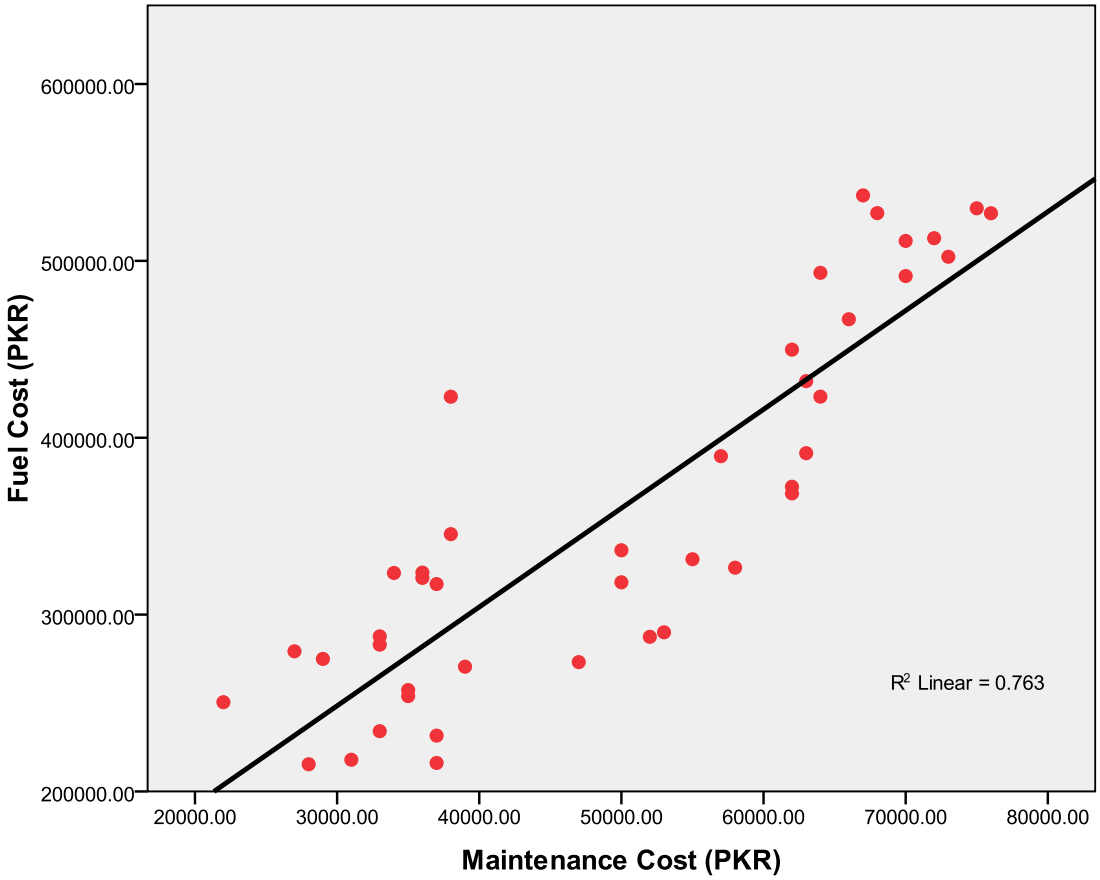

Figure 4: Correlation of fuel cost with maintenance cost.

Hence Pearson correlation and significance values lead to the rejection of null hypothesis and acceptanceof alternate hypothesis which states that

There is a significant, strong and positive correlation between fuel cost and other cost components including labour cost, consumables cost and maintenance cost, i.e. $r_1 \geq 0.50$; $r_2 \geq 0.50$; $r_3 \geq 0.50$ *and p-value* ≤ 0.01 *for all these correlations.*

There is a highly significant and very strong correlation of fuel cost with all other cost components including labour cost, consumables cost and maintenance cost but it does not reflect any causation between the tested variables. An increase in one of these costs also causes increase in the fuel cost and vice versa. The reason of high correlation between fuel cost and labour cost may be the overtime work hours resulting in more monthly fuel consumption. The workers need to be paid for these extra work hours resulting in high labour cost per month. The highly significant and very strong correlation between fuel cost and maintenance cost may be associated with depreciation phenomenon. Depreciated compressors and DTH drill machine(s) need frequent reactive and proactive maintenance works while these depreciated machines have low output efficiency thereby increasing the required operational time to complete a drilling activity. The reason for a highly significant and strong correlation between fuel cost and consumables cost may be due to the fact that the (button) bit becomes blunt after drilling to a certain length and needs sharpening. If such sharpened bit is further used for drilling activity, there will be slow penetration rate causing in additional work hours to get the job done which results in high fuel consumption and hence high fuel cost.

IV. Conclusion

The highly significant and very strong correlations among cost components incurred during bench drilling phase suggest that fuel cost is interrelated with other cost components and the operators and planners need more cautions to monitor the performance of drilling unit. Rise of an anomalous situation related to the drilling unit will not only increase one cost component but also induces an increase in the fuel cost too. Similarly more fuel consumption is a reflection of problems associated with the drilling unit which may result in increased work hours and maintenance activities which will eventually end up with high incurrence of other cost components.

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Complications of Unattended Spina Bifida Presenting in Adults

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Abstract- Spinal bifida is a congenital neural tube decade , has been described in literature since 19th century . There has been gross development of management of spina bifida in the form of prenatal repair , MOMs trial . Since the introduction of folic acid in primary health care, there is a significant reduction in incidence of spina bifida . In the era where pediatrics neurosurgeons are faced to manage the neonatal and pre natal repair of mmc . we are challenged to manage patients with adult spina bifida with complications, in this advanced neurosurgical era this is rare challenge to face . we described 4 patients with neglected complications of spina bifida , their clinical presentations and management.

Index Terms- meningocoele, spina bifida ,epidermoid cyst, tethered cord .

I. Introduction

Spina bifida varies in its presentation from occulta , aperta to overt manifestations. Incidence of spina bifida had dramatically reduced over past 2 decades after the implementation of perinatal consumption of folic acid .

In the era where the world is witnessing the role of FOETAL surgery in the management of spinal bifida, we are challenged with adult presentations of meningomeyelocoele , complicated meningomyelocole , dermal sinus with intra medullary epidermoid cyst .

Materials and methods

This is a retrospective study done at BIN , IPGMER .

We had retrospectively collected the data over 3 years duration .

We had traced the pre operative , operative and post operative track records , follow up after 1 year , with telephonic conversations for all the patients .

II. CASE DISCUSSIONS

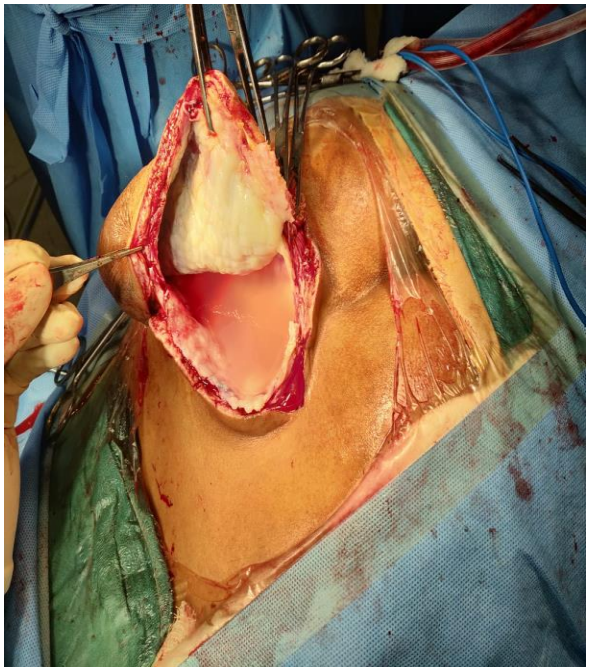
CASE 1) 46 year old female patient , P2 L2 ,clinical symptoms of swelling over the back present since birth , progressively increased to attain the size of a foot ball , with watery discharge from past 10 days .

Neurological examination shows no gross motor or sensory deficits with retained bladder and bowel function .

MRI lumbo sacral spine : meningocole with tethered cord

Operative details : meningocole sac opened , with large gush of csf, detethering of the sac done with primary

closure.



CASE 2) : 23 year old male , unmarried , with complaints of swelling over the back since birth , with out any csf leakage without any neurological deficits , with only necessiaty being cosmetic purpose .

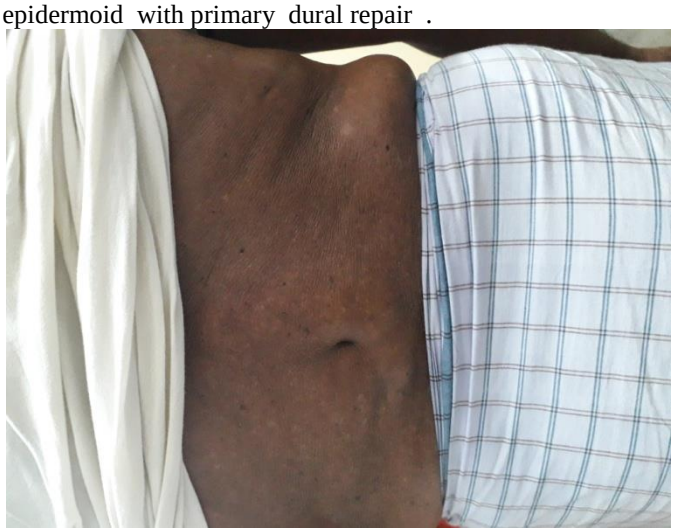
MRI lumbosacral spine : meningocole

Operative details: meningocole sac opened , with reduction of the contents and primary closure of the sac .

CASE 3) : 52 year old male patient with complaints of recurrent pus discharge (2 weeks) from a small swelling over the mid back which has been present since birth, with progressive weakness of lower limbs (spatic paraparesis) with intact bladder and bowel control .

MRI DORSOLUMABR SPINE : dermal sinus D 10 level with intra medullary hyperintense signals , Epidermoid cyst, with syringomyelia extending to D 2 level .

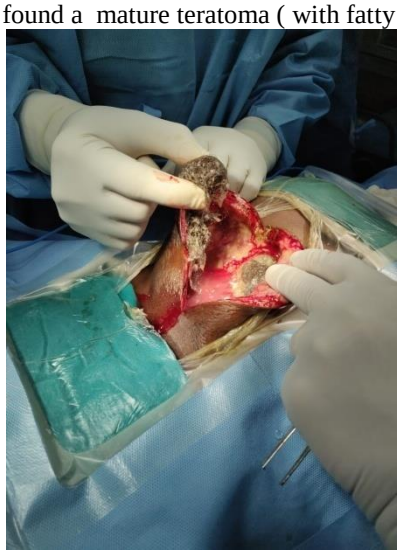
Operative details : Elliptical incision with dissection of the sinus tract, laminectomy with removal of intra medullary epidermoid with primary dural repair .

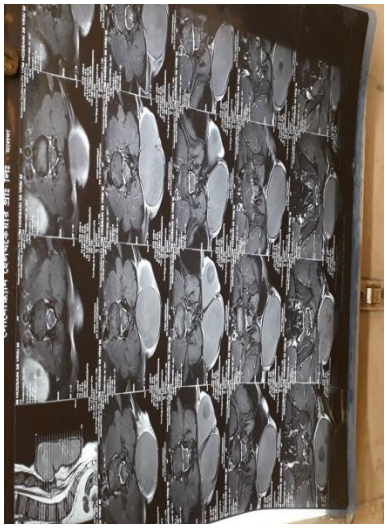


CASE 4) : 55 year old male ,with 2 married children , with progressive increase in swelling which was present since birth with occasional whitish discharge from the swelling , clinical neurological examination did not reveal any deficits .

MRI LUMBOSACRAL SPINE : meningocole with tethered cord with probable multiple heterogenous signal mixed mass that occupied the sac.

Operative details : meningocoele sac is opened and we had found a mature teratoma (with fatty tissue , hair).





III. DISCUSSIONS

Spina bifida is a complex congenital condition with an estimated prevalence of between 3.06 and 3.13 cases per 10,000 live births, not including cases of spina bifida occulta (1). The introduction of mandatory folic acid supplementation and early prenatal diagnosis accompanied by the subsequent termination of affected fetuses has lead to a decrease in the incidence of spina bifida .(7 ,6)

The term spina bifida simply refers to splitting of the vertebral arches. This splitting can be isolated (spina bifida occulta), or it may include the meningeal sac (meningocele) or the meningeal sac plus portions of the spinal cord and/or spinal nerves (myelomeningocele) (5). When excess lipomatous tissue is involved, the condition is referred to as lipomeningocele or lipomyelomeningocele, depending on the involvement of the nervous tissue . Associated conditions that do not necessarily involve splitting of the vertebral arches, but often do, include diastematomyelia (split cord), diplomyelia (duplicated cord), myeloschisis (flatten malformed cord), and fatty filum (lipomatous tissue surrounding the filum terminale).(4)

Spinal dysraphism manifests as an incomplete fusion of the neural arch, varying from the occult to more severe open neural tube defects (NTD). Meningocele is the simplest form of open NTD characterized by cystic dilatation of meninges containing cerebrospinal fluid without any neural tissue.(9) The majority of meningocoeles are identified and treated perinatal. We describe the delayed presentation of a meningocoele and its complications and the reasons behind their late presentations in adulthood with relevant review of the literature.(8)

In developed countries MOMS trail has focused the attention of training neuro surgeons in foetal surgery (3)

In developing countries like INDIA we still face the challenge of managing the neglected spina bifida and its complications in adults .

case	*Age*	Symptoms	Reason for presenting late	Reason for presenting now	Complication	Intra and post op period.
1	46	Csf leak	Uneducation	Csf leak	None	Mmc repair with detetherig
2	23	Cosmesis	Poverty,lack of knowledge	Cosmesis	None	Mmc repair
3	52	paraparesis	Poverty,lack of knowledge	paraparesis	Transiet paraplegia for 48 hours	Sinus tract excision with complete removal of epidermoid cyst
4	55	Whitish discharge	uneducation	Whitish discharge	Mature teratoma	mmc

Author/ year	Age in years/sex	Symptoms/signs	Location of lesion/radiology	Intervention/outcome
Chambers and Revilla[5]	53/male	Urinary incontinence, lower limb weakness	Lumbosacral meingocoele, bony defect at L5 on X-ray	Surgery Weakness improved but not the incontinence
Rao and Dinakar[6]	25/male	Pain, nocturnal enuresis Loss of perianal sensation and ankle jerks	Lumbosacral meingocoele, spina bifida at L4 and L5 on X-ray	Surgery Pain improved, the other deficits remained same
Gok *et al.* (2005)[1]	48/male	Pain, urinary incontinence, sexual dysfunction Loss of perianal sensation and ankle jerks	Myelocele, sac from L5 spina bifida. Conus reaching L5 level on MRI	Refused surgery
Sarda *et al.*[7]	20/male	Asymptomatic	Meingocoele, sac from L4 to L5 spina bifida on CT scan	Operated
Düz *et al.* (2008)[8]	21/male	Sensory loss, leg length discrepancy	Lumbosacral meningocoele, corpus callosal agenesis, conus at L5	Refused surgery
Düz *et al.* (2008)[8]	21/male	Dermal sinus, tethered cord syndrome	Lumbosacral meningocoele, split cord at L1, conus at L3	Refused surgery
Gillis *et al.*[4]	28/female	Known sacral agenesis Swelling at age 20, headache in upright position Loss of perianal sensation and ankle jerks, plantar flexion 2/5	Sacral meningocoele at S1, conus reaching L5 level, syrinx at L2–3 on MRI	Operated Reccurent CSF leaks for which lumbopritoneal shunt done Neurologically same
Present case	53/male	Pain radiating to lower limbs, urinary incontinence, perianal hypoesthesia	Lumbar meningocoele, conus at L3 on MRI	Operated Improved in all the symptoms

CSF = Cerebrospinal fluid; CT = Computed tomography; MRI = Magnetic resonance imaging

IV. CONCLUSION

Most of the spina bifida are corrected in childhood , but rarely we can see those neglected patients in adults . Here we had come across 4 patients over 3 years period at Eastern india(10) . Most of them hailed from poor socio –economical status with lack of medical knowledge .

One patient had come across for the purpose of cosmesis .

Remaining three patients had presented in their 40/ 50s after the development of complications .

It is very rare thing to notice that 46 year old lady has completed her pregnancy and delivery , gone unnoticed by medical examinations and presented with csf leak after rupture of sac .

It has not been reported on the mature teratoma withing the sac , which is quite unexpected .

Social stigma in adolescence is one of the major factor too for their late presentations .

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Ishwar Singh,* Seema Rohilla,1 Prashant Kumar,2 and Saurabh Sharma

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Design, Analysis and Fabrication of Compound Gear Box

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Abstract- A compound gear train is a combination of gears used to transmit motion and power from one shaft to another. The gears that make up a compound gear usually differ in size and have a different number of teeth. This is useful if there is a need to speed up or slow down the final output. Our motive is to design a compound gearbox, which has a reduction gear ratio of 10:1. Though, most of the contemporary gearboxes with standard gear ratios are available readily in the market, this specific gearbox, which is to be used in an ATV, must especially be designed and fabricated. The module of the gears, materials to be used and dimensions of components, were all calculated based on design theory. Modelling and assembly was done using NX. Stress Analysis of the tooth was done on ANSYS, which provided satisfactory results. The gear casing was manufactured using sand casting with required machining. The gears were manufactured on lathes and hobbing machines. Later gear finishing, grinding and heat treatment was carried out. The gear components were assembled in the casing with lubrication. The gear box is finally mounted in the vehicle cockpit.

Index Terms- NX, ANSYS, Analysis, Fabrication

I. Introduction

This article deals with the design, analysis and fabrication of a compound gear box having a velocity ratio 10:1. A gear is a rotating machine part having cut teeth which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. A compound gear train is a combination of gears used to transmit motion and power from one shaft to another. Consequently, they rotate at the same contact speed. There are a great many tooth profiles that provides a constant velocity ratio. In many cases, given an arbitrary tooth shape, it is possible to develop a tooth profile for the mating gear that provides a constant velocity ratio. However, constant velocity tooth profiles are the most commonly used in modern times which are cycloid and involute profiles. The involute profile design has two advantages, it is easier to manufacture, and it permits the centre-to-centre spacing of the gears to vary over some range without ruining the constancy of the velocity ratio. This article concludes on how gear boxes of velocity ratio 10:1 differ in various aspects.

II. Literature Survey

Power has to be transmitted from Engine to CVT (continuously variable transmission) to gear box and then to wheels of the car. The basic flow of power is shown below:

A. ENGINE SPECIFICATION: Engine specifications are the basis for the designing of gear box. With these specifications input variables such as power and speed are known. The engine that is mandated by SAE BAJA is manufactured and available at Briggs and Stratton. The model number that is accepted is 19L232-0054 G1. This engine has a displacement of 305mm with bore/stroke of 3.12''/2.44''. The compression ratio is from 8.1 to 1 and gross power is 10hp. The oil capacity is 24 ounces and the factory set RPM is 3800.

B. CVT SPECIFICATION: There are four different CVTs that are currently being used by participants, Polaris P90, Gaged engineering CVT, CVTech, Comet. Some of the participants who faced troubles in transmission used CVT sold by Fastparts. This CVT is made for smaller ATVs and gets heated up when used in BAJA vehicles. Continuous variable transmission forms the intermediate system for gearbox and engine. The output at the engine is transmitted to the gear box via CVT. The CVT ratio is generally 0.45:1. There are two parts in a CVT, namely Driver and the Driven. The driver is mated to the engine shaft and the driven is mated to the gear box. The driver and driven are held together by a belt. It is advised to look for the type of mating in the CVT before buying. CVTs offer splines or keyways. Its feasible to buy CVTs with keyway as it can be directly mated with the engine which also has keyway. On the other hand if the CVT has splines then designing a coupler to the engine would allow the mating of such CVT to the engine shaft.

C. SHAFTS: Based on the inputs from the CVT and Engine specifications the input RPM at the input shaft of the gear box would be around 9000rpm. There are 3 shafts present in the gear box, namely input shaft with pinion, intermediate shaft and output shaft.

D. GEARS: There are three gears- intermediate gear, input gear and output gear. The face width and pitch circle diameter of these gears determine the compactness of the gear box.

E. BEARINGS: Bearings are the most crucial components in the assembly and working of the gear box. For spur gears it is necessary to use taper bearings. At a speed of 9000rpm it is certain that the shaft will face axial loads. Taper bearings allows rotation of shafts and also restricts the axial movement of the shaft due to high speeds. In case of helical gears the gears are arrested in place thus there is no chance for the gears to come out of mesh. For helical gears ball bearings can be used instead of taper bearings. For this gear box we require taper bearings at both the ends of the shaft. As spur gears are used the use of taper bearings is compulsory.

F. KEY: There are many methods used to mate shafts and gears, out of which keyways and splines are most commonly used. Keyways are highly capable of taking shear and torsional loads. As the ratio that is required for the gear box is 10:1 which means that for 10 revolutions of the input gear the output gear rotates once, it is advisable to mate the output shaft with the output gear using keyway instead of splines. Splines are advantageous over medium range of speeds with low loads. Also the material used influences the selection of splines or keyways for mating shafts and gears. Harder the material it is advisable to go for spline cutting and softer the material it is viable to use keyways. In this gear box the intermediate shaft is spline cut to mesh witht the intermediate gear and the output shaft has 2 keyways cut for assembly of output gear and the shaft.

G. CASING: The casing encloses completely different sets of spur gears, bearings to support the shafts. For casting, there are several factors to be considered for better result like material properties, mechanical properties, chemical composition, fluidity, boundary clearance, thermal properties, etc. to meet all this criteria.

H. MATERIAL: The ferrous, non-ferrous materials and non-metals are used as shaft material depending on the application. For the given specifications, the most appropriate materials was chosen as EN19/24, yield strength=555Mpa, ultimate strength=780Mpa, young's modulus=190GPa

III. METHODOLOGY:

A. DESIGN CALCULATIONS :

a) INPUT AND OUTPUT SHAFTS: The term 'transmission shaft usually refers to a rotating machine element, circular in cross-section, which supports transmission elements like gears, pulleys and sprockets and transmits power. A transmission shaft supporting a gear in a speed reducer is shown in Fig. The shaft is always stepped with maximum diameter in the middle portion and minimum diameter at the two ends, where bearings are mounted. The steps on the shaft provide shoulders for positioning transmission elements like gears, pulleys and bearings. The rounded-off portion between two cross-sections of different diameters is called fillet. The fillet radius is provided to reduce the effect of stress-concentration due to abrupt change in the cross-section.

$$\tau_{max.} = \frac{16}{\pi d^3}\sqrt{(k_b M_b)^2 + (k_t M_t)^2}$$

For the design of shaft following two methods are adopted,

1. Design based on Strength: In this method, design is carried out so that stress at any location of the shaft should not exceed the material yield stress. However, no consideration for shaft deflection and shaft twist is included.
2. Design based on Stiffness: Basic idea of design in such case depends on the allowable deflection and twist of the shaft. The following specifications were obtained based on the above criteria:-
   Input Diameter=25mm
   Output Diameter =30mm

b) GEARS: Lewis considered gear tooth as a cantilever beam with static normal force F applied at the tip. Assumptions made in the derivation are:

1. The full load is applied to the tip of a single tooth in static condition.
2. The radial component is negligible.
3. The load is distributed uniformly across the full face width.
4. Forces due to tooth sliding friction are negligible.
5. Stress concentration in the tooth fillet is negligible. The gear tooth is stronger throughout than the inscribed constant strength parabola, except for the section at 'a' where parabola and tooth profile are tangential to each other.

Maximum torque calculations table:

RPM	FGR	Velocity	Acceleration	Torque	Traction force
3000	36	1.916	7.043	514.368	1760.93
3200	36	2.044	7.043	514.368	1760.93
3400	36	2.172	7.043	514.368	1760.93
3400	33.6	2.327	6.574	480.076	1643.533
3400	31.2	2.506	6.104	445.785	1526.138
3400	28.6	2.734	5.595	408.636	1398.959

3400	26.4	2.962	5.165	377.203	1291.348
3400	24	3.258	4.695	342.912	1173.954
3400	21.6	3.620	4.226	308.620	1056.555
3400	19.2	4.073	3.756	274.32	939.130
3400	16.8	4.655	3.287	240.038	821.766
3400	14.4	5.431	2.817	205.747	704.371
3400	12	6.517	2.347	171.456	586.977
3400	9.6	8.146	1.878	137.164	469.578
3400	7.25	10.86	1.408	102.873	352.184
3400	5.16	15.157	1.009	73.726	252.399
3500	5.16	15.602	1.009	73.726	252.399
3600	5.16	16.04	1.009	73.726	252.399

Tangential load = $P_t = \frac{P}{v} c_s$; where c_s = 1.8 for heavy shock operating for 8-10hrs a day

Lewis equation: $P_t = (\sigma_w c_v) b. P_c. y$

Where,

y = Lewis form factor =$0.154 - \frac{0.712}{T}$, σ_w= wear load, c_v= $\frac{6}{6+v}$, T= no of teeth, P_c= pitch circle diameter.

Dynamic load using Buckingham method:

$$P_d = P_t + \frac{21v(bc+P_t)}{21v+\sqrt{bc+P_t}}$$

Where $c = \frac{K.e}{\frac{1}{E_p}+\frac{1}{E_g}}$; E_p= young's modulus for pinion; E_g = young's modulus for gear;

k = factor that depends on form of gear = 0.111; e = error = 0.08

Wear load from Hertz equation:

$$P_w = D_p. b. Q. k$$

Where Q = $\frac{2.VR}{VR+1}$ for external gears; k = load stress factor =$\frac{(\sigma_{ef})^2.\sin\emptyset}{1.4}\left\{\frac{1}{E_p}+\frac{1}{E_g}\right\}$; b = face width.

B. MODELLING ON NX 11 :

Step 1:

Copy these parameters into a text file and save it. Rename the file extension to .exp.

[degrees]alpha=20 //Reference Pressure Angle

c=sqrt(1/(cos(alpha))^2-1)/pi() //Parameter of Involute Curve

[mm]m=3.5 //Module

```
[degrees]phi=arctan(yc/zc)+90/z //Rotation angle
[mm]r=m*z/2 //Reference Radius
[mm]ra=r+m //Tip Radius
[mm]rb=r*cos(alpha) //Base Radius
[mm]rc=m*.38 //Tooth Blend Radius
[mm]rf=if(m>1.25)(r-1.25*m)else(r-1.4*m) //Root Radius
t=0 //NX Parameter
[mm]xt=0 //x Coordinates of Involute
yc=rb*(sin(deg(c*pi()))-cos(deg(c*pi()))*c*pi())
yt=rb*(sin(deg(t*pi()))-cos(deg(t*pi()))*t*pi()) //y Coordinates of Involute
(Integer) z=25 //Number of Teeth
zc=rb*(cos(deg(c*pi()))+sin(deg(c*pi()))*c*pi())
zt=rb*(cos(deg(t*pi()))+sin(deg(t*pi()))*t*pi()) //z Coordinates of Involute
```

Step 2:

Launch NX, create a new model file, push the CTRL+E keys and imports the expressions.

Step 3:

Create the involute curve by Law Curve command.

Step 4:

Create a circular pattern on the involute curve.

Step 5:

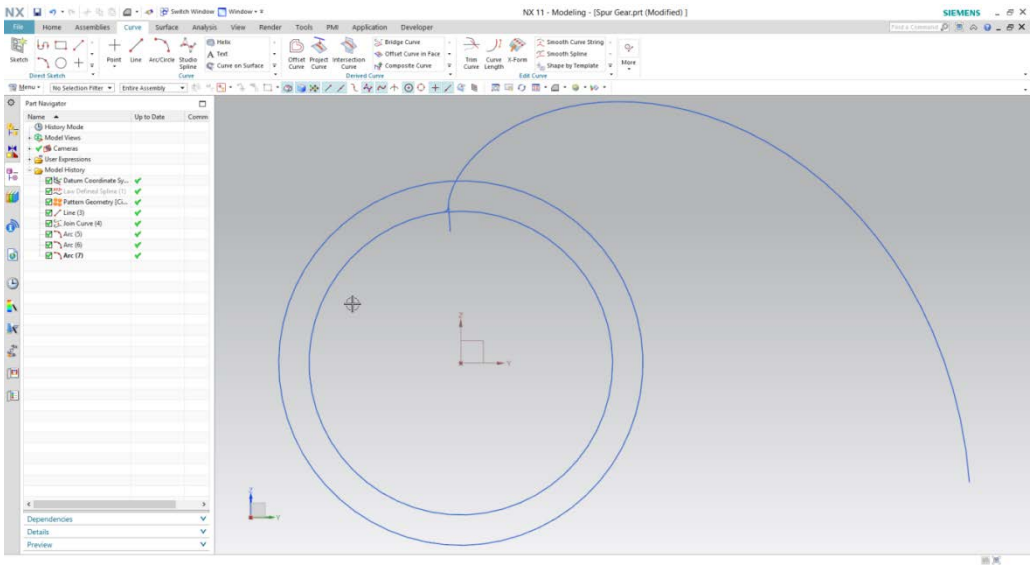
Draw a line which starts from the end point of involute and tangents the curve. Set its limit by equation.

Step 6:

Launch the Join Curve command and join the line and the involute curve.

Step 7:

Draw the tip and root circles by full circle. Draw a tangent circle for the tooth blend.

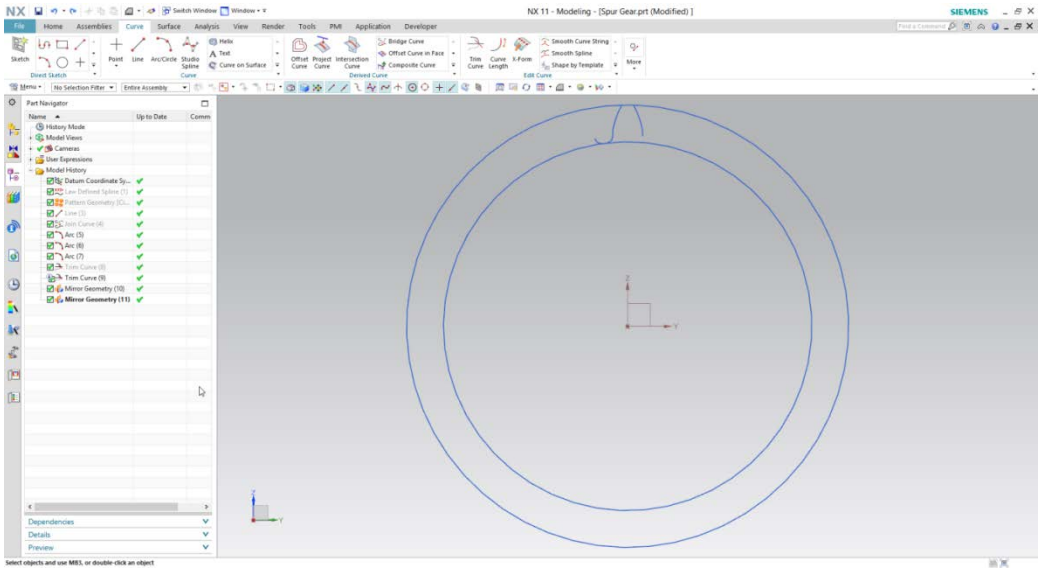


Step 8:

Trim the unnecessary parts of the curves.

Step 9:

Mirror the involute curve and the tangent circle.

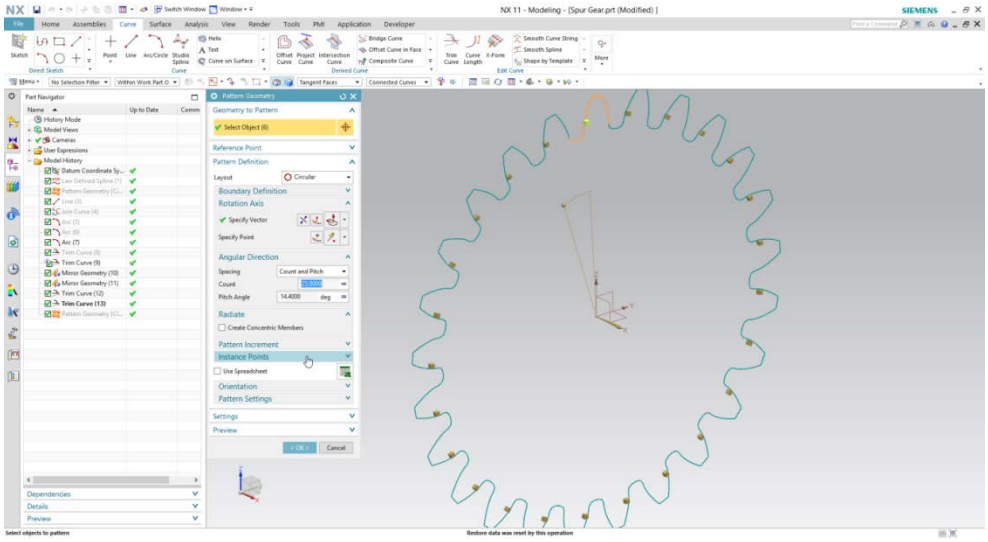


Step 10:

Trim the tip and root circles.

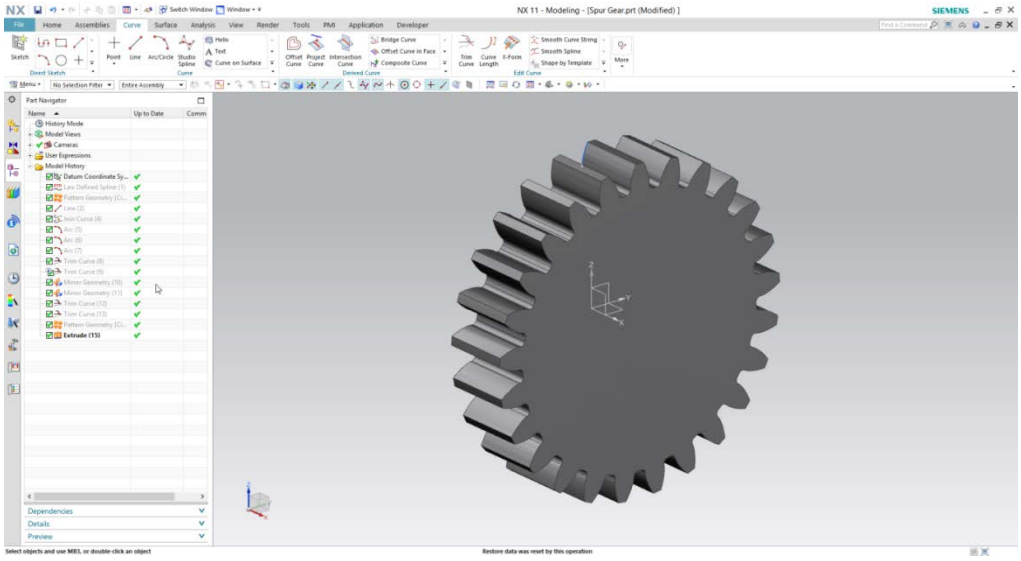
Step 11:

Create a circular pattern, set the parameters**.**



Step 12:

Extrude the curves to get the spur gear body.



C. ANALYSIS: The maximum force acting on teeth of input pinion was calculated manually, which is as follows

> (Maximum Torque on input shaft) = (PCD of input gear)*(maximum Force)/2

> (Maximum Force) =2*(Maximum Torque on input shaft)/ (PCD of input gear)

> (Maximum Force) = [2*(5.1438E5)/ (25)] N

> (Maximum Force) =41150.4N

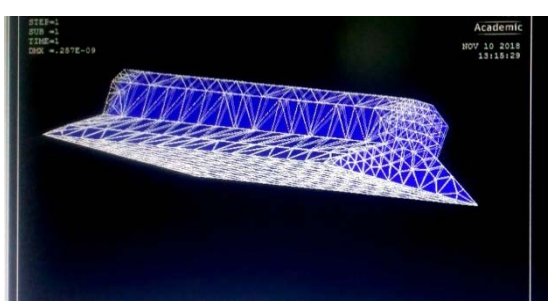
> (Maximum Force) =41.15KN

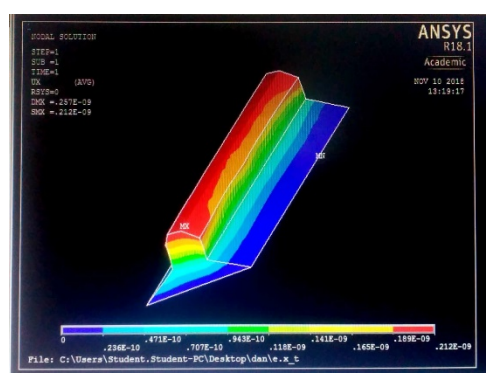
The stress variation was within the limits.

IV. MANUFACTURING

The gear box designed was manufactured which is strong enough to bear all kinds of loads and can last for years. The manufacturing phase consists of material selection, turning and facing on lathes, hobbing for gears, polishing and grinding, spline cutting and key slotting, sand casting for gear box casing and CNC milling for gear box casing. The last step of manufacturing is assembly which is done according to the design.

- Gear material selection and gear cutting:





- Casting of gear casing:

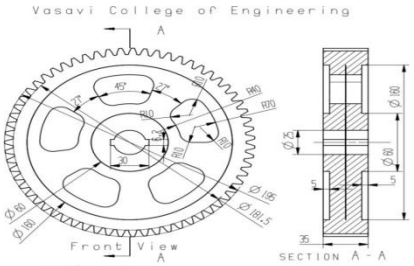
- Spline cutting and drilling:

- Bearing assembly:

- Final assembly:

V. RESULTS

Based on the above calculations the design of gears were done and the results are drafted below



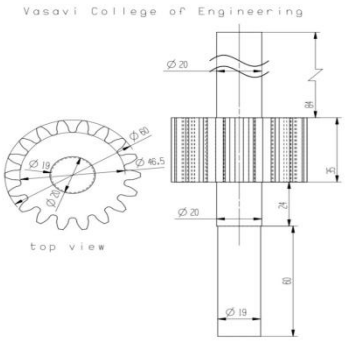
shaft hole

hole dia	25
no. keys	2
key height	5
key width	6.25
key length	40

intermediate gear

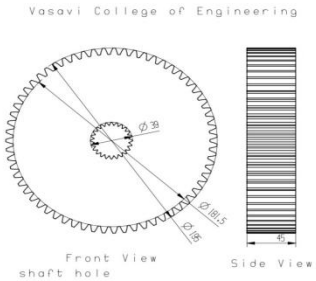
MODULE	3
No Of Teeth	63
Face Width	35
Pressure Angle	20
Pitch Diameter	189
Tip Diameter	195
Root Diameter	181.5
Tip Circle Pr.Angle	24.3867□
Ref Circle Tip	4.712389
Tip Thickness	2.364444
pitch	9.424778
Base pitch	8.856394
Fillet Radius	0.75
Base Diameter	177.6019
Addendum	3
Dedendum	3.75

All Dimensions are in mm



input shaft and pinion

MODULE	3
No Of Teeth	18
Face Width	35
Pressure Angle	20
Pitch Diameter	157.5
Tip Diameter	162.5
Root Diameter	151.25
Tip Circle Pr.Angle	24.3867□
Ref Circle Tip	3.92699
Tip Thickness	1.97037
pitch	7.85398
Base pitch	7.38033
Fillet Radius	0.625
Base Diameter	148.00156
Addendum	2.500
Dedendum	3.125



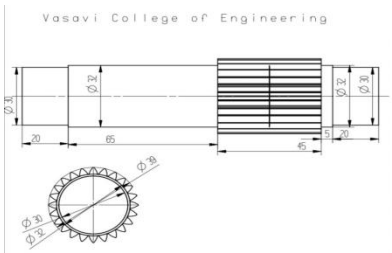
shaft hole

module	1.5
no.teeth	24
pressure angle	30
pitch diameter	36
base diameter	31.176915

SPUR GEAR I

MODULE	3
No Of Teeth	63
Face Width	45
Pressure Angle	20
Pitch Diameter	189
Tip Diameter	195
Root Diameter	181.5
Tip Circle Pr.Angle	24.3867□
Ref Circle Tip	4.712389
Tip Thickness	2.364444
pitch	9.424778
Base pitch	8.856394
Fillet Radius	0.75
Base Diameter	177.6019
Addendum	3
Dedendum	3.75

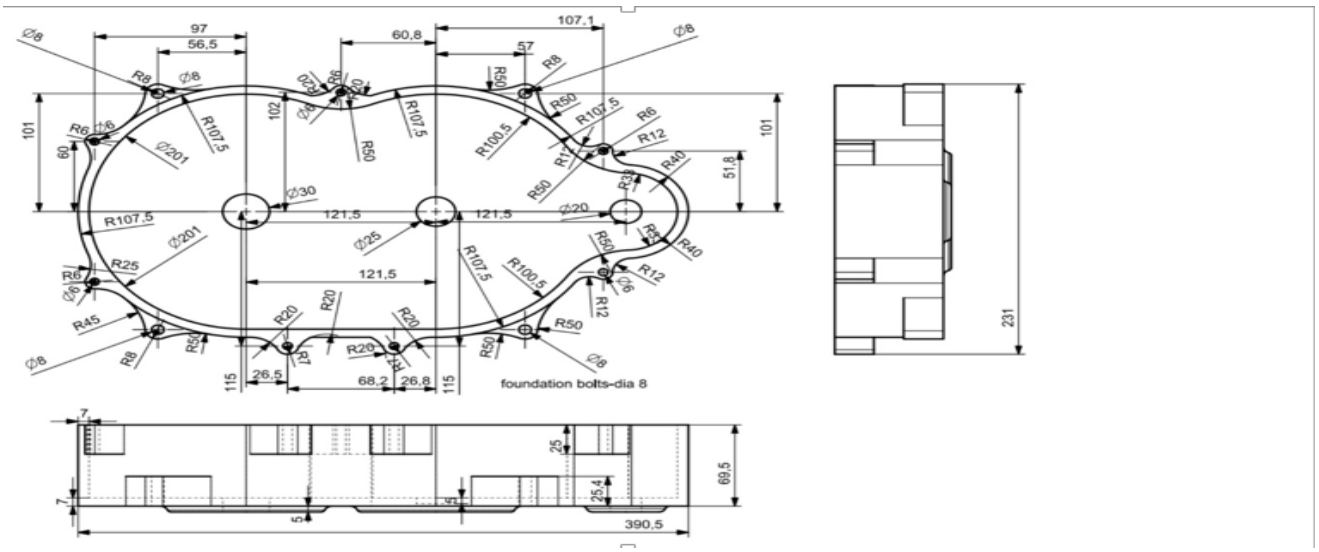
All Dimensions are in mm



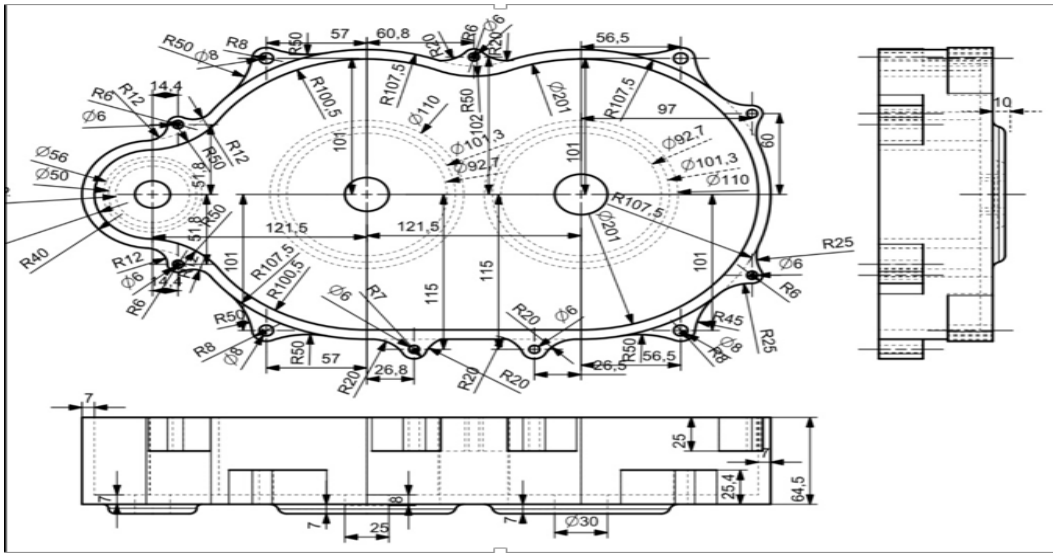
spline

MODULE	1.5
No Of Teeth	24
Face Width	45
Pressure Angle	30
Pitch Diameter	36
Tip Diameter	39
Root Diameter	32.25
Tip Circle Pr.Angle	36.926386
Ref Circle Tip	2.356194
Tip Thickness	2.364444
pitch	4.712389
Base pitch	4.081049
Fillet Radius	0.375
Base Diameter	31.176915
Addendum	1.5
Dedendum	1.875

All Dimensions are in mm



(Left gear casing)



(Right gear casing)

VI. CONCLUSION

The manufacturing process was optimized for better finish of the gears. Use of advanced machinery reduced errors and tolerances. Casting of gear casing made the gear box cost effective. Not much machining was done for the gear casing. The module was decreased to 3 to improve strength and reduce the size. The gears are more compact and can give better performance when compared to 12:1 ratio gear box. Aluminum was used for gear casing, thus making it lighter in weight. Splines are used instead of keyways to mate gear and shaft, thus the locking of gear and shaft are perfect and there is no chance of gear slipping off the shaft. Roller bearings are used over sliding bearings to effectively transmit power to the wheels. Lubrication levels were increased for better heat dissipation from the gears. The gears are extrusion cut around the bore to make them lighter in weight and to decrease inertia forces. The gear teeth are designed to take a maximum load of 41.15KN.

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Respected sir/madam,

Please find the attachment of our proposed research paper "Design, Analysis and Fabrication of Compound Gear Box" for review. Hoping for a positive response.

Thanking you,

Aditya.

Antifungal and Phytochemical Screening of Extract from *Vitellaria Paradoxa* (Shea Butter Tree) Leaves, Barks and Roots on Dermatophytes

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Abstract- This study was carried out to investigate the phytochemical constituent and antifungal activities of extract from leaves, barks and roots of *Vitellaria paradoxa* (shea butter tree) against dermatophytes. The leaves, barks and roots of *Vitellaria paradoxa* were extracted using aqueous, ethanol and acetone as solvent of extraction. The extracts were tested for antifungal activities against dermatophytes using agar well diffusion and broth dilution method. The Phytochemical constituents of the extract of the plant parts were determined. The result of antifungal activities of the leaves, barks and roots of *Vitellaria paradoxa* indicated that there are significant differences ($p<0.05$) in the effect of the extracts when used at different concentrations. The largest zone of inhibition was recorded with ethanolic crude bark extract against *Microsporium audouinii* (20.5 mm), at 250mg/ml followed by acetone barks extract against *Microsporium audouinii* (19mm) at 250mg/ml. There was no activity with most of the aqueous extract except the bark extract. The lowest MIC/MFC value of 7.813/15.62mg/ml were obtained from ethanolic bark extract. This result has shown that the leaves, barks and roots extracts of *Vitellaria paradoxa* possess phytochemical constituents that can inhibit the growth of some dermatophytes and the bark extract proved to be most efficacious.

Index Terms- Antifungal, *Vitellaria paradoxa*, Phytochemical, Dermatophytes, Minimum Inhibitory Concentration and Minimum Fungicidal Concentration

I. INTRODUCTION

Dermatophytes are pathogenic fungi that specialize in infection of the skin, hair and nails that utilize keratinous substrates as the carbon, nitrogen and sulphur sources. They belong to three anamorphic (asexual or imprerfect) genera Epidermophyton, Microsporum and Trichophyton (Ellis *et al.*, 2000). They are spread by direct contact (anthropophilic organisms) animals (zoophilic organisms) and soil (geophilic organisms) as well as indirectly from formites (Barry and Hainer, 2003). It is one of the most common cutaneous infections world-wide and poses a great public health problem to human and animals (Ameen, 2010; Havlickova *et al.*, 2008). The spreading of this diseases in most developed countries of the world present both health and economic problem usually accompanied by a parallel increase in the infection of the nails (onycomyces) which are very difficult to treat (Seebacher *et al.*, 2008). In poor economic resource countries, mycoses appear endemically, primarily with children and their treatment often fail because of paucity of efficient antifungal (Ndako *et al.*, 2012).

Nature has been a source of medicinal agent for thousands of years and an impressive number of modern drug has been isolated from natural resources. Medicinal plants have been used for years in daily life to treat diseases all over the world (Ates and Erdogical, 2003). In African one of such plant which is claimed to have antimicrobial properties is shea butter tree (Vitellaria paradoxa) (Falana *et al.*, 2014).

The study of plant as antimicrobial is to address the problem of antimicrobial resistance by microbes (Odugbemi and Akinsulire, 2006). As majority citizens especially those that belong to low socio-economic group, use medicinal plant as complementary alternative medicine. It has become necessity that more scientific studies should be embarked upon to obtain scientific data that will provide benefit to humanity. Studies on medicinal plant highlight the potential clinical usefulness of plants in finding solution to health problems (Soladoye *et al.*, 2005; Odugbemi and Akinsulire, 2006). Therefore, the purpose of this work was to investigate the phytochemical constituent and antifungal efficacy of extract from leaves, barks and roots of *Vitellaria paradoxa* against *Trychophyton rubrum, Trychophyton mentagrophytes, Trychophyton schoeleinii, Microsporum audouinii and Microsporum ferugeneum*.

II. MATERIALS AND METHOD

2.1. Plant Collection and Identification

Fresh leaves, roots and barks of *Vitellaria paradoxa* were collected from the permanent site campus of the University of Ilorin, Ilorin. The plant samples were identified at the Herbarium Unit of the Department of Plant Biology, University of Ilorin, Nigeria. A voucher specimen number: UILH 001/961 was obtained for the sample.

2.2 Sample Preparation and Extraction Procedure

The fresh plant materials were air dried for a period of two weeks and they were pre-crushed in a mortar. They were later pulverized into fine powder using milling machine. A quantity (200g) of the fine powdered leaves roots and barks were weighed into a 2500ml capacity conical flask after which 1000ml of ethanol, sterile distilled water and acetone were poured respectively and allowed to stand for 48 hours with constant shaking at regular interval at room temperature. The percolates were then filtered and the solvent (Ethanol, Sterile distilled water and Acetone) were evaporated using rotary evaporator to obtain the ethanol, sterile distilled water and acetone extracts of the leaves, roots and barks respectively. These were stored in sterile air tight containers and stored in the refrigerator at 4ºC until needed for analysis.

2.3 Preparation of Dilution of Crude Extract for Antifungal Assay

The dry extracts were reconstituted with their respective solvents to give a concentration of 250mg/ml for the antifungal activity evaluation as described by (Banso and Ayodele, 2001).

2.4 Source and Identification of Test Organisms

The dermatophytes used in this study were *Microsporum audouinii, Microsporum ferugineum, Trichophyton rubrum, Trichophyton mentagrophytes, Trichophyton schoenleinii.* They were obtained from the stock culture collection of Spectra Medic Diagnostic and Research Laboratories, Sagamu, Ogun State, Nigeria. The organisms were subcultured on Sabouraud Dextrose Agar containing 50mg Chloraphenicol, 400mg Cycloheximide and 40mg Gentamycin and incubated at ambient temperature (28-30ºC) for 1-7 days. The fungal isolates were reconfirmed using microscopic, cultural characteristic, growth rate and biochemical test as described by (Larone, 2002).

2.5 Preparation and Standardization of Inoculum

The preparation and standardization of inoculum was done according to the method described by Ogunledun *et al.,* (2008) with slight modification. Fungal spores of *Trichophyton rubrum, Trichophyton mentagrophytes, Trichophyton schoeleinii, Microsporum ferugineum* and *Microsporum audouinii* were harvested after 7 days. The culture was flooded with 10ml of 40% sterile sucrose solution, suspension were made by gently scraping the colony with the tip of a sterile Pasteur pipette. The resulting suspended mixture was withdrawn and transferred to a sterile tube. Heavy particles of the suspension present were allowed to settle for 15 minutes at room temperature. The spores suspension were standardized to $1x10^6$ spores/ml by making 1:1000 dilution with sterile water to match an opacity of 0.5Mcfarland's standard.

2.6 Preparation of Sabouraud Dextrose Agar

65gm of sabouraud Dextrose Agar powder was weighed and dissolve in 1 liter of distilled water, then 400mg Cycloheximide, 50mg of Chloraphenicol and 40mg of Gentamycin were added to prevent saprophytic fungi and bacteria contaminant respectively. The media was autoclaved at 121ºC for 15minutes, and allowed to cool and dispensed into the petridishes. The media were allowed to solidify and dried in the oven at 45ºC.

2.7 Antifungal Susceptibility Test

2.71 Agar Well Diffusion Method

Sabouraud Dextrose Agar (SDA) was prepared according to specifications and autoclaved at 121ºC for 15minutes, and allowed to cool. The media was dispensed into sterile petri dishes and they were allowed to set and solidify. The media were dried in the oven at 45ºC before use. 1ml of standardized spores suspension containing $1x10^6$ spores/ml was evenly spread on the surface of the SDA plates and were allowed to dry. Then sterile cork borer (6mm in diameter) was used to make well equidistant to each other on each seeded plates and 0.1ml of the reconstituted aqueous, ethanol, and acetone extracts (250mg/ml, 125mg/ml and 62.5mg/ml) was dispensed into each labeled well. The solvent and standard drug fluconazole (50mg/ml) served as negative control and positive control respectively. The plates were allowed to stand on the bench for five minutes to allow the extract to diffuse into media and were incubated at ambient temperature for 1-7 days and observed for growth and all tests were done in duplicate. The zone of inhibition produced by the extract as well as the control were measured and recorded as means diameter of zones of inhibition around the wells (CLSI, 2006).

2.7.2 Determination of Minimum Inhibitory Concentration (MIC) of Extracts.

The minimum inhibitory concentration of the extracts was determined using broth dilution method as described by ibekwe *et al.,* (2001). Sabouraud Dextrose Broth was prepared according to the manufacturer's instruction and 1ml each was dispensed into separate test tube, sterilized at 121ºc for 15 minutes and then allowed to cool. Two fold serial dilutions of the extracts in the broth were made from the stock concentration of the extract to obtain concentrations of 125mg/ml, 62.5mg/ml, 31.25mg/ml, 15.625mg/ml, 7.81mg/ml, 3.91mg/ml and 1.59mg/ml. A 0.1ml of the standardized inoculums ($1x10^6$spores/ml) was inoculated into the different concentrations of the extracts in the broth. Controls which include water, 50% ethanol and 50% acetone were also set up along with the test experiment. All incubations were done at 30ºC for 1-7 days. The test tubes were observed for visible growth. The lowest concentration which showed no visible growth in the test tube was recorded as minimum inhibitory concentration.

2.7.3 Determination of the Minimum Fungicidal Concentration (MFC) of Extracts

Fresh Sabouraud Dextrose Agar media were prepared, sterilized at 121ºC for 15 minutes, allowed to cool, poured into sterile petri dishes and left to solidify. The content of the tube with the minimum inhibitory concentrations were sub cultured onto the media. All the plates were incubated at 30ºC for 1-7 days and observed for growth. The Minimum Fungicidal Concentration was taken as the lowest concentration of the extracts without growth on the agar plate.

2.8 Statistical Analysis

The data obtained from the study were analyzed statistically using the Analysis of Variance (ANOVA) in Statistical Package for Social Sciences (SPSS) version 21.00.

2.9 Phytochemical Screening

The aqueous, ethanol and acetone extracts of various parts (leaves barks roots) were prepared by dissolving 2g of each extract

in 20ml of solvents used and were analysed for the presence of Alkaloid, Tannins, Saponins, Flavonoids steroids, cardiac glycosides phenolics, Phlobatanin and carbohydrates as described by Trease and Evans (2002).

III. RESULTS AND DISCUSSION

Many naturally occurring compounds found in plants, herbs and spices have been shown to possess antimicrobial functions and serve as a source of antimicrobial agents against pathogens (Kumar *et al*., 2006).

The preliminary phytochemical screenings of leaves, barks and roots of *Vitellaria paradoxa* (Acetone, ethanol and water) extracts revealed the presence of saponins, tannins, alkaloids, flavonoids, phlobotanins and phenolic compounds in the extracts. The result from this study showed that the ethanolic extract of the plant parts contain all the phytoconstituents tested except saponin in leaf and root. Of the three solvents used, saponin was detected in the aqueous extracts of the three plant parts investigated. The aqueous extract did not contain phlobatannin, glycosides and carbohydrate in all the three parts and alkaloid in the bark and root extract while acetone extract did not contain carbohydrate in all the three plant parts and saponin in leaf and root. Other phytoconstituents tested were detected in acetone extract of all three plant parts except glycosides in bark (Table 3.1).

These secondary metabolites are known to be biologically active and play significant roles in bioactivity of medicinal plants, because the medicinal values of plant lies in these phytochemical compounds which produce a definite and specific action on the human body. Saponins, a special class of glycosides with soapy characteristic, were reported as active antifungal agents (Ogu *et al.,* 2011). Tannins have been reported to hinder the development of micro-organisms by their ability to precipitate and inactivate microbial adhesions enzymes and cell envelope proteins (Ogu *et al.,* 2011; Cowan, 1999). The antimicrobial activity of flavonoids is due to their ability to complex with extracellular and soluble protein and to complex with microbial cell wall, thereby disrupting their membrane integrity (Ogu *et al.,* 2011). The significant antifungal activities observed in this study could thus be attributed to the interaction of one or more of the identified metabolites against the dermatophytes.

The result of antifungal activities of the leaves, barks and roots of *Vitellaria paradoxa* indicated that there were significant differences ($p<0.05$) in the effect of the extracts when used at different concentrations, and as well the level of activities among the parts of the plant. However, the highest zone of inhibition was produced when higher concentration (250mg/ml) was used. Ethanolic extracts of the leaves, roots and barks produced the highest inhibition zones (Table 3.2), followed by acetone extracts (Table 3.3) and the lowest inhibition zone was produced by aqueous extracts used at high concentration. No inhibition was produced when they were used at concentrations lower than 250mg/ml (Table 3.4).

Among the dermatophytes, the largest zones of inhibition were recorded with ethanolic crude bark extract against *Microsporium audouinii* (20.5mm), *Microsporium ferrugenum* (19.5mm) and *Trichophyton rubrum* (17.5mm) followed by acetone bark extract against *Microsporium audouinii* (19mm), *Microsporium ferrugenum* (17.5mm) and *Trichophyton rubrum* (16.5mm) at 250mg/ml. The antifungal activities of the crude extracts of roots and leaves also showed significant zones of inhibition and the aqueous extract has no activity except for the bark extract that showed narrow activity against *Microsporium audouinii* (6mm) *and Microsporium ferrugenum* (5.5mm) at the highest concentration of 250mg/ml. This result is in agreement with the findings of Ahmed et al., (2009) who reported that the bark extract of *Vitellaria paradoxa* was active against some dermatophytes. The antimicrobial activity of the plant part varies with the solvent of extraction, ethanol extracts have the highest activity. Falodun *et al.,* (2006) and Nsor-Atindana *et al.,* (2012) have reported that solvent of extraction is the major determinant of antimicrobial activity of plant extracts. Differences in polarity among various solvents have been reported to be accountable for the differences in solubility of plant active principles, hence variation in degree of activity (El-Mahmood *et al.,* 2008). The water extracts however, demonstrated no activity against all the tested dermatophytes. When plant materials are grounded in water or the plant cells are damaged, some phenolases and hydrolases are often released and these enzymes might have modulatory effect on the activity of the active compounds in the extract or there may be incomplete extraction of the active principles thus explaining the low activity (El-Mahmood *et al.,* 2008).

The low MIC/MFC values of 7.813/15.62mg/ml were obtained for ethanolic bark extract against *Tricophyton rubrum, Trichophyton schoeleinii, Microsporum ferrugenum* and *Microsporium audouinii and* 15.62/31.25mg/ml against *Trichophyton mentagrophyte*. Also the ethanolic root extract has MIC/MFC value of 7.813/15.62mg/ml against *Microsporum ferrugenum* and *Microsporium audouinii* and MIC/MFC value of 31.25/62.5mg/ml against *Trichophyton mentagrophyte Trichophyton rubrum and Trichophyton schoeleinii*. The ethanolic leave extract has MIC/MFC value of 15.62/31.25mg/ml against *Microsporium audouinii* and MIC/MFC value of 31.25/62.5mg/ml against *Tricophyton rubrum, Trichophyton schoeleinii, Microsporum ferrugenum* and *Trichophyton mentagrophyte* (Table 3.5). The MIC/MFC value of acetone extract were similar to that of ethanolic extract of leave, bark and root(Table 3.6) except the aqueous extracts that have MIC/MFC value of >250/>500mg/ml against all the dermatophytes (Table 3.7). Ahmed et al., (2009) reported that agent with low antimicrobial activity against an organism would require high concentration MIC/MFC while those with high activity require low concentration to either inhibit or totally kill such organism.

The MIC and MFC values obtained showed that the ethanolic extracts of *Vitelleria paradoxa* has the most potent effect against tested organisms and the bark extract of *Vitellaria paradoxa* could possess potent fungicidal components against the tested dermatophytes at very low concentration than the root and the leave extracts. The MIC and MFC results showed that the extracts exhibited definite fungistatic and fungicidal activities. This result signifies the probable optimum concentration of such extracts that could inhibit or cause a total cidal effect on the tested organisms (Brooks *et al.,* 2003).

IV. CONCLUSION

In conclusions, this result has shown that the leaves, barks and roots extracts of *Vitellaria paradoxa* possess Phytochemical

constituents that can inhibit the growth of some dermatophytes. It was also observed from this work that ethanol and acetone were better for extraction because the bioactive substances of all the parts of *Vitelleria paradoxa* are more soluble in those solvent than water. Of the three plant parts of *Vitellaria paradoxa* (leaves barks and roots), the bark extract proved to be most efficacious.

Table 3.1: Phytochemical Analysis of Leaves, Barks and Roots Extracts of *Vitellaria paradoxa*

Phyto consistituent	Aqueous extract Leaves /Barks/Roots	Ethanol extract Leaves /Barks/Roots	Acetone extract Leaves /Barks/Roots
Saponin	+ + +	- + -	- + -
Alkaloids	+ - -	+ + +	+ + +
Flavonoids	+ + +	+ + +	+ + +
Tannin	+ + +	+ + +	+ + +
Steroids	+ + +	+ + +	+ + +
Phenols	+ + +	+ + +	+ + +
Phlobatannin	- - -	+ + +	+ + +
Glycoside	- - -	+ + +	+ - +
Carbohydrate	- - -	+ + +	- - -

+ = present, - = absent, + + + = present in leave, bark and root extracts

3.2: Comparative Antidermatophytic activities of the ethanolic extract of *Vitelleria paradoxa*

Org	50% ETH	Zones of inhibition (mm) 0f various Concentration of Ethanolic extracts(mg/ml)								
		50mg/ml		62.5mg/ml		125mg/ml			250mg/ml	
		Flu	LEAF	BARK	ROOT	LEAF	BARK	ROOT	LEAF	BARK
TR	0±0.0	10.2±1.11	2.1±0.27	6.0±2.66	3.0±1.00	3.5±0.17	10.0±1.00	7.5±0.50	6.0±1.00	17.5±1.32
TM	0±0.0	12.9±0.46	2.6±0.40	5.0±1.00	2.5±0.53	3.8±0.27	9.0±1.00	5.0±1.00	5.0±2.00	13.5±1.32
TS	0±0.0	11.6±0.56	3.1±0.10	5.5±0.87	3.0±1.00	5.3±0.30	9.8±0.27	6.0±2.66	8.0±1.73	14.0±4.36
MF	0±0.0	17.0±0.92	3.6±0.20	6.5±0.20	4.0±1.00	5.4±0.30	10.0±1.18	8.0±2.65	8.0±1.73	19.5±1.80
MA	0±0.0	15.6±1.49	3.8±0.53	9.0±1.73	4.5±0.56	7.0±0.92	12.0±1.00	10.0±3.22	9.0±2.00	20.5±1.32
F - Value		17.636		9.627			9.583			15.794
P-Value		<0.05		<0.05			<0.05			<0.05

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*, ETH=Ethanol, FLU = Fluconazole

Table 3.3: Comparative Antidermatophytic activities of the Acetone extract of *Vitelleria paradoxa*

Org	50% ETH	Zones of Inhibition (mm) of various Concentration of Acetone Extracts(mg/ml)								
		50mg/ml		62.5mg/ml		125mg/ml			250mg/ml	
		Flu	LEAF	BARK	ROOT	LEAF	BARK	ROOT	LEAF	BARK
TR	0±0.0	10.2±1.11	2.0±0.0	5.6±0.6	3.0±1.0	3.5±1.1	9.1±0.8	7.0±0.8	5.5±0.6	16.5±2.1
TM	0±0.0	12.9±0.46	1.6±0.3	4.5±0.4	2.3±0.3	2.5±0.7	8.0±2.7	3.8±0.4	4.0±1.1	11.0±4.6
TS	0±0.0	11.6±0.56	3.0±1.0	5.0±1.0	2.0±0.3	6.3±0.5	9.6±0.6	3.6±0.6	10.0±1.0	13.0±2.0
MF	0±0.0	17.0±0.92	2.8±0.2	6.5±0.2	4.3±0.4	4.4±0.6	10.0±3.6	8.9±0.8	6.0±1.0	17.5±1.5
MA	0±0.0	15.6±1.49	3.2±0.7	8.9±0.8	5.0±1.1	7.0±1.0	12.0±1.7	9.0±0.4	9.0±1.7	19.0±2.0
F - Value		17.636		28.440			12.893			19.690
P-Value		<0.05		<0.05			<0.05			<0.05

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*, ACE= Acetone , FLU = Fluconazole

Table 3.4: Comparative Antidermatophytic activities of the Aqueous extract of *Vitelleria paradoxa*

Org	50% ETH	Zones of inhibition (mm) of various Concentration of Aqueous extracts(mg/ml)								
		50mg/ml		62.5mg/ml			125mg/ml			250mg/ml
		Flu	LEAF	BARK	ROOT	LEAF	BARK	ROOT	LEAF	BARK
TR	0±0.0	10.2±1.11	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0
TM	0±0.0	12.9±0.46	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0
TS	0±0.0	11.6±0.56	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0
MF	0±0.0	17.0±0.92	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	5.5±0.63
MA	0±0.0	15.6±1.49	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	0±0.0	4.0±1.0	6.0±2.65
F - Value		17.636								
P-Value		<0.05								

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*,WAT=Water,FLU=Fluconazole

Table 3.5: MIC/MFC of the Ethanolic extract of *Vitelleria paradoxa*

ORG	MIC (mg/ml)				MFC (mg/ml)			
	LEAVE	BARK	ROOT	ETH	LEAVE	BARK	ROOT	ETH
TR	31.25	7.813	31.25	0.00	62.5	15.625	62.5	0.00
TM	31.25	15.625	31.25	0.00	62.5	31.25	62.5	0.00
TS	31.25	15.625	31.25	0.00	62.5	31.25	62.5	0.00
MF	31.25	7.813	7.813	0.00	62.5	15.625	15.625	0.00
MA	15.625	7.813	7.813	0.00	31.25	15.625	15.625	0.00

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*, ETH =Ethanol

Table 3.6: MIC/MFC of the Acetone Extract of *Vitelleria paradoxa*

ORG	**MIC (mg/ml)**				**MFC (mg/ml)**			
	LEAVE	BARK	ROOT	ACE	LEAVE	BARK	ROOT	ACE
TR	31.25	15.625	31.25	0.00	62.5	31.25	62.5	0.00
TM	31.25	15.625	31.25	0.00	62.5	31.25	62.5	0.00
TS	31.25	15.625	31.25	0.00	62.5	31.25	62.5	0.00
MF	31.25	7.813	15.625	0.00	62.5	15.625	31.25	0.00
MA	15.625	7.813	7.813	0.00	31.25	15.625	15.625	0.00

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*, ACE=Acetone

Table 3.7: MIC/MFC of the Aqueous extract of *Vitelleria paradoxa*

ORG	MIC (mg/ml)				MFC (mg/ml)			
	LEAVE	BARK	ROOT	WAT	LEAVE	BARK	ROOT	WAT
TR	>250	>250	>250	0.00	>500	>500	>500	0.00
TM	>250	>250	>250	0.00	>500	>500	>500	0.00
TS	>250	>250	>250	0.00	>500	>500	>500	0.00
MF	>250	>250	>250	0.00	>500	>500	>500	0.00
MA	>250	>250	>250	0.00	>500	>500	>500	0.00

TR = *Trichophyton rubrum*, TM = *Trichophyton mentagrophyte*, TS = *Trichophyton schoeleinii*, MF = *Microsporium ferrugenum*, MA = *Microsporium audouinii*, WAT= Water

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Non-Oil Exports and Economic Growth in Selected African Countries

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Abstract- This study investigates the relationship between non-oil exports and economic growth in selected African countries which include Algeria, Angola, Cameroun, Chad, Egypt, Equatorial Guinea, Ghana, Libya, Republic of Congo, Nigeria and Sudan from 1986-2018. The study has employed the Dynamic Panel Data Models and findings revealed that non-oil exports have positive relationship with economic growth in all the countries except Gabon in the long-run. The estimated coefficients are however not statistically significant at 5% level of significance. The study also found that there is positive impact of non-oil exports on economic growth in Angola, Egypt, Equatorial Guinea, Gabon, Libya, Nigeria, Republic of Congo and Sudan in the short-run while there is negative influence in Algeria, Cameroun, Chad and Ghana in the short-run. It is concluded from the findings of the study that non-oil exports have positive influence on economic growth in most selected African countries, although not significant. The study therefore, recommends that the African oil producing countries and oil producing countries generally should improve their production and exports of non-oil products relatively more than imports of these products. The products should also have international standard that could stand competitive at the world market. This would help to increase foreign earnings that could contribute positively to economic growth in one way, absorb the oil price shocks and create domestic jobs for the economy in another way.

Index Terms- African Countries, Dynamic Panel Models, Economic growth, and Non-oil Exports

JEL Classification Codes: F, F14, F21, F31

I. Introduction

The significance of exports to international trade and economic growth is an issue that has been of interest to economists even before the days of Adam Smith. Abou-Stait (2005) asserts that exports are catalysts necessary for the overall development of an economy; when export sectors are developed, employment opportunities for the people are created and the standard of living is improved. Increased exports earnings help in lessening the pressure on balance of payment disequilibrium. Similarly, Usman and Salami (2008) opined that export helps in increasing the level of aggregate economic activities through its multiplier effects on the level of national income. Studies by Abu-Qarn and Abu-Bader (2004); and Bahmani-Oskooee and Economidou (2009) suggested that in most developing countries, there is a positive long-run relationship between exports and economic growth.

In Africa, between 1995 and 2010, Africa's total exports increased from US$ 57 billion to US$ 169 billion and were essentially driven by exports to Asia-Pacific and to the rest of the World. Even though Africa's export revenues have been rising in the last two decades, its overall export performance as a share of the world total has been persistently declining during this same period. Specifically, Africa's share of total world exports plummeted from 4.1 percent in 1981 to 1.7 percent in 1998, only rising slightly to 2.4 percent in 2009 (Mutenyo, 2011). Over this entire period, Africa has on average only accounted for about 2 percent of total global exports, of which 30 percent is attributed to South Africa. Africa's export performance is in sharp contrast to that of China. While China's exports accounted for 1.1 percent of total global exports in 1981, its share had risen to 9.8 percent by 2009 (Mutenyo, 2011). According to West African economic outlook (2018), all countries in the region except Côte d'Ivo-ire, Guinea-Bissau, and Nigeria recorded negative net exports—importing more goods than they exported. In 2018, net exports reduced West Africa's real GDP growth by 1.5 percentage points. While exports have been found to be growth enhancing in Africa, the reverse is the case for imports, pointing to the need to limit them. To the extent that imports comprise investment or inter-mediate products, they may contribute to growth. But excessive imports of consumer products may be detrimental to growth. Efforts to achieve a positive external balance would greatly benefit from export promotion policies, especially ones targeted at diversifying from exporting primary commodities.

However, African exports are not diversified with 80 percent of its exports concentrated in oil, minerals and primary agricultural commodities. Fuel and minerals alone account for over 50 percent of Africa's total exports. Broken down by country, it is clear that the region's exports are consistently dominated by primary agricultural commodities, natural resources and minerals. For instance, Nigeria's non-oil exports amounted to about $3.0 billion (₦486 billion) in 2013 (Abiodun, 2014). In a similar way, the share of Angola's non-oil exports reduced from 86.6% in 1980 to 22% in 1987 respectively. By 2015 the percentage of non-oil exports to total exports was 5% in 2015 (World Bank, 2017). Similarly, Cameroon had 99.96% of the share of non-oil exports in 1970. However, the proportion of the non-oil exports declined to 55.4% in 2015 (World Bank, 2017). Many other African countries such as Gabon, Congo, Ghana, Sudan, Egypt, Equatorial Guinea and Chad had declining share of non-oil exports as compared to oil exports while Algeria and Nigeria experienced

declining share of non-oil exports from 1980 to 2000 with sudden upsurge in 2015 (World Bank, 2017). Africa's lack of export diversity and dependence on commodities are further compounded by its share of industry to total GDP, which declined from 37 percent in 1981 to 33 percent in 2010 (Mutenyo, 2011). Accordingly, Gylfason (2006) noted that the oil dependency syndrome made oil producing countries realize that relying on only the oil sector was not an economically sustainable strategy, and that other ways should be sourced. This can be achieved through diversification of a productive base and promotion of non-oil exports.

Oil as well as other non-renewable resources will eventually be exhausted, the price, which fluctuates considerably, implies that selected African Countries understudy such as Algeria, Angola, Cameroun, Chad, Egypt, Equatorial Guinea, Ghana, Libya, Republic of Congo, Nigeria and Sudan has faced a series of external shocks in the last three decades. Indeed, Africa is well aware that its oil resources will at some time be exhausted. This fact makes government of selected African Countries to realize that, the bases of her economies are very weak as long as their economies continue to depend on the export of a single depleting commodity, since continued dependence on oil revenue for socio-economic development is not a reliable option in the long term and hence the urgent need for non-oil exports development/economic diversification. The effects of over-dependence on oil on Africa Countries was witnessed from fall in growth rate of gross domestic product, the deterioration of the nation's public accounts, and the decline in export earnings (Macuta, 2015).

More recently, the drop in the price of crude oil in 2016 coupled with United States entry into the world market and the global issue of oil over supply has adversely affected the economic performance of most oil producing nations as their industrial, construction and services sectors adjusted to cuts in private consumption and public investment amid limited availability of foreign exchange (African Economic Outlook, 2017).

It is against this background that this study examined the causal relationship and the impact of non-oil exports on economic growth in these selected African countries.

II. Theoretical Review

This study is hinged on the Export-Led Growth Hypothesis. According to the international trade theory, exports can contribute to economic performance through many channels". As Adams Smith (1776) postulated, "international trade improves productivity by enhancing market size and enjoying economies of scale". Furthermore, David Ricardo (cited in Akmal & Ali, 2013) opined that international trade plays an important role in economic growth. A country can attain specialization in the production of a good through trade in which it is comparatively advantaged. This attained specialization may perk up the efficiency of resources exploitation by raising the capital formation which improves the total factor productivity (TFP).

Hassan (2011) in his description of export-led growth hypothesis admits that expansion in exports of a country can lead to the economic growth of the country. He affirms that the overall growth of economies does not owe to increase in the labor and capital stock only, but also expansion in exports. This approach, according to Hailegiorgis (2012) leads to better resource allocation, creating economies of scale and production efficiency through technological development, capital formation, employment creation and hence economic growth. The choice of this framework in this study is owed to the fact that it stresses that long run growth depends on export of resources that have a lifespan. First, that the export sector may generate positive externalities on non-export sectors through more efficient management styles and improved production techniques (Feder, 1982). Second export expansion will increase productivity by offering potential for scale economies (Helpman and Krugman, 1985; Krugman 1997). Secondly, exports are likely to alleviate foreign exchange constraints and can thereby provide greater access to international markets (Esfahani, 1991). These arguments have recently been extended by the literature on "endogenous" growth theory which emphasizes the role of exports on long-run growth via a higher rate of technological innovation and dynamic learning from abroad (Grossman and Helpman, 1991, 1995). Marin (1992) found that countries exporting a large share of their output seem to grow faster than others. The growth of exports has a stimulating influence across the economy as a whole in the form of technological spillovers and other externalities (Bhagwati, 1988). Models by Grossman and Helpman (1991), posit that expanded international trade increases the number of specialized inputs, increasing growth rates as economies become open to international trade. Buffie (1992) considers how export shocks can produce export-led growth.

III. Empirical Framework

Onodugo and Anowor (2016) carried out a study to investigate the specific impact of the non-oil exports to the growth of Nigerian economy using data between 1981 and 2012. The study adopted the Augmented Production Function (APF), employing the Endogenous Growth Model (EGM) in its analysis. The conventional tests for mean reversion and co-integration were employed. Findings reveal a very weak and infinitesimal impact of non-oil export in influencing rate of change in level of economic growth in Nigeria.

Adel (2015) investigated the role of oil and non-oil exports in the Syrian economy over the period 1975-2010. Using Johansen Co-integration test, Granger causality test, Impulse response functions (IRF) and variance decomposition analysis, the results showed that GDP is positively and significantly related to oil and non-oil exports. The Granger Causality test indicated bi-directional short-run causality relationship between GDP, oil exports and non-oil exports. There are also bi-directional long-run causality relationships between GDP and non-oil exports, and unidirectional long-run causality relationship running from oil exports to GDP.

Abogan, Akinola and Baruwa (2014) investigated the impact of non-oil exports on economic growth in Nigeria between 1980 and 2010. The study used the Ordinary Least Square Methods involving Error correction mechanism. The study revealed that the impact of non-oil exports on the economic growth was moderate. It was evident in the study that the policies on non-oil sectors during the period in Nigerian do not sufficiently encourage non-oil exports, thus reduce their contributions to growth.

Ifeacho, Omoniyi and Olufemi (2014) analyzed the role of non-oil exports on economic development of Nigeria. The study used per capita income as proxy for economic development and expressed it as a function of non-oil export volume, trade openness, exchange rate and inflation rate. The study used the Ordinary Least Square Technique and the results showed that non-oil export exhibits a significant and positive relationship with per capita income.

Ezike and Ogege (2012) investigated Nigeria foreign trade policy and its impact on non-oil exports. The study used both correlation analysis and least square techniques to analyze data from 1980-2009. Their findings showed that there is a negative relationship between trade policies and non-oil exports in Nigeria. However, non-oil exports have positive effect on economic growth in Nigeria; also exchange rate is positive and significant at 5% level of significance. Mustapha (2013) carried out a study to examine the effect of non-oil exports on the agricultural sector performance in Nigerian economy from 1980-2011. Modern econometric analysis was used to validate if there is any relationship between non-oil exports and sectoral performance, the results revealed that non-oil export commodities fail to enhance growth of the economy in their findings, while agriculture, openness and exports promote growth in both the short and long run.

IV. Methodology of the Study

The study has employed the Dynamic Panel Data Models because of the nature of dynamism of the macroeconomic indicators. This framework has the following techniques or estimators; Generalized Method of Moments (GMM) (either First Difference GMM or System GMM, that is; the Arellano-Bond estimator and the Arellano-Bover/Blundell-Bond estimator), Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Fixed Effects (DFE) (Bun & Sarafidis, 2013). Other panel techniques include: Seemingly Unrelated Regression (SUR), Swamy's random coefficient model and Mean group estimation (Muck, 2016). But, Panel GMM is applicable to the cases in which the number of periods is small relative to the number of cross-sectional observations (T < or = N). Otherwise-asymptotic imprecision and biases may arise (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). Since the number of time dimensions for this research is relatively larger than cross sections (T >N), that is, for large T, Pesaran and Smith (1995) show that the traditional panel techniques [Fixed Estimator (FE), Instrumental Variables (IV), GMM estimators] can produce inconsistent, and potentially very misleading estimates of the average values of the parameters in dynamic panel data model unless the slope coefficients are in fact identical, hence, the need for analyzing the long-run effects and the speed of adjustment to the long-run. Also, since the overriding interest is to account for long-run effects or impact of non-oil exports on economic growth among selected African countries, the study used Panel ARDL or non-stationary heterogeneous panel data.

V. Specification of the Model

In order to capture the impact of Non-oil Exports on the economic growth of some selected African countries, this study has adopted a Keynesian Growth Model in linkage with the Export Led Growth hypothesis.

In a simple Keynesian Model

$Y = C + I + G + (X - M)$- - - - - - - - - 1

Where:

Y is GDP, the sum total of the market value of goods and services produced in a country;

C represents consumption expenditures, expenditures by household sector on currently produced final goods and services;

I represent Investments;

G is total government expenditures as a share of GDP;

X represents total exports;

M is total imports;

But,

$X = X_{oil} + X_{Noil}$ - - - - - - - - -2

Where;

X_{oil} represents Oil Exports;

$X_{Noil}$is Non-Oil Exports;

Substituting equation 2 in equation 1, we have;

$Y = C + I + G + X_{oil} + X_{Noil} - IMP$ - - - - - - - -3

Furthermore, Foreign Direct Investment (FDI) and Exchange rate (EXR) are also foreign components that have impact on economic growth (determinants of economic growth). Hence, if we include FDI and EXR in equation 3; the functional model becomes:

$Y_t = f(C_t, I_t, G_t, X_{oil_t}, X_{Noil_t}, M_t, FDI_t, EXR_t)$ - - - - - - 4

Specifying the above econometric model of the growth equation (4) and using other similar acronyms with natural logarithm transformation, it is explicitly re-written as:

$$lnGDP_t = \alpha_0 + \alpha_1 lnPVC_t + \alpha_2 lnINV_t + \alpha_3 lnGEX_t + \alpha_4 lnOIL_t + \alpha_5 lnNOIL_t + \alpha_6 lnIMP_t + \alpha_7 lnFDI_t + \alpha_8 lnEXR_t + \eta_i + v_{it} \quad - - - - -5$$

Where:

Y=GDP=Gross Domestic Product

C=PVC=Private Consumption Expenditures (current);

I=INV= Gross Fixed Capital Formation, private sector (current);

G=GEX= Government Spending or Expenditures;

X_{oil}=OIL=Oil Exports (current)

X_{Noil}=NOIL= Exports of Non-oil (current)

M=IMP= Imports of goods and services (current)

FDI=Foreign direct investment

EXR=Exchange Rate: local currency units per U.S. dollar.

ln= Natural Logarithm

α_0 = Intercept

$\alpha_1 - \alpha_8$ = Parameter Coefficients to be estimated

η_i = Individual Specific Effect or Fixed Effect

v_{it} = An idiosyncratic error

Following a linear dynamic panel data model which considers an autoregressive panel data model of the form (Blundell, Bond & Windmeijer, 2009):

$y_{it} = \propto y_{it-1} + \beta' x_{it} + U_{it}$ - - - - - - - - 6

$U_{it} = \eta_i + v_{it}$ - - - - - - - - 7

Where$i = 1, \dots, N$ and$t = 2, \dots, T$. Where $\eta_i + v_{it}$ is the usual 'error components' decomposition of the error term; N is large, T is fixed and $/\propto/< 1$. The above model specification is therefore sufficient to cover most of the standard cases encountered in linear dynamic panel application and allows the inclusion of x_{it-1} that provides the autoregressive panel data model as:

$y_{it} = \propto y_{it-1} + \beta_1' x_{it} + \beta_2' x_{it-1} + \eta_i + v_{it}$ - - - - - - 8

Applying the above typical linear dynamic panel model to equation 5 in examining the impact of non-oil exports on economic growth of some selected African countries, the model is re-stated as:

$lnGDP_t = \alpha_0 + +\partial lnGDP_{it-1} + \alpha_1 lnPVC_{it} + \alpha_2 lnINV_{it} + \alpha_3 lnGEX_{it} + \alpha_4 lnOIL_{it} + \alpha_5 lnNOIL_{it} + \alpha_6 lnIMP_{it} + \alpha_7 lnFDI_{it} + \alpha_8 lnEXR_{it} + \eta_i + v_{it}$ - - 9

Where

α_0 = Intercept

$\alpha_1 - \alpha_8$ = Parameter Coefficients to be estimated

η_i = Individual Specific Effect or Fixed Effect

v_{it} = An idiosyncratic error

The equation 9 is re-specified to capture the error correction term ($ec_{i,t-1}$), the long-run equilibrium and the individual heterogeneity of the coefficients to be estimated as follows:

$lnGDP_{it} = ec_{i,t-1} + \sum_i^1 \delta_i lnGDP_{it-1} + \sum_t^1 \alpha_{1i} lnPVC_{it} + \sum_t^1 \alpha_{2i} lnINV_{it} + \sum_t^1 \alpha_{3i} lnGEX_{it} + \sum_t^1 \alpha_{4i} lnOIL_{it} + \sum_t^1 \alpha_{5i} lnNOIL_{it} + \sum_t^1 \alpha_{6i} lnIMP_{it} + \sum_t^1 \alpha_{7i} lnFDI_{it} + \sum_t^1 \alpha_{5i} lnEXR_{it} + \alpha_{1i} lnPVC_{it} + \alpha_{2i} lnINV_{it} + \alpha_{3i} lnGEX_{it} + \alpha_{4i} lnOIL_{it} + \alpha_{5i} lnNOIL_{it} + \alpha_{6i} lnIMP_{it} + \alpha_{7i} lnFDI_{it} + \alpha_{8i} lnEXR_{it} + \eta_i + v_{it}$ - - - - - 10

Where the error correction version of the equation 10 yields the following:

$lnGDP_{it} = ec_{i,t-1} + \sum_i^1 \delta_i lnGDP_{it-1} + \sum_t^1 \alpha_{1i} lnPVC_{it} + \sum_t^1 \alpha_{2i} lnINV_{it} + \sum_t^1 \alpha_{3i} lnGEX_{it} + \sum_t^1 \alpha_{4i} lnOIL_{it} + \sum_t^1 \alpha_{5i} lnNOIL_{it} + \sum_t^1 \alpha_{6i} lnIMP_{it} + \sum_t^1 \alpha_{7i} lnFDI_{it} + \sum_t^1 \alpha_{8i} lnEXR_{it} + \eta_i + v_{it}$ - - - - - - - - - - 11

Where $ec_{i,t-1}$ measures how long it takes the system to converge to its long-run equilibrium in due to any distortion that may arise.

This study assumed that the explanatory variables have contemporaneous effect (that is, the current value of GDP depends on the current value of explanatory variables) while the dependent variable is allows for inter-temporal effect (that is, $ln\mathrm{GDP}_t$ depends on either the current and/or lagged values of $ln\mathrm{GDP}_t$). The coefficients on the contemporaneous and lagged variables are combined to obtain a long-run effect

Given that the lagged value of GDP ($ln\mathrm{GDP}_{i,t-1}$) is also the function of these effects (individual specific effects and disturbance term), $ln\mathrm{GDP}_{i,t-1}$ is correlated with the error term, that is, E($ln\mathrm{GDP}_{it-1}, v_{it}$), Hence, the application of OLS estimator is biased and inconsistent even if the error term U_{it} is not serially correlated. And for the application of Fixed Effect estimator, although with transformation might have eliminated the effects, however, ($ln\mathrm{GDP}_{it-1} - ln\overline{\mathrm{GDP}}_{i.-1}$), where $ln\overline{\mathrm{GDP}}_{i.-1} = \sum_{t=2}^{T} \frac{\overline{\mathrm{GDP}}_{i.-1}}{T-1}$ will still be correlated with $v_{it} - \bar{v}_{i.}$even if the error term v_{it} is not serially correlated which by construction, $ln\mathrm{GDP}_{it-1}$ is correlated with$\bar{v}_{i.}$ since latter average contains v_{it}that is obviously correlated with$ln\mathrm{GDP}_{it-1}$. Similarly, v_{it} is correlated with $ln\bar{Y}_{i.-1}$ since the latter average contains $ln\mathrm{GDP}_{it}$. This correlation also renders the Fixed Effect Estimator inconsistent. The Generalised Least Squares (GLS) method like Least Squares Dummy Variable (LSDV) estimator of estimation of the random effects model to estimate dynamic panel data models will also produce similar results of fixed effect model. Although, the GLS estimator involves quansi-demeaning the data, however, this demeaning process also unavoidably causes the quansi-demeaned dependent variable to be correlated with the quansi-demeaned residuals, and therefore the GLS estimator will also be biased and inconsistent.

Hence, to overcome these econometric problems inherent in the use of OLS, FE (LSDV) and GLS estimators for the above dynamic panel data models, the use of the Arellano and Bond (1991) Generalised Method of Moment (GMM) estimator, Blundell and Bond (1998) system GMM estimator, Mean Group, Pooled Mean Group and Dynamic Fixed Effects becomes the alternatives (Bun & Sarafidis, 2013). But since the number of time series for this research is relatively large than cross section (T >N), Mean Group, Pooled Mean Group and Dynamic Fixed Effects sometimes referred to as Panel Autoregressive Distributed Lag (ARDL) Models is most preferred or Panel SUR.

The apriori expectations of the coefficient of the model specified in 3.10 is as follows:

$\alpha_1 > 0, \quad \alpha_2 > 0, \quad \alpha_3 > 0, \quad \alpha_4 > 0, \quad \alpha_5 > 0, \alpha_6 < 0, \quad \alpha_7 > 0, \quad \alpha_8 < 0$

VI. Panel Unit Root Test Results

In order to determine whether series are having the problem of unit root in this study, panel data for all the variables were subjected to panel unit root tests using Levin, Lin and Chu (2002), Im, Perseran and Shin (2003) and Hadri (2000) panel unit root test. The selection of these unit root tests was based on the fact that Levin, Lin and Chu (LLC) (2002) and Hadri (2000) assumes that the persistent parameters are common across cross-sections while Im, Peseran and Shin (IPS) assumes that the parameters vary freely across sections, hence has gained superseding importance among the procedure of testing for unit root in this panel data since emphasis is placed on individual heterogeneity among the countries. The results obtained are presented in Table 1.

Table 1. Panel Unit Root Tests Results

Variables	Livin, Lin and chu (LLC)		Hadri LM		Im, peseran and shin (IPS)			Remark
Variables	Adjusted t-statistic	probability value	Z-Statistic	Probability Value	W-t-bar Statistic	Probability Value	Order of Integration	Remark
LogeGDP	1.1366	0.8721	62.7584	0.0000	4.7863	1.0000		Not Stationary
D.LogeGDP	-3.3864	0.0004	3.2404	0.0006	-5.2474	0.0000	I(1)	Stationary
logePVC	-2.9910	0.0014	60.6942	0.0000	1.3356	0.9092		Not Stationary
D.PVC	-3.6609	0.0001	8.7110	0.0000	-6.0452	0.0000	I(1)	Stationary
logeINV	-1.1705	0.1206	56.2510	0.0000	-1.5440	0.1407		Not Stationary
D. logeINV	-21.8243	0.0000	2.2693	0.0116	-14.1425	0.0000	I(1)	Stationary
logeGEX	1.0373	0.8502	56.8032	0.0000	3.2013	0.9993		Not Stationary
D. logeGEX	-5.2470	0.0000	-0.1464	0.5582	-6.9401	0.0000	I(1)	Stationary
logeOIL	-0.5561	0.2891	22.0931	0.0000	0.4001	0.6555		Not Stationary
D. logeOIL	-7.8291	0.0000	-2.4959	0.9937	-9.9844	0.0000	I(1)	Stationary
logeNOIL	-0.3264	0.3721	48.6690	0.0000	1.2620	0.8965		Not Stationary
D. logeNOIL	-8.6439	0.0000	-1.9023	0.9714	-11.1660	0.0000	I(1)	Stationary
logeIMPT	-0.4110	0.3405	59.7375	0.0000	2.4155	0.9921		Not Stationary
D.l0geIMPT	-4.7218	0.0000	0.7071	0.2398	-6.9609	0.0000	I(1)	Stationary
logeFDI	-0.8950	0.1854	17.9299	0.0000	-0.8534	0.1967		Not Stationary
D.logeFDI	-8.3067	0.0000	-2.5786	0.9950	-10.6094	0.0000	I(1)	Stationary
logeEXR	-1.6746	0.0470	56.9917	0.0000	0.5146	0.6966		Not Stationary
D. logeEXR	-5.5255	0.0000	2.1527	0.0157	-7.0017	0.0000	I(1)	Stationary

Source: Computations from STATA 14.2 Output

The results in Table 1 show the panel unit root or stationary tests. The results indicate that all the panels contain unit roots at levels except for Gross Fixed Capital Formation (INV) as reported by the Levin, Lin and Chu (LLC) test and Im, Peseran and Shin (IPS) test. More so, Hadri LM test shows non-stationary panels for GDP, PVC, INV and EXR at levels and first difference. But, based on the majority of the results with special attention to Im, Peseran and Shin panel unit root test results, the researcher conclude that some panels are stationary at first difference. Thus, the null hypotheses that all panels contain unit roots for Levin, Lin and Chu (LLC) and Im, Peseran and Shin (IPS) are rejected at first difference while for Hadri LM test, the null hypotheses for most of the panels cannot be rejected at 5% level of significance as indicated in Table 1. Deducing from the results in Table 1, the panels were estimated at first difference in order to yield robust results.

Panel Granger Non-Causality Test Results

This study examines the panel granger non-causality test among the variables incorporated in the study but paying particular attention to the test of granger non-causality test between economic growth (GDP) and non-oil exports (NOIL). The results are presented in Table 2

Table 2. Panel Causality Test Results (5% Level of Significance

Statistic	Variable X	Variable Y	Causality	Decision
	PVC	GDP		
Z-Bar(Prob Value)	23.2506(0.0000)	4.0568(0.0000)	⟷	Bidirectional
	IVC	GDP		
Z-Bar(Prob Value)	34.5352(0.0000)	26.332(0.0000)	⟷	Bidirectional
	GEX	GDP		
Z-Bar(Prob Value)	1.1049(0.2692)	16.029(0.000)	⟵	Unidirectional
	OIL	GDP		
Z-Bar(Prob Value)	5.5104(0.0000)	5.0390(0.0000)	⟷	Bidirectional

	NOIL	GDP		
Z-Bar(Prob Value)	5.8828(0.0000)	9.0910(0.0000)	⟷	Bidirectional
	IMPT	GDP		
Z-Bar(Prob Value)	12.0486(0.0000)	3.2435(0.0012)	⟷	Bidirectional
	FDI	GDP		
Z-Bar(Prob Value)	2.1245(0.0336)	6.2872(0.0000)	⟷	Bidirectional
	EXR	GDP		
Z-Bar(Prob Value)	17.0948(0.0000)	0.2538(0.7996)	←	Unidirectional
	INV	PVC		
Z-Bar(Prob Value)	11.4247(0.0000)	11.7597(0.0000)	⟷	Bidirectional
	GEX	PVC		
Z-Bar(Prob Value)	1.3444(0.1788)	8.087(0.0000)	←	Unidirectional
	OIL	PVC		
Z-Bar(Prob Value)	-0.0316(0.9748)	2.8384(0.0045)	←	Unidirectional
	NOIL	PVC		
Z-Bar(Prob Value)	6.9955(0.0000)	16.4925(0.0000)	⟷	Bidirectional
	IMPT	PVC		
Z-Bar(Prob Value)	8.1038(0.0000)	2.1389(0.0000)	⟷	Bidirectional
	FDI	PVC		
Z-Bar(Prob Value)	1.8562(0.0634)	5.1476(0.0000)	←	Unidirectional
	EXR	PVC		
Z-Bar(Prob Value)	4.3647(0.0000)	2.1533(0.0313)	⟷	Bidirectional
	GEX	INV		
Z-Bar(Prob Value)	14.8983(0.0000)	4.6803(0.0000)	⟷	Bidirectional
	OIL	INV		
Z-Bar(Prob Value)	2.4108(0.0159)	6.2696(0.0000)	⟷	Bidirectional
	NOIL	INV		
Z-Bar(Prob Value)	8.2487(0.0000)	13.5085(0.0000)	⟷	Bidirectional
	IMPT	INV		
Z-Bar(Prob Value)	7.6691(0.0000)	4.9989(0.0000)	⟷	Bidirectional
	FDI	INV		
Z-Bar(Prob Value)	2.7880(0.0053)	5.0622(0.0000)	⟷	Bidirectional
	EXR	INV		
Z-Bar(Prob Value)	4.6680(0.0000)	3.7980(0.0001)	⟷	Bidirectional
	OIL	GEX		
Z-Bar(Prob Value)	8.1510(0.0000)	1.5375(0.1242)	→	Unidirectional
	NOIL	GEX		
Z-Bar(Prob Value)	6.1648(0.0000)	5.8647(0.0000)	⟷	Bidirectional
	IMPT	GEX		
Z-Bar(Prob Value)	15.2805(0.0000)	-0.4668(0.6407)	→	Unidirectional
	FDI	GEX		
Z-Bar(Prob Value)	7.9530(0.0000)	9.3119(0.0000)	⟷	Bidirectional
	EXR	GEX		

Z-Bar(Prob Value)	8.9172(0.0000)	-0.2945(0.7684)	→	Unidirectional
	NOIL	OIL		
Z-Bar(Prob Value)	0.3811(0.7031)	9.4938(0.0000)	←	Unidirectional
	IMPT	OIL		
Z-Bar(Prob Value)	7.6430(0.0000)	6.6574(0.0000)	↔	Bidirectional
	FDI	OIL		
Z-Bar(Prob Value)	0.6944(0.4874)	5.0487(0.0000)	←	Unidirectional
	EXR	OIL		
Z-Bar(Prob Value)	8.9172(0.0000)	0.2945(0.7739)	→	Unidirectional
	FDI	NOIL		
Z-Bar(Prob Value)	4.4227(0.0000)	4.5056(0.0000)	↔	Bidirectional
	EXR	NOIL		
Z-Bar(Prob Value)	2.7041(0.0068)	2.2788(0.0227)	↔	Bidirectional
	IMPT	NOIL		
Z-Bar(Prob Value)	12.1282(0.0000)	1.3203(0.1867)	→	Unidirectional
	FDI	IMPT		
Z-Bar(Prob Value)	3.4085(0.0007)	10.8107(0.0000)	↔	Bidirectional
	EXR	IMPT		
Z-Bar(Prob Value)	6.5969(0.0000)	-0.2386(0.8114)	→	Unidirectional
	EXR	FDI		
Z-Bar(Prob Value)	2.0043(0.450)	-0.2252(0.8218)	✖	No Causality

Source: Computations from STATA 14.2 Outputs

The results of panel granger non-Causality test by Dumitrescu and Hurlin (2012) is judged at 5% level of significance. The result in Table4 shows that there is bidirectional relationship between non-oil experts and economic growth in selected African countries. This is because, the estimates reveal Z-bar statistic of 5.8828 and 9.091 with their respective probabilities of 0.0000 and 0.0000. This indicates that non-oil exports granger-causes economic growth at least in one country with feedback mechanism. The result also shows bidirectional relationship between PVC and GDP, INV and GDP, OIL and GDP and between FDI and GDP in selected African countries. The result also reveals unidirectional relationship running from GDP to GEX at 5% level of significance. This implies that GDP does granger-cause GEX for at least one country. The rejection of null hypothesis does not necessarily imply that the causality exists in all the panels or countries. It simply implies that there is granger-causality for at least one country in the panels.

Considering the causality relationship between other variables and PVC, there exists bidirectional relationship between INV and PVC, NOIL and PVC, IMPT and PVC, EXR and PVC at 5% level of significance. The result in Table 4 also reveals unidirectional relationship running from PVC to GEX, OIL and FDI for at least one country.

The result also shows two way causal relationships between GEX and INV, OIL and INV, NOIL and INV, IMPT and INV, FDI and INV and between EXR and INV. This implies that all other variables incorporated in the model granger-cause INV for at least one country and in a likewise manner, INV granger-cause all the variables for at least one panel.

The result in Table 2 further reveals unidirectional relationship running from IMPT and EXR to GEX but directional relationship between IMPT and GEX and between FDI and GEX OIL granger cause NOIL and FDI for at least one country while EXR granger cause OIL and IMPT without feedback effect. There also exists bidirectional relationship between FDI and IMPT. The results also reveal unidirectional relationship running from NOIL to IMPT and no causal relationship between EXR and FDI.

The implication of these results is that there exist inter dependence of the identified variables on others for at least one country. This does not necessarily show the incidence of endogeneity among all the panels. Hence, this study considers the one-way effect of non-oil exports on economic growth among the selected African countries.

VII. Impact of Non-oil Export on Economic Growth in Selected Africa Countries

This section presents the results of panel ARDL also known as non-stationary heterogeneous panel models for the study. The study estimated the impact of non-oil exports on economic growth in selected African countries. Towards this end, the study employed and estimated Dynamic panel data models often referred to as non-stationary heterogeneous panel models. The framework has two estimators, viz: PMG and MG estimators and the justification of which estimator is preferred is done by the application of Hausman test. Table 3 contains the results of Hausman test by comparing the estimates of MG and PMG estimators to know whether the difference in the estimated coefficients between the two techniques employed are systematical or not. The rule of thumb is that if the probability value (chi-square) of the Hausman test is less than 0.05 (at 5% level of significance), the researcher rejects the null hypothesis (H_o: difference in coefficient not systematic) and conclude that the difference in coefficients is systematic and preferably, use MG estimator, otherwise, the researcher preferably, uses PMG estimator. Sigmamore was used in the specification and estimation of the Hausman test because it provides a proper estimate of the contrast variance for the so-called tests of exogeneity and over identification in instrumental variables regression.

Table 3 Hausman Test Results

	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	Mg	Pmg	Difference	S.E.
logePVC	0.090473	-0.37775	0.468225	0.7138492
logeIVC	0.051238	0.07823	0.4341506	0.635
logeOIL	-0.49809	-0.16088	-0.3372189	1.124
logeNOIL	0.428227	0.166109	0.2621184	0.295
logeIMPT	-0.23264	0.871137	-1.103782	0.587
logeFDI	-1.14554	-2.50899	1.363451	2.295
logeEXR	1.387046	1.526274	-0.1392278	1.871

b = consistent under Ho and Ha; obtained from xtpmg
B = inconsistent under Ha, efficient under Ho; obtained from xtpmg
Test: Ho: difference in coefficients not systematic
$chi^2(6)$ = (b-B)'[(V_b-V_B)^(-1)](b-B) = 14.17
Prob>chi^2 = 0.0482
Source: Author's Computation from STATA 14.2 Output

The results in Table 3 showed the chi-square value of 14.17 with its probability value of 0.0482. Since the probability value of 0.0482<0.05 (at 5% level of significance), the null hypothesis that PMG estimator is preferred over the MG estimator is rejected. Following the deductions from the above based on Hausman test results; the study presents the estimates of Mean Group (MG) in examining the impact of non-oil exports on economic growth in selected African Countries. The Mean Group estimator presents the long-run and short-run estimates of the individual countries thereby allowing for heterogeneity of all the parameters without imposing any cross country restriction. Hence, the estimates for each country, averages of the country specific-coefficients that provide consistent estimates of the long-run coefficients are presented in Table 4.

Table4. Long-run Estimates (MG estimator)

Country	LogePVC	logeINV	logeOIL	LogeNOIL	logeIMPT	logeFDI	logeEXR
Algeria	-0.54543	-0.24715	-0.03707	0.094277	0.701274	-1.10558	0.993918
Probability	0.494	0.322	0.891	0.612	0.288	0.562	0.337
Angola	-0.71803	0.557094	-2.06099	1.431699	0.661469	0.092537	0.5005
Probability	0.537	0.553	0.671	0.553	0.256	0.757	0.562
Cameroon	-0.02147	0.323253	0.128964	0.319601	0.069137	0.637264	0.286312
Probability	0.976	0.383	0.194	0.101	0.788	0.553	0.336
Chad	0.526948	-0.07464	-0.03707	0.077545	0.200243	-0.32063	-0.01175
Probability	0.021*	0.335	0.644	0.646	0.255	0.645	0.972
Egypt	0.313741	0.024795	-0.06468	-0.00288	-0.04136	0.315866	-0.14167
Probability	0.000*	0.434	0.081	0.975	0.755	0.058	0.130
Eq. Guinea	-0.51769	-0.00704	0.14744	0.074171	1.164654	-1.27705	0.613744
Probability	0.018*	0.946	0.004*	0.523	0.000*	0.343	0.259
Gabon	0.561654	-0.0607	0.239244	-0.22817	0.207003	-0.76477	-0.19698
Probability	0.009*	0.690	0.396	0.190	0.518	0.674	0.477
Ghana	-1.07813	0.072067	3.32907	1.441512	0.263047	-2.21292	1.437061
Probability	0.670	0.655	0.688	0.662	0.707	0.713	0.593
Libya	-1.79407	2.609979	5.38042	1.378354	-1.37034	-15.329	13.52807

Probability	0.885	0.892	0.890	0.897	0.911	0.898	0.889
Nigeria	0.139512	3.755699	1.094337	0.01884	0.004654	0.296097	0.084951
Probability	0.564	0.152	0.136	0.87	0.971	0.284	0.684
R. Congo	4.21366	-0.78731	3.986154	0.5469	-3.2637	5.552934	-0.61146
Probability	0.929	0.943	0.933	0.926	0.933	0.939	0.914
Sudan	0.004971	-0.01749	0.368364	0.024555	-1.38786	0.36869	0.161856
Probability	0.969	0.837	0.038	0.874	0.306	0.789	0.06

Source: Author's Computation from STATA 14.2 output

Note: Note: The first figure in each cell is the estimated coefficient while the second is its probability value. This study uses 5% level of significance upon which the statistical significance of the estimated variables can be examined. The asterisk (*) denotes rejection of no statistical significance at 5% critical level.

Table 5. Short-run estimates

Country	Ec	llogeGDP	logePVC	logeINV	logeOIL	logeNOIL	logeIMPT	logeFDI	logeEXR	C
Algeria	-0.1664	-0.1598	-0.1178	0.1062	0.0206	-0.0097	-0.0016	0.0304	-0.1503	-1.9836
Probability	0.3440	0.6590	0.3430	0.0960	0.5130	0.4980	0.9820	0.8630	0.0010*	0.3690
Angola	-0.8935	-0.0056	0.0458	-0.0215	0.0844	0.0380	-0.6060	-0.0126	-0.0759	-1.1632
Probability	0.5660	0.9810	0.0130*	0.2140	0.5050	0.4450	0.5700	0.5700	0.3710	0.3340
Cameroon	-0.2016	-0.3906	-0.1052	-0.0753	0.0010	-0.0081	0.0155	-0.1625	0.0001	-3.6157
Probability	0.1250	0.2380	0.3640	0.0780	0.9550	0.8200	0.6590	0.3540	0.9980	0.1770
Chad	-0.9064	-5707702	-0.1289	0.1534	0.1764	-0.0378	-0.3384	-0.2432	-0.1178	1.2166
Probability	0.0020*	0.0200*	0.9560	0.0850	0.0520	0.6600	0.0260*	0.6000	0.1650	0.2210
Egypt	-0.2539	-0.4657	0.0465	-0.0066	0.0115	0.0044	-0.0207	-0.0501	-0.0090	-0.6881
Probability	0.0170*	0.0420*	0.3160	0.4670	0.0750	0.7810	0.4510	0.0080*	0.6770	0.1280
Eq. Guinea	-0.4776	-0.6197	0.1481	-0.1645	0.0389	0.0727	-0.3930	-0.4613	0.0721	-5.1812
Probability	0.0000*	0.0010*	0.4270	0.7240	0.0210*	0.1400	0.0040*	0.3750	0.4320	0.2100
Gabon	-0.4905	-0.6735	-0.0689	0.0050	0.1036	0.0375	-0.0552	0.3758	0.0412	1.3208
Probability	0.0880	0.0110*	0.6370	0.9350	0.5500	0.2990	0.6660	0.5070	0.5050	0.1700
Ghana	-0.0583	-0.5087	0.0215	-0.0040	0.1497	-0.5297	0.0121	0.3379	0.1674	-4.6188
Probability	0.6580	0.0190*	0.3830	0.6170	0.0060*	0.1590	0.6340	0.0050	0.6950	0.2260
Libya	-0.0348	0.7498	0.0014	-0.3801	0.5037	0.0812	0.5767	0.0218	-0.3075	2.6477
Probability	0.8890	0.0010*	0.9860	0.7810	0.0000*	0.2520	0.0690	0.9590	0.6560	0.2620
Nigeria	-0.4407	-0.3149	0.0080	46.1926	0.2187	0.0013	-0.0657	-0.2197	-0.0545	-45.5743
Probability	0.0530	0.3290	0.9280	0.0530	0.3100	0.9710	0.1630	0.2090	0.3470	0.2980
R. Congo	-0.0152	-0.2683	-0.2325	-0.0395	0.0886	0.0085	0.0720	-0.0509	-0.0884	17.5833
Probability	0.9320	0.2990	0.6630	0.3570	0.4090	0.6910	0.1930	0.7970	0.6270	0.2550
Sudan	-0.4782	-0.7732	-0.3761	0.2554	0.4530	0.0229	0.0192	-0.3161	-0.1331	-14.2420
Probability	0.2410	0.0310*	0.1340	0.1730	0.1230	0.6590	0.9580	0.6480	0.5860	0.0200*

Source: Authors' Computation from STATA 14.2 output
Note: Note: The first figure in each cell is the estimated coefficient while the second is its probability value. This study uses 5% level of significance upon which the statistical significance of the estimated variables can be examined. The asterisk (*) denotes rejection of no statistical significance at 5% critical level.

The study found that non-oil exports have positive relationship with economic growth in all the countries except Gabon in the long-run. The estimated coefficients are however not statistically significant at 5% level of significance. The negative influence of non oil on economic growth in Gabon is attributed to

limited expansion of the secondary and tertiary sectors impacted by the decline in public expenditure (World Bank Group 2017). Also, the poor quality of Gabon's business climate is a major barrier to diversification or low performance of the non-oil sector of its economy. Gabon is ranked 167 out 190 countries in the 2018 doing business report. This implies that increase in non-oil exports do not contribute significantly to the growth of Algeria, Angola, Cameroon, Chad, Egypt, Equatorial Guinea, Ghana, Libya, Nigeria, Republic of Congo and Sudan. This study findings is consistent with the findings of Onodugo and Anowor (2016), Adel (2015), Ezike and Ogege (2012), Adesoji and Sotubo (2013) and Mehrara, Musai and Nasibparast (2012) who found positive but weak or insignificant long-run relationship of non-oil exports and economic growth.

The study also found that there is positive impact of non-oil exports on economic growth in Angola, Egypt, Equatorial Guinea, Gabon, Libya, Nigeria, Republic of Congo and Sudan in the short-run while there is negative influence in Algeria, Cameroun, Chad and Ghana in the short-run. The relationship was not statistically significant in any of these countries. This result is similar with the findings of Mehrara, Musai and Nasibparast (2012) who found positive but statistically insignificant short-run impact of non-oil exports on economic growth. This is attributed to the low performance of the non-oil sector and the nature of the non-oil exports that are often less competitive at the international market, implying that, selected African countries often use traditional system where agricultural production and even extractions have been crude in nature.

The relationship of oil export and economic growth is significant in Equatorial Guinea, Ghana and Libya in the short-run. However, the study revealed a positive but not significant influence of oil exports in Cameroun, Equatorial Guinea, Gabon, Ghana, Libya, Nigeria Republic of Congo and Sudan in the long-run and a negative influence in Algeria, Angola, Chad and Egypt in the long run. This study finding is similar with that of Esfahani, Mohaddes and Pesaran (2012) who suggested that oil has not contributed positively to long-run economic performance of oil-exporting countries. This implies that oil export is also beneficial to the selected African counties but the sector suffers shocks from changes in international oil price. That is, even though oil export is still a main driver of economic activities in most of these selected African oil-exporting countries, any change in oil prices has a drastic effect on their economic performance. This is because, while oil exporting developed countries all have some type of oil reserve funds (Buffers) to stabilize their economies, most oil-exporting developing countries still face this important challenge which can be attributed to in effective buffers to mitigate against the impact of oil price shocks.

This study reveals positive influence of exchange rate on the growth of selected African countries such as Algeria Angola, Cameroun, Equatorial Guinea, Ghana, Libya, Nigeria and Sudan in the long run. This implies that the countries recorded more value of imports than the value of exports leaving adverse effect and downward pressure on the country's currencies that often leads to devaluation of the currencies, hence, making the prices of imported goods and services to be high. This can be evidence by the high average exchange rate of Selected African countries to US dollar. However, Chad, Egypt, Gabon and Republic of Congo have a negative influence of exchange rate on the growth of their economies, though not statically significant at 5%.

Furthermore, the study revealed a positive influence of imports on economic growth on the economies of Algeria, Angola, Cameroun, Chad, Equatorial Guinea, Gabon, Ghana and Nigeria in the long run. And a negative influence of imports on the economies of Egypt, Libya, Republic of Congo and Sudan in the long-run. This study finding is similar with that of Mohammed (2017) who suggested that exports and imports promote economic growth in Panama.

The study also reveals a positive influence of foreign direct investment on economic growth on the economies of Angola, Cameroun, Egypt, Nigeria, Republic of Congo and Sudan in the long-run even the statistically it was insignificant at 5%. This conforms with the study of Kolawole and Okodua (2010) which suggests that foreign direct investment leads to economic growth in Nigeria. However, Algeria, Chad, Equatorial Guinea, Gabon, Ghana, and Libya recorded a negative influence of foreign direct investment on economic in their respective economies in the long-run though statiscally insignificant at 5%.

Similarly, Gross Fixed Capital Formation (INV) recorded positive influence on economic growth in the long-run on the economies of Angola, Cameroun, Egypt, Ghana, Libya and Nigeria in the long-run and a negative influence on economic growth on the economies of Algeria, Chad, Equatorial Guinea, Gabon, Congo and Sudan in the long-run but were insignificant at 5% level of significance. The study further revealed a positive relationship between Private Consumption Expenditure (PVC) and economic growth on the economies of Chad, Egypt, Gabon, Nigeria, Republic of Congo and Sudan while Algeria, Angola, Equatorial Guinea, Ghana and Libya recorded a negative influence of PVC on economic growth in the long-run respectively.

VIII. Conclusion and Policy Recommendations

Emergent from the foregoing it is concluded from the findings of the study that non-oil exports have positive influence on economic growth in most selected African countries, although not significant. This is because, the selected African countries have common characteristics of traditional system where agricultural production and even extractions have been crude in nature, and the consumer demand has been import dependent as well as monolithic exports. Due to the fact that, these oil exports have always been affected by external shocks of global oil price decline, there is need to compliment the oil exports and non-oil exports. The study therefore concludes that non-oil exports can contribute significantly to the growth of selected African countries.

The study therefore, recommends that the African oil producing countries and oil producing countries generally should improve their production and exports of non-oil products relatively more than imports of these products. The products should also have international standard that could stand competitive at the world market. This would help to increase foreign earnings that could contribute positively to economic growth in one way, absorb the oil price shocks and create domestic jobs for the economy in another way.

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Study of Comparative Evaluation of Atorvastatin and Salicinol (Salacia Roxburghii) on GFR and Carotid Intima Media Thickness in Diabetic and Nondiabetic CKD Patients with Hypertension

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Abstract- **Background:** Most of the newer concepts in Nephrology developed in the 19th and 20th century. Progression of renal failure is an area of Nephrology where our understanding has improved appreciably in the last century but still our knowledge is like a drop in ocean. We have ample of evidence that progression of renal failure can be slowed down but we still need more definite information whether established renal failure can be reversed. This pilot clinical study was planned to explore the therapeutic potential of salicinol in retardation of chronic kidney disease progression and anti-atherosclerotic property by looking for if reduction in CIMT is possible.

OBJECTIVES: To study of comparative evaluation of atorvastatin and salicinol (salacia roxburghii) on GFR and CIMT in diabetic and nondiabetic CKD patients with hypertension

METHODS: The present study was conducted in the Department of Medicine, Institute of Medical Sciences, Banaras Hindu University, Varanasi. Eighty patients of mild to moderate stable chronic renal failure with hypertension attending Nephrology OPD or admitted in Nephrology ward from May 2014 to June 2015 were included in the study. Patient with acute MI, congestive heart failure, unstable angina, myopathy. Subsequently patients were allocated to one of the two groups, the first group consisted of Diabetic patient treated with atorvastatin salicinol and second group was of nondiabetic treated patients.

RESULTS: Among total patients included in the study 35 were non diabetic and 45 were diabetic.

Mean serum creatinine at baseline study in diabetic & non-diabetic group were 4.3±2.0 & 5.0±1.6 & changes were statistically significant intra group. Mean CIMT in diabetic and non-diabetic at baseline were 0.92±0.07 and 0.90±0.07 and when comparing both changes were statistically significant at three month and six months suggesting CIMT regression more in diabetic group compared to non-diabetic. Mean GFR in diabetic and non-diabetic group at baseline were 23.4±15.6 and 17.8±13.7. On intergroup comparison changes were statistically significant at three month and at six month.

CONCLUSION: The male to female ratio was 2:1. Age of the patient ranged from 20yrs onward. No significant effect of the drug was seen on 24hrs urinary protein, blood pressure, hemoglobin & GFR. On comparison of non-diabetic and diabetic significant decrease (<0.05) in GFR were observed at the end of study. On comparison of non-diabetic and diabetic highly significant decrease (<0.001) in CIMT were observed at three months and at the end of study

I. Introduction

Hippocrates in 5th century B.C blamed malfunctioning kidney tor certain signs and symptoms. He commented that suppression of urine was a sign and could be followed by smell of urine in the breath, coma and convulsions since then our understanding of nephrology has had revolutionary changes. Most of the newer concepts in Nephrology developed in the 19th and 20th century. At the beginning of this century even the term Nephrology did not exist.

No one could foresee the introduction of medication such as diuretics. Antihypertensive agents and immunosuppressive drugs that have brought a scientific revolution in the treatment ol renal diseases. These considerations make one humble and one wonders whether our current management of renal disease will look any better to future Nephrologists at the end of the next century. Progression of renal failure is an area of Nephrology where our understanding has improved appreciably in the last century but still our knowledge is like a drop in ocean.

We have ample of evidence that progression of renal failure can be slowed down but we still need more definite information whether established renal failure can be reversed. Retarding the progression of renal failure is one of the most important task for the nephrologists as it not only improves the quality of life of the patient but also delays the development of end stage renal disease, This also forestalls the considerable financial burden of dialysis, transplantation and immunosuppressive drugs. Progression of renal failure cannot only viewed as scientific or medical problem and patients cannot be viewed as merely an organism with an increasingly less efficient excretory apparatus, Dealing with such patients needs compassionate attention by empathetic physician All possible areas shall be explored, where one can see even a slightest ray of hope new drugs for retardation or reversing the progression of renal failure of It is with this motive that we looked towards traditional medicines, which have followers of allopathic system mostly received step motherly treatment from the of medicine.

This pilot clinical study was planned to explore the therapeutic potential of salicinol in retardation of chronic kidney disease progression and anti-atherosclerotic property by looking for if reduction in CIMT is possible.

In various experimental and clinical studies it has been demonstrated that salacia species containing salicinol has shown anti-inflammatory, Anti proteinuric and Hypolipidemic action with improvement in endothelial dysfunction. With these property the anti-inflammatory anti proteinuric and anti-atherosclerotic property of salicinol along with Adiponectin enhancing potential of salicinol has been evaluated in the present clinical trial.

The antidiabetic property of salacia species has been recognized since ancient time. The Ayurvedic practitioners of south India particularly Tamil Nadu and Kerala are using this plant for the treatment of diabetic complications like peripheral neuritis, diabetic gangrene.

The scientific evaluation on salacia species was conducted at BHU by Dubey et al (1993) and reported its antidiabetic property and its role in diabetic complications (Dubey 1994, Wani 2006, Singh 2007, Sharma 2007, Rajesh 2009).

The findings were confirmed in collaborative studies in 2005. The antidiabetic and anti-inflammatory activity of salacia was studied by Syed Ismail and Elango (1997) at the Tamil Nadu University. The aldose reductase and a- glucosidase inhibitory property were reported by Patricia et al (2005) and Yuhao Li (2004). But no worker could study the role of salacia species in the prevention and management of micro vascular complication in diabetes cases. Since it is an Indian Plant it was decided te evaluate other dimensions of salacia particularly in the management of microvascular complication including antidiabetic antiatherogenic, antioxidant and anti-inflammatory properties. The pre-clinical and clinical studies were carried out with the view to prove the anti atherogenic hypolipedemic and anti-obesity properties of salacia species. Antioxidant properties were also determined

II. MATERIAL AND METHODS

The present study was conducted in the Department of Nephrology, Institute of Medical Sciences, Banaras Hindu University, Varanasi. Eighty patients of mild to moderate stable chronic renal failure with hypertension attending Nephrology OPD or admitted in Nephrology ward from May 2011 to June 2012 were included in the study. Patient with acute MI, congestive heart failure, unstable angina, myopathy. Non-compliant patient & those patient taking medicines for their disease which is known to improve lipid profile (lipid lowering agent other than atorvastatin) were excluded from the study.

Initially patients were explained in detail about the experimental nature of the drugs and plan of study and only willing patient were included in the study after signing of the written consent. Before starting the drugs a through history was taken and clinical examination was done.

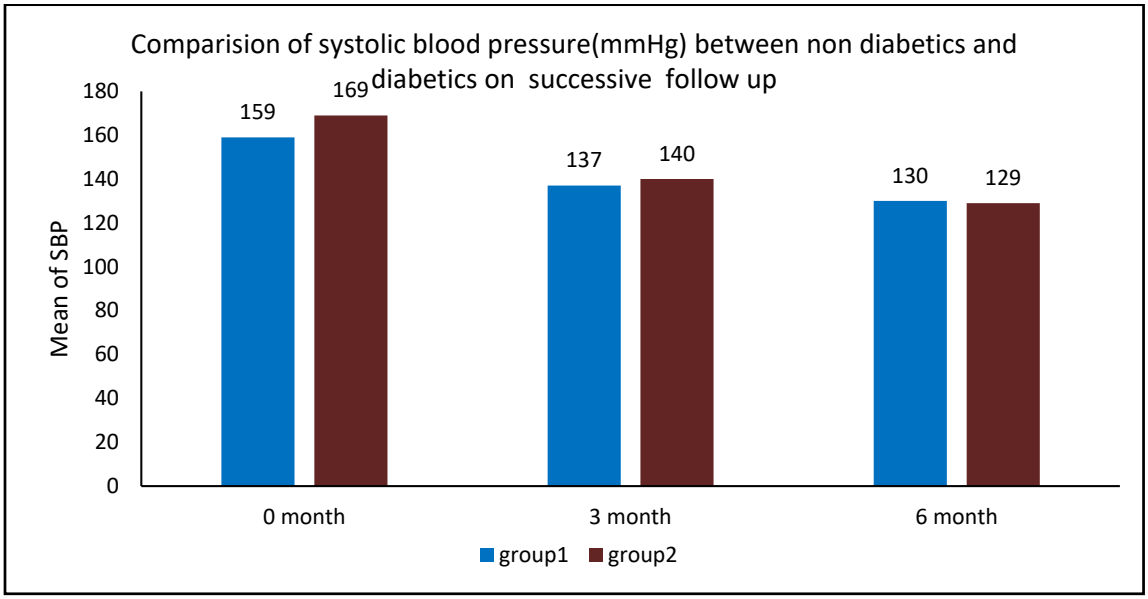
III. OBSERVATIONS

COMPARISON BETWEEN DIABETIC AND NON-DIABETIC (INTER GROUPS AND INTRA GROUPS)

Among total pt. included in the study 35 were non-diabetic and rest 45 were diabetic.

TABLE 1: Comparison of Systolic Blood pressure between groups and within group on successive follow up

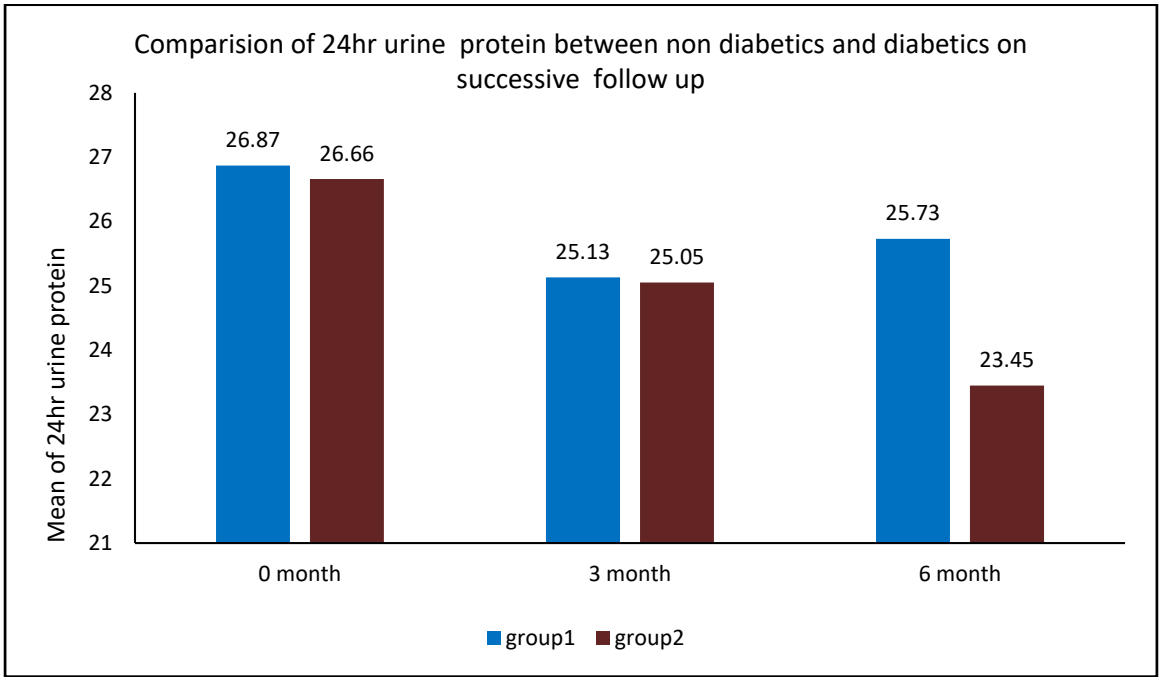
Group	**Systolic Blood pressure (Mean+-SD)**			**Within the group comparison paired 't' test**	
	0 month	**3 month**	**6 month**	**0 vs 3**	**0 vs 6**
Non Diabetic	159±18	137±8	130±6	11.160 P<0.001	9.430 P<0.001
Diabetic	169±19	140±8	129±5	15.395 P<0.001	16.375 P<0.001
t-value	-2.264	-1.589	0.067	-	-
p-value	0.026	0.116	0.947		

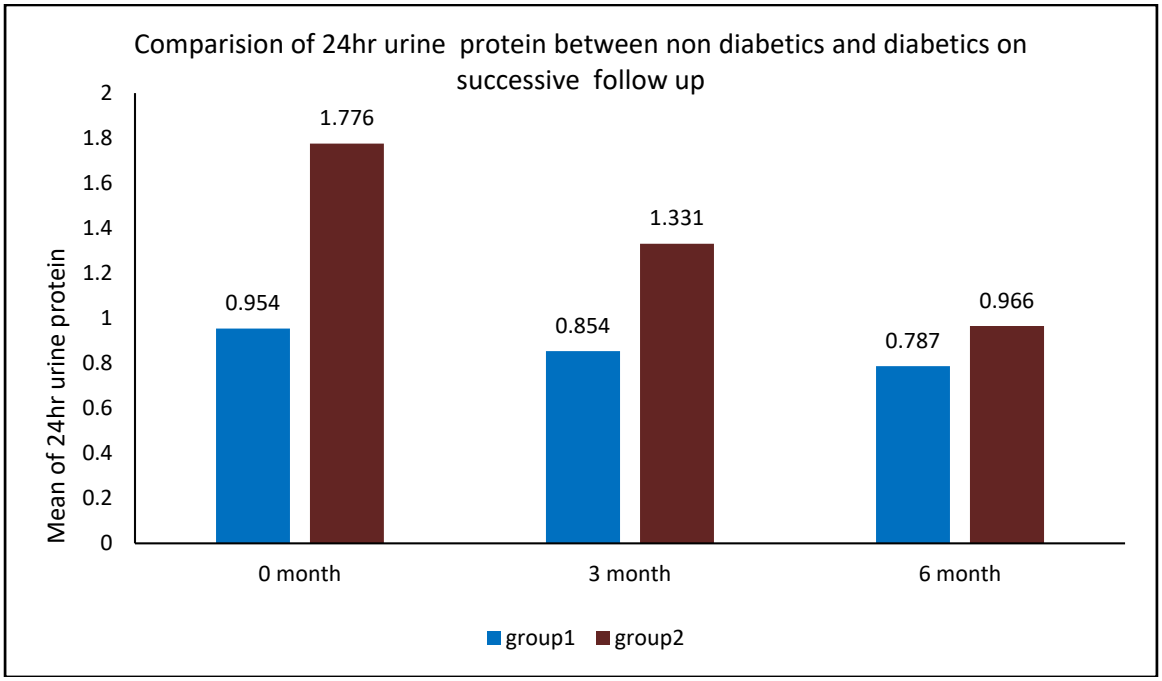


Mean Systolic blood pressure & diastolic blood pressure in non-diabetic at baseline was 159±18 & 96±8 while in diabetic baseline SBP and DBP in 169±19 & 97±9 SBP & DBP changes on subsequent visit were statistically significant.

Table 3: Comparison of 24hr urine protein between groups and within group on successive follow up

Group	**24hr urine protein(Mean+-SD)**			**Within the group comparison paired 't' test**	
	0 month	**3 month**	**6 month**	**0 vs 3**	**0 vs 6**
Non diabetic	0.954±1.101	0.854±0.882	0.787±0.818	1.548 P=0.133	1.639 P=0.110
diabetic	1.776±1.446	0.966±0.990	0.966±0.686	3.316 P<0.001	5.199 P<0.001
t-value	-2.780	-2.231	-1.058	-	-
p-value	0.007	0.029	0.293		





Mean 24 hrs. urinary protein in non-diabetic & diabetic at baseline were 0.954±1.101 & 1.776±1.446 & were statistically significant on subsequent visit in diabetic group. On intergroup comparision, no statistically significant changes were found at the end of study.

Table 4: Comparison of Creatinine between groups and within group on successive follow up

Group	**Creatinine (Mean+SD)**			**Within the group comparison paired 't' test**	
	0 month	**3 month**	**6 month**	**0 vs 3**	**0 vs 6**
Non diabetic	5.0±1.6	5.6±1.7	6.2±2.1	-1.572 P=0.125	-2.998 P=0.005

diabetic	4.3±2.0	3.51±0.47	2.68±0.51	-2.736 P=0.009	-3.240 P=0.002
t-value	1.546	1.463	1.942	-	-
p-value	0.126	0.148	0.058		

Mean serum creatininine at baseline study were 5.0±1.6 & 4.4±2.0 in non-diabetic & diabetic group respectively. Changes werestatistically significant at 6 months in non-diabetic group while at 3 & 6 months in diabetic group. On intergroup comparison, no statistically significant changes were found.

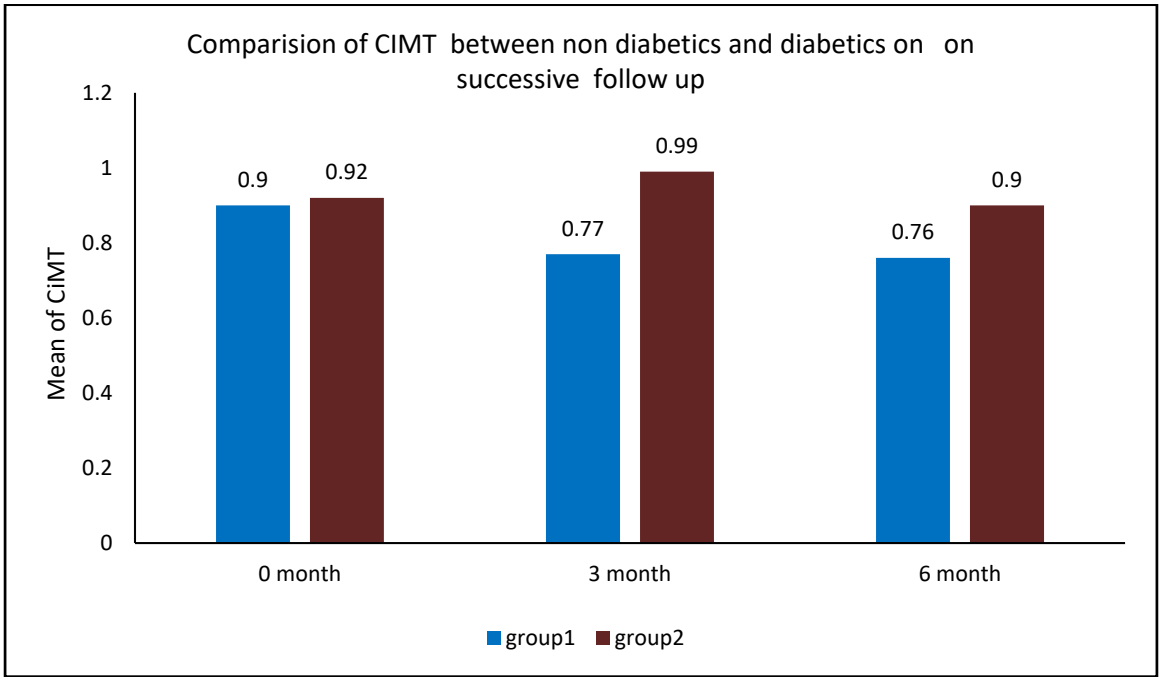
Table 24: Comparison of CIMT between groups and within group on successive follow

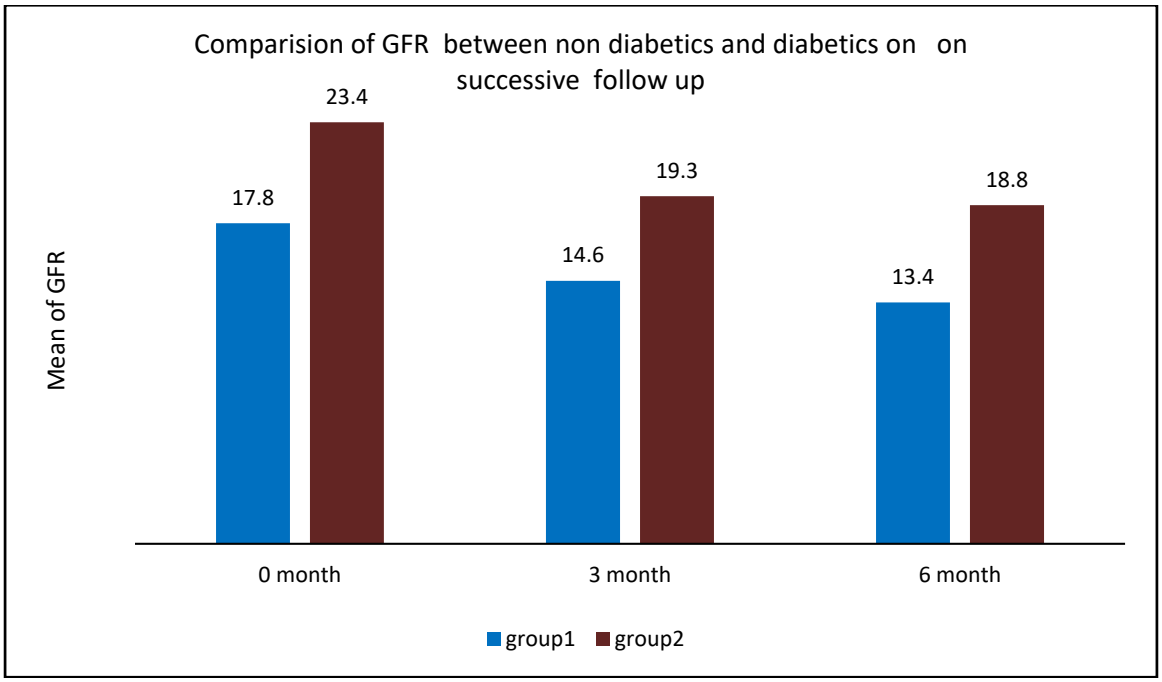
Group	**cimt (Mean+SD)**			**Within the group comparison paired 't' test**	
	0 month	**3 month**	**6 month**	**0 vs 3**	**0 vs 6**
Non-diabetic	0.90±0.07	0.77±0.06	0.76.±0.06	7.965 P<0.001	8.158 P<0.001
diabetic	0.92±0.07	0.99±0.13	0.90±0.11	-3.095 P=0.003	.707 P=0.483
t-value	-1.044	-8.854	-6.824	-	-
p-value	0.300	<0.001	<0.001		

Mean CIMT in non-diabetic & diabetic at baseline was 0.90±0.07 & 0.92±0.07 and it was statistically significant on subsequent visit in non-diabetic, while on inter group comparison CIMT changes were statistically significant at 3 and 6 months.

Table 25: Comparison of GFR between groups and within group on successive follow up

Group	**GFR (Mean+SD)**			**Within the group comparison paired 't' test**	
	0 month	**3 month**	**6 month**	**0 vs 3**	**0 vs 6**
Non-diabetic	17.8±13.7	14.6±7.9	13.4.±7.4	1.333 P=0.191	1.728 P=0.093
diabetic	23.4±15.6	19.3±11.4	18.8±11.0	3.748 P<0.001	3.684 P<0.001
t-value	-1.657	-2.059	-2.483	-	-
p-value	0.102	0.043	0.015		





Mean GFR at baseline in non-diabetic & diabetic were 17.8±13.7 & 23.4±15.6 & was statistically significant at 3 and 6 months in diabetic and on intergroup comparison statistically significant changes found at three and six months.

Discussion

Due to rapid urbanization and industrialization, the incidence of diseases particularly Diabetes mellitus, Hypertension and CHD are increasing worldwide at an alarming rate. Due to remarkable risk profile of modern synthetic agents there is an urgent need to develop eco-friendly and bio-friendly plant-based products to replace synthetic chemicals since chronic disease is a lifelong process. India has a rich national heritage in the form of plant based remedies. These plants have shown pharmacological therapeutic potentials in the prevention and managements of various mental and physical diseases. It is pertinent to mention here that we have extensive experience based knowledge but we are lacking with evidence based scientific documentation required for global acceptance of these natural products. Recently World Health Organization has provided guidelines for validation of these plant origin products for its global acceptance.

There is an urgent need to focus new concepts and targets for the managements of chronic diseases. As in the present investigation, we are concentrating on the treatment modalities for

chronic kidney disease with hypertension with abnormal lipid profile.

Among 95 patients of chronic renal failure taken for study, Eighty patient of chronic renal failure with hypertension completed the six months follow-up and were finally included in the study. Group-I consisted of forty patients treated with Salicinol and Atorvastatin, Group-II consisted of forty patients treated with Atorvastatin only.

Age of patient ranged from 20 years onwards. Mean age of patient in various group were well matched & there was no significant statistical differences. Mean age of group-I was 53.9 yrs & Mean age of Group-II was 51.75

There was male preponderance in our patient. Overall 65% patients were male & 35% were female. In Group-1 623% patient were male while in Group-II 67.5% were male. The male predominance in our patient is probably a reflection of male dominance in the social structure of our society. We have a society where male children are more cared for and adult male is the bread earner of the family. So. probably male patient are brought for the treatment to the hospital more frequently.

On comparison of SBP & DBP in non-diabetic & diabetic group changes were not significant at the end of study.

on comparison of 24hrs urinary protein value changes In diabetic & non-diabetic were found to be insignificant at the end of study. Mean serum creatinine at baseline study in diabetic & non-diabetic group were 4.3±2.0 & 5.0±1.6 & changes were statistically significant intra group, but on intergroup comparison changes were insignificant suggesting probably no specific role of salicinol in diabetic group as for as renal impairment progression is related.

Mean CIMT in diabetic and non-diabetic at baseline were 0.92±0.07 and 0.90±0.07 and when comparing both changes were statistically significant at three month and six months suggesting CIMT regression more in diabetic group compared to non-diabetic.

Mean GFR in diabetic and non-diabetic group at baseline were 23.4±15.6 and 17.8±13.7. On intergroup comparison changes were statistically significant at three month and at six month.

Thus the beneficial effect of salicinol was observed and for further substantiating the finding by prospective study is recommended.

IV. Summary and Conclusion

Present study entitled "Study of Comparative evaluation of atorvastatin and salicinol (salacia Roxburghii) on GFR and carotid intima media thickness in patient of chronic kidney disease with hypertension" was conducted at the Department of Nephrology, Institute of Medical Sciences, Banaras Hindu University, Varanasi between the period of May 2011 to June 2012.

Eighty patient of mild to moderate chronic renal failure were included in the study. Forty patient, each were randomized to two groups. Group-I were on Atorvastatin & Salicinol while Group-II were kept on Atorvastatin only. The salient features of this study are :

1. The male patients dominated over the female patients with a male to female ratio of 2:1.

2. Age of the patient ranged from 20yrs onward. Majority of the patient were above 40yrs of age.

3. Commonest symptom was weakness in all the groups followed by anorexia, swelling over body, pallor & sleep disorders.

4. No significant effect of the drug was seen on 24hrs urinary protein, blood pressure, hemoglobin & GFR.

10. On comparison of non-diabetic and diabetic significant decrease (<0.05) in GFR were observed at the end of study.

11. On comparison of non-diabetic and diabetic highly significant decrease (<0.001) in CIMT were observed at three months and at the end of study.

Thus on overall favorable effect of salicinol was seen with respect to decrease in serum creatinine & carotid intima media thickness. However in this study the follow-up period was only six months which is relatively a short period to assess the effect of salicinol on GFR & CIMT which has a natural course running into years, A large prospective study is recommended to further establish the findings of this study.

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Study of Compliance of Diabetic Patients to Prescribed Medication

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***Abstract*- Introduction:** The important determinant of treatment success is adherence to recommended medication and it is one of the factors which plays a major role between process of disease and its prognosis. Compliance of patients depends on many factors such as resource limitations, cost of the treatments, patient's beliefs.Diabetes mellitus is a metabolic disorder. There are two types which are type 1 diabetes and type 2 diabetes.In patients with diabetes, non-adherence can lead to many serious complications. Primary goal in management of diabetes is to keep the blood glucose levels stable. Majority of diabetic patients are ineffectual in controlling their blood glucose levels with modifications in diet ,exercise and required medication. The aim of this study was to assess the compliance of diabetic patients to prescribed clinical regimen and factors affecting it.

Material and methods: **Study design** Descriptive cross-sectional study method. **Setting**: It was conducted in hospitals of Faisalabad. **Duration of study**: 6 months; From Jan 2018- June 2018. **Sample size**: 60 diabetic patients. **Sample technique**: random sampling. **Sample selection:** We included diabetic patients of all ages and excluded non-diabetic patients. **Data collection procedure**: provided well-structured close ended questionnaire to diabetic patients. **Data analysis**: SPSS version 20.

Results: According to research, 60% of patients were compliant to medication while 40% of patients were not adherent. 38% people abstain from medicine when they started feeling better. People related to lower socio-economic status were more non-compliant (21.7%). Significant association was found between knowledge of patient about medicine and compliance to medication (p-value0.03).

Conclusion: Compliance to medication is an important factor in managing the diabetes. Several factors affect the medical adherence including socio-economic status, treatment regimen complexity and knowledge of patient about disease and medication.

Index Terms- non-adherence, diabetes mellitus, compliance, factors of compliance.

I. Introduction

The important determinant of treatment success is adherence to recommended medication. According to WHO, medical adherence is defined as "the degree to which the person's behaviour corresponds with the agreed recommendations from a health care provider". Compliance to treatment is one of the factors which plays a major role between process of disease and its prognosis [1]. Poor compliance to prescribed medication can result in further deterioration of health. Compliance of patients depends on many factors such as resource limitations, cost of the treatments, patients beliefs and expectations that prevent person to follow prescribed medication [2].

Compliance can be divided into two types; When the medication is not available to patient then it is called primary non-compliance and when the medication is not taken as prescribed, by the patients then it is called secondary non-compliance. It can be further divided as intentional and unintentional non-compliance. If diagnosis and treatment of a doctor is rejected by patient then it is called intentional non-compliance and factors like social, demographic, psychological and unawareness to medication can lead to unintentional non-compliance [3].

Diabetes mellitus is a chronic disorder which is metabolic in nature and can result either from decrease in insulin production in body which is Type 1 diabetes or due to increase in insulin resistance which is called Type 2 diabetes. It is a condition which adversely affects quality of life and managing this condition is a complicated task. Diabetes mellitus occurs throughout the world but greatest increase in prevalence occurs in third world countries. According to recent research , 451 million adults have diabetes mellitus [4]. The prevalence of diabetes mellitus type 2 in Pakistan in 2016 was 11.77% [5]. Moreover, in Pakistan the prevalence of diabetes mellitus is very high and estimated to reach 15% (14 million) by 2030[6].

Non-adherence to treatment is a serious problem in patients with chronic diseases like diabetes and adherence to medication is poor in such patients regardless of how much information was given to them about importance of treatment [7.] Prevalence of adherence to diabetes treatment is reported to range from 23% to 77%[8] . According to one research conducted in Pakistan, 35% of patients were found to be non-compliant and 20% were compliant [9]. It is also found in another research that rate of non-adherence in patients with poor knowledge of diabetes is 47% while it is much less (7.8%) in patients who have good knowledge about diabetes [10]. Such minimum adherence in patients can result in poor health outcomes and it also has a notable effect on health care costs[11] like increase costs of outpatient care , ER visits, hospitalization and managing the diabetic complications.

One of the pitfalls of non-adherence in a diabetic patient is that it doubles the risk of hospitalization. Despite the fact that diabetes is manageable and reversible with appropriate management, patients frequently do not comply with recommended treatment. To keep the blood glucose levels stable

and at normal levels is the primary and main goal in management of diabetes, in-order to can prevent or delay other medical hazards that can happen secondary to diabetes. Chances of occurrence of grave complications of diabetes are much less in people who keep their blood sugar levels well-controlled. Poor medication compliance is considerably associated with poor glycemic control. Majority of diabetic patients are ineffectual in controlling blood sugar levels with modifications in diet, exercise and required medication. Pharmacotherapy includes oral hypoglycaemic agents, injectable insulin formulations and combination therapy. Chronic poor glycemic control can lead to high rates of morbidity, mortality and compliance is a key factor regarding this [12] .

Complications of diabetes are retinopathy, neuropathy, heart diseases, diabetic foot, kidney failure etc. These complications can prove fatal in non treated person making diabetes the 8th leading cause of death in the world [12].

Objectives:

1) To assess the compliance of diabetic patients to clinical regimen

2) To scrutinise the factors resulting in non-compliance in diabetic patients.

Operational definition:

Compliance is defined as engaging in a response that matches the delivered instructions within 'x' seconds from the time instruction was given and completing request.

II. Material and Methods

i) Study design:
Descriptive cross-sectional study method.
ii) Setting:
It was conducted in hospitals of Faisalabad.
iii) Duration of study:
Duration of this study was 6 months; From Jan 2018- June 2018.
iv) Sample size:
60 diabetic patients.
v) Sample technique:
It was a random sampling
vi) Sample selection:
We included diabetic patients of all ages.
We excluded non-diabetic patients.

Data collection procedure:

We provided well-structured close ended questionnaire to diabetic patients and data was collected.

Data analysis:

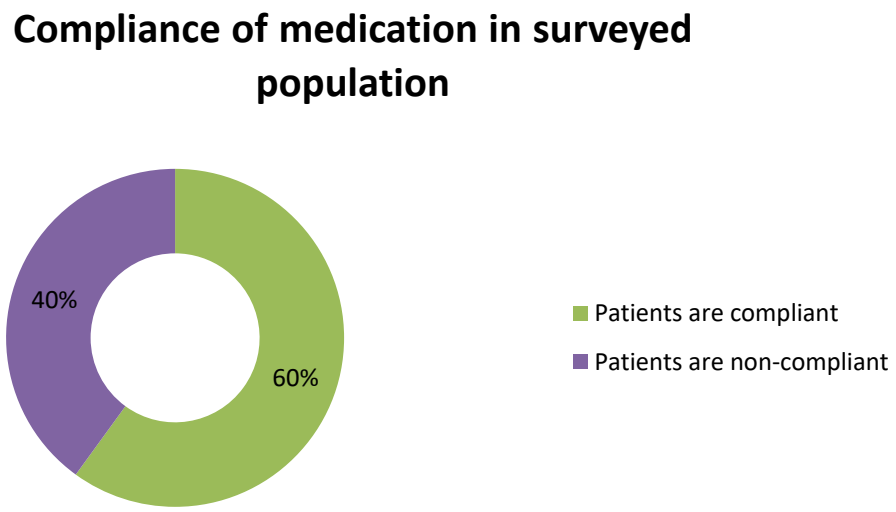
We analysed our results through SPSS version 20.

III. Results

Different factors including age, sex, education , socio-economic status, duration of diabetes, disease and medicine related knowledge were associated with medication adherence.

According to research, 60% of patients were compliant to medication while 40% of patients were non-compliant, out of which 25% skip their medicine 1-2 times a week. Modifications in dosage of drug were done by 33% patients. It is found that 38% people abstain from medicine when they started feeling better. Some patients stop taking medicines because they felt that medicine was not effective or it was expensive. Patients who take medicine more than 3 times a day or take both oral and injectable forms are found to be non-compliant because of complexity of regimen. People belonging to lower socio-economic status were found to be more non-compliant (21.7%) as compared to higher socio-economic status(1.7%). Another factor associated with non-adherence is knowledge about diabetes and medicine which 68% of patients do not have and it is based on information given by physicians to patients about disease and medicine(66% of patients were not given any information). Non-compliance was found in old, uneducated, poor people who were ignorant of benefit of medication and complications of diabetes.

Figure1:



This illustrates that 40% of people do not take medicine at recommended time while 60% of patients are compliant to medication.

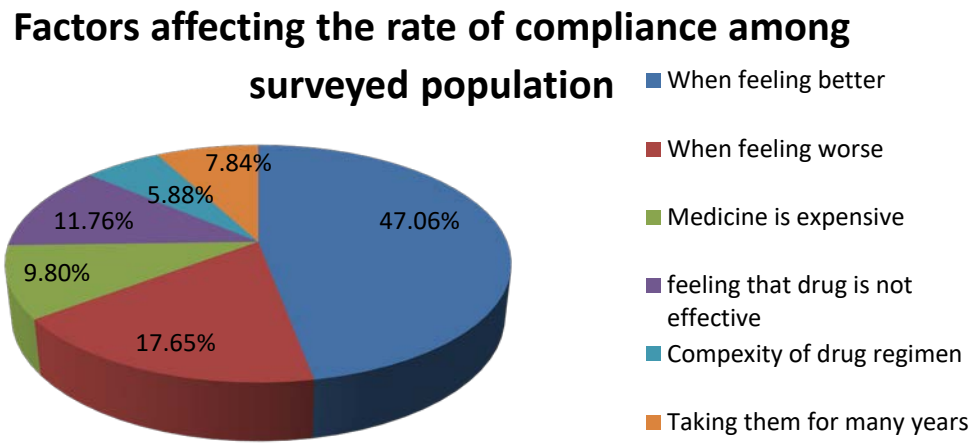


Figure2:

This shows that one of main reason for noncompliance in patients is when they start feeling better(47%) Other reasons are complexity of regimen(5.8%)medicine is expensive(9.8%), feeling that drug is not effective(11.7%) or they are taking them for a long time(7.8%).

Figure 3: Relation between compliance of medication and knowledge about Medicine among surveyed population

This illustrates that people with good knowledge about importance of treatment take their medicine at appropriate time while people with no knowledge about importance of medication do not comply to treatment.

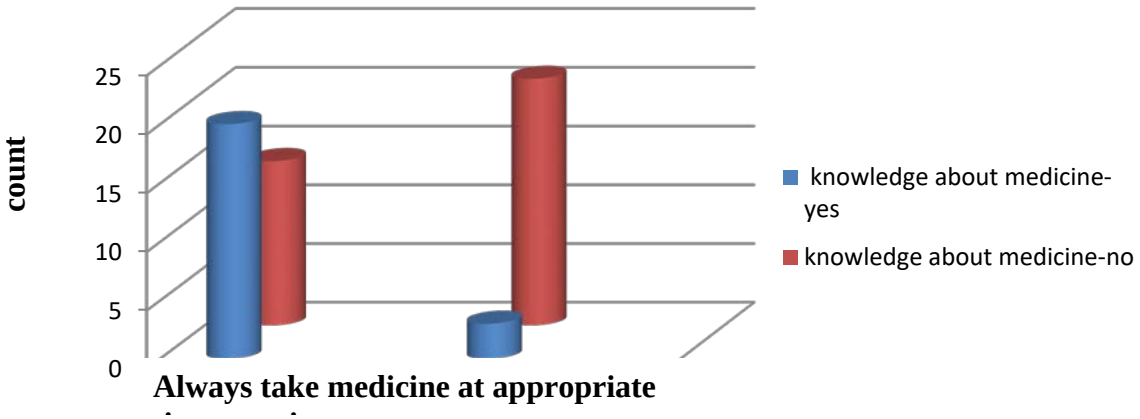
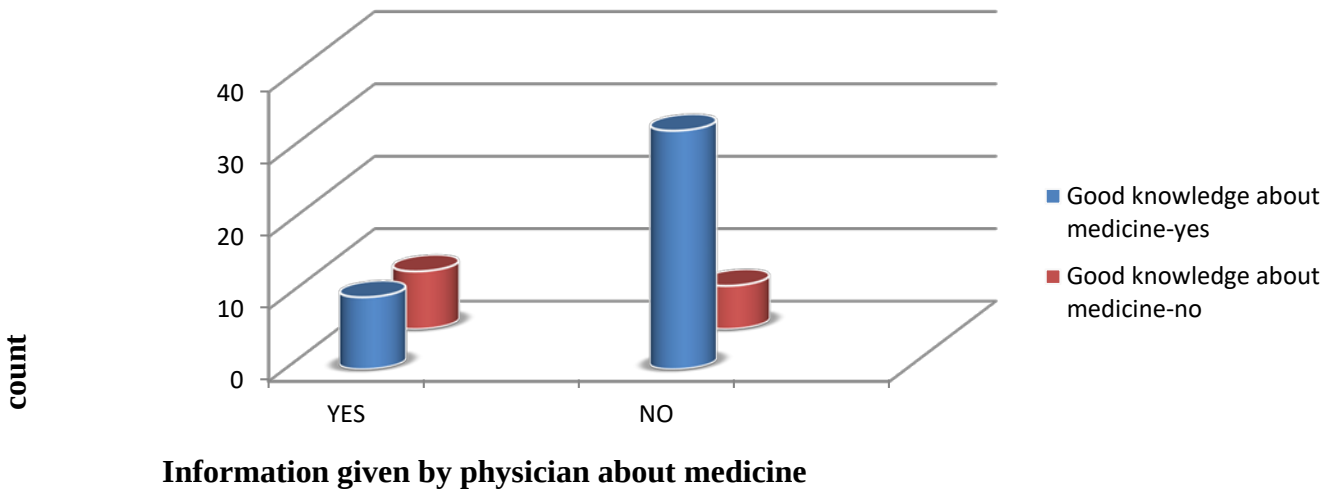
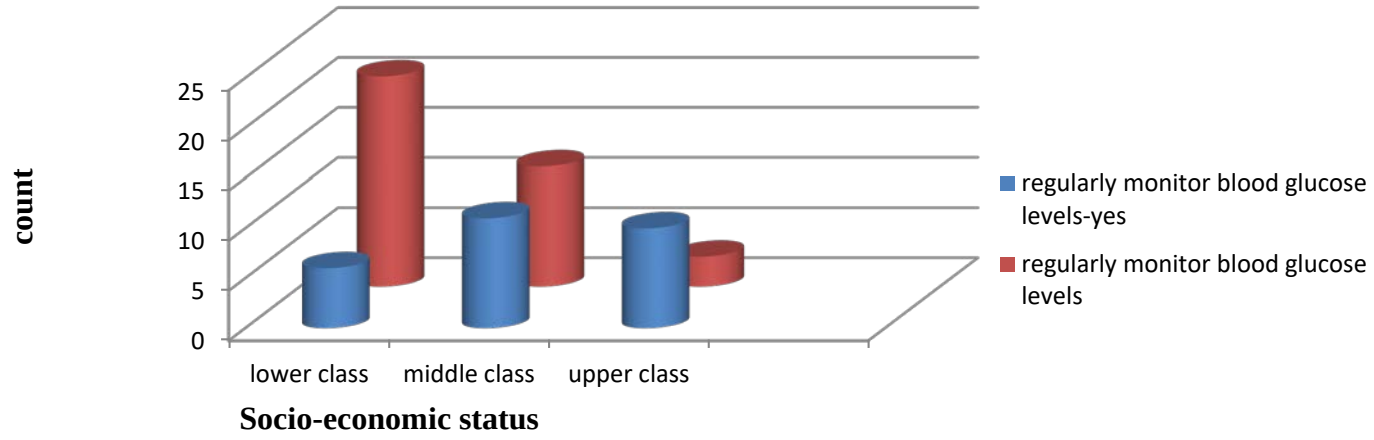


Figure 4: Relation between information given by physician and knowledge about medicine among surveyed population



This figure shows that patient's knowledge of their disease and medication depends on information given to them by physicians. If information is given by physicians then patients have knowledge about medication and they show compliance while on the other hand people have no knowledge if they are not provided any information and guidance.

Figure 5: Relation between socio-economic status of surveyed population and ability to regularly monitor blood glucose levels



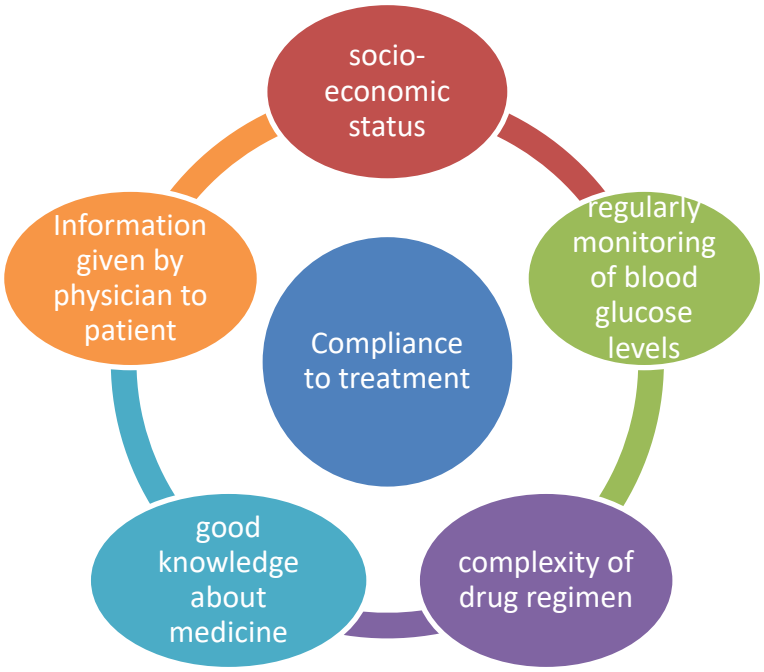
This illustrates that people belonging to lower socio-economic status do not regularly monitor their blood glucose levels while people with higher socio-economic status do monitor their blood glucose level

Figure 6:

Factors	p-value
Good knowledge about medicine* always take medicine at appropriate time	0.03
Information given by physician about medicine* good knowledge about medicine	0.00
Socio-economic status* information given by physician about medicine	0.04
Socio-economic status* regularly monitoring of blood glucose	0.001

This figure shows that there is significant association between compliance of patients to treatment and patient's knowledge about medicine.. Good knowledge of patients about medicine is also associated with the information given by physician. Socio-economic status is also found to be significantly associated with information given by physician and ability of patients to regularly monitor their blood glucose levels.

Figure 7: Interrelationship between factors affecting compliance to medication



This figure shows the interrelationship between different factors and adherence to medication

IV. Discussion

In this study, ,the adherence to the diabetic medication was 60% which was associated with socioeconomic status, information given by the physician about medication, patient's knowledge about medication and monitoring of blood glucose regularly by patients.

Socio-Economic status was associated with adherence to medication. In this study people belonging to poor socio-economic status were found to be more non compliant (21.7%). Socio-Economic status is a person's economic and social position that they occupy within a given social structure and it is one of the

major factor which contributes to many cases of diseases and disability, including diabetes[13,14] . Above 80% of deaths due to diabetes occurs in middle and low income countries[15].According to this study, socio-economic status was related to medical compliance as non-compliance was found to be 21.7% in people belonging to lower socio-economic status while non-compliance found in people with higher socio-economic status was 1.7% similar to a study which shows that in people with high income and good socio-economic status adherence increases to 90% [16]. Different studies shows socio-economic status as major determinant of adherence to anti-diabetic and thus low income have been associated with high rates of non-adherence. [17,18,19]

Knowledge of patient about diabetic medication was also an important factor contributing to the compliance to medication. Out of total 40% patients who had poor adherence to medication 68.3% didn't have good knowledge about their medication. In other studies common cause of non-adherence was due to limited knowledge of disease and medication[20]. In another study, the patients who had adequate knowledge about diabetes were found to be 45% and out of which 93.33% of patients were adherent to therapy[21]. In our study patients with better knowledge about medication had better adherence to medication (p-value0.03).

The education status of the patient had no significant relationship with adherence to medication (p-value 0.4) as compared to the study where patients with good education level and knowledge had better treatment adherence (P=0.001)[21].

Information given by physician about diabetic medication to patients had very significant role in medication adherence. Compliance to treatment improves the outcome of a disease, prevents complications of unnecessary interventions[22]. Among total 40% of patients were non-adherent to medication, 66.7% patients didn't get information about medication from their physician. Physician communication is significantly related with patients adherence[23]. Risk of non-adherence is 19% among patients whose physician communicate poorly. This study result shows that information given by physician about medication had a very important role in adherence to medication. Adherence to medication is about 70% in patients who were given information by physician similar to a study which shows that patient's medication adherence becomes 2.16 times better if his physician communicates well with them and there is a significant role between patients adherence to medication and their physician communication and knowledge given by him (P=0.001)[23].

Complexity of drug regimen and cost effective treatment were also important factors which play part in compliance among surveyed group. According to our study, there is significant association between complexity of drug regimen and patient adherence to medication (p-value0.009). Similar results were obtained in another research which shows that adherence decreases with increasing frequency of medication (79% to 94% for once-daily while 38% to 67% for thrice-daily; p-value<0.05) [24].

In our study, Regular checking blood glucose levels was strongly associated with socio-economic status (p-value0.001) but with adherence to medication, it was not found to be significantly associated as compared to the results obtained in other studies which shows that self -monitoring of blood glucose levels lead to better adherence & low glucose levels (P < 0.0001)[25].

Limitations: some factors limit the scope of our study such as small sample size and restricted areas for study. Patient factors were also included like their coordination and willingness to participate in research.

Recommendations: Physicians should provide adequate knowledge about disease and its complications especially to uneducated and to those who belong to lower socio-economic status so that they can show adherence to medication. Also Government should lower down the prices of medicines so that people can afford them.

V. Conclusion

It is apparent that diabetes is a progressive disease and to maintain normal blood glucose levels and to reduce adverse outcomes, compliance to medication has an important role. Despite of beneficial outcomes the compliance to medication is suboptimal among diabetic patients. There are several reasons for poor adherence including knowledge of a patient about medicine and disease, complexity of clinical regimen, socio-economic status (poor, uneducated) have key roles in non-adherence to diabetic medication.

Moreover, stoppage of taking medicine when patient start feeling better has also an important role in poor adherence. Certainly, adherence to medication needs to be improved. Measures to improve compliance in diabetic patients should include doctor-patient communication, reduction in complexity of treatment regimen and reduction in cost of medicines.

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Purification and Characterization of Cellulase from *Aspergillusniger* Causing Soft Rot of White Yam in Three Yam-growing Environments in Nigeria

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Abstract- Aspergillus niger isolated from diseased yam in three yam-growing zones in Nigeria synthesized cellulase (EC.3.2.1.4) which caused soft rot of the yam within nine days of inoculation. Microscopic and molecular analyses revealed two isolates of A. niger, P1 and P2, from yam growing in tropical rain forest and southern guinea savannah produced cellulase enzymes in significantly different proportions. When the protein extracts from the infection were subjected to molecular exclusion chromatography, three peaks of absorption (A, B and C) were produced with only the components of peak A showing cellulase activity. Further fractionation of the components of peak A by ion-exchange chromatography produced two absorption peaks (Aa and Ab) with only component Aa showing cellulase activity. A. niger isolates, P1and P2 showed considerable differences in the intensity of cellulase production suggesting that multiple strains of A. niger in the soil in different yam-growing environments synthesized cellulase as transcriptional products in different manner underscoring the effect of physico – chemical properties of the soil on infectivity and virulence of the organism during yam rot.

Index Terms- Aspergillus niger, soil, cellulase, gel electrophoresis, Yam

I. Introduction

Food security is considered very essential for human security. Yams (*Dioscorea spp*) are most important food crop in many tropical countries where it provides staple food for majority of the people [1]. *Dioscorea rotundata* is the most important of the various species cultivated in Nigeria and it is currently an export crop providing foreign exchange. As important as yam is in the economy, out of the world production of about 52 million tons, about 10 million tons (about 20%) are lost annually through deterioration in storage [2] endangering food security and potentials for export. The black mould rot of yam is caused by *Aspergillus niger*. The infection is characterized by decay of entire tuber during which the cells collapse with loss of integrity as a functional unit. In host-pathogen interaction, the ability of the pathogen to produce extracellular enzymes capable of degrading the host tissues is one of the more obvious properties influencing virulence [3,4,5]. *A niger* is abundant in most tropical soils and, invariably, on the surface of yam tubers while still attached to the plant and on the root hairs during harvesting or storage. Naturally, the peridermic surface of the tubers function to exclude pathogen but damage caused by accidental incision or cut surface during weeding, insect attack and harvesting provide avenue for the infection. According to [6], chemo – taxonomic characteristic is a virulence factor with variation arising from a multiplicity of factors including the nature of soil ecology and production of primary and secondary metabolites such as enzymes, aflatoxins and phytoalexins.

A.niger is able to synthesize cellulase enzyme complex that breaks down cellulose of the cell wall components into glucose [7] giving the organism access to utilize the tissues for its metabolism causing the collapse and disintegration of the cellular structure thereby aiding the pathogen in the propagation of the disease.

The environment in which a pathogen grows dictates to a large extent, the quality and nature of enzymes involved in the infection and degradation of the host tissues. This study examined the pattern of synthesis of cellulase as transcriptional product of *A.niger* causing soft rot of yam in three tropical rain forest and Southern Guinea Savanna of Nigeria.

II. Materials and Methods

2.1. Organism and Culture Condition

A.niger was obtained from diseased yam from three yam growing zones in the Southern Guinea Savanna and tropical rain forest zones of Nigeria. It was grown in Petri dishes containing Potato Dextrose Agar (PDA) medium in aseptic conditions. The plates were incubated at ambient temperature and then sub-cultured on the same media plates and the fungi spores from 72hr – old culture was used to inoculate healthy yam tubers.

2.2. Extraction and Purification of Enzymes

Inoculated and uninoculate tissues of yam in the three environment were extracted for enzyme activity every 24hr. The extractant was 0.5N NaCl in 0.02M citrate phosphate buffer (pH 5.0).

2.3. Precipitation and Dialysis of Enzyme

The enzyme was partially purified by ultracentrifugation followed by ammonium sulphate precipitation and dialysis for 24

hours at 40C against the buffer (pH 6.0) using acetylated cellophane tubing [8,9]. The protein content was determined by the method of [10].

2.4. Cellulase Assay

The assay for cellulase was determined by the modified Dinitro Salicylic Acid (DNSA) method of [11, 12]. Glucose was used as standard and one unit of cellulase activity was defined as the amount of enzyme in 1ml of the reaction mixture required to liberate reducing sugar equivalent to 10mg glucose in one minute under the specific condition of the reaction on application of enzyme.

2.5. G-75 Column Calibration and Gel Filtration

A vertical glass tube chromatography column (640 x 25mm) was calibrated with proteins of known molecular weights according to the method of [13], and employed for the fractionation of the enzyme. 10ml of dialysed enzyme concentrate was applied to the column and eluted with 0.02M citrate phosphate buffer (pH 6.0). Fractions were collected (5ml per tube) and protein content determined at 280nM.

2.6. Further Fractionation of Enzyme by Ion-exchange Chromatography

Eluted fractions which showed appreciable enzyme activity after gel fractionation was combined and 10ml of enzyme concentrate applied to the column (280 x 250mm) of Sephadex CM G-50 and the fraction were collected and measured for protein content and cellulase assay. The effect of physico-chemical factors of soil on purified enzyme (G-75 factor) was determined. The effects of temperature, pH and cations (k+, Na+ and Ca2+) on enzyme activity in the three yam growing zones were determine by the method of [14].

2.7. Morphological Identification

Each of the A. niger isolated from decayed yam in the three environments were identified using the manuals about the genus Aspergillus [15, 16]. Slides were stained with cotton blue and mounted in lactophenol. Photomicrographs were taken with digital canon camera (A550, 7.1 megapixels).

2.8. Preparation of Genomic DNA

The method of [18] was used for DNA isolation. Dissolved generic DNA samples from each of the A.niger isolates P1 - P6 were stored at - 200C.

2.9. DNA Amplification and Electrophoresis

Polymerase Chain Reaction (PCR) was carried out on the isolated DNA of A.niger from the different environments using the amplification kit and automated programmable PCR thermal cycler with ITS 1 and ITS 4 as primers at the DNA laboratory, Ungwan Sarki, Kaduna, Nigeria. Amplified fragments P1, P2, P3, P4, P5 and P6 were each separated in agarose gel in the electrophoretic chamber and Chemidoc was used to produce camera snaps of DNA band pattern.

III. Results

3.1. Infection of Yam Tissues by A. niger

A. niger caused extensive degradation of healthy yam tissues at the point of infection irrespective of the source of yam. Extensive sporulation occurred at the point of inoculation. Tubers aseptically inoculated with sterile water lacked sporulation. Infection of the Yam tissues was very slow in yams placed on bare ground devoid of soil. Organism labelled P1 was isolated from yam growing in the Southern Guinea Savanna zone while both P1 and P2 were isolated from yam growing in the tropical rain forest zone.

When the organisms from rotted yam in the different yam-growing zones were sub-cultured on Potato Dextrose Agar (PDA), there were variations in the cultural appearance of conidiospores of A. niger appearing on agar plates. Structural morphologies of the isolates also showed some differential characteristics.

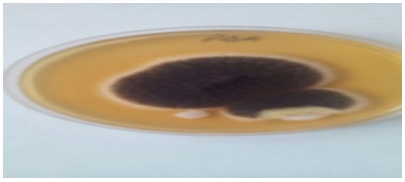

Plate I. Growth of A. niger Strain Isolate P1 from Infected Tubers on PDA Plates

Plate II. Growth of A. niger Isolate P2 from Infected Yam Tubers

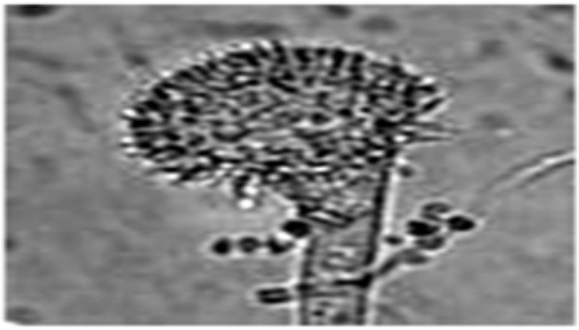

Plate III. Microscopic Features of A.nigerIsolate P1Stained withLactophenol in Cotton Blue (Mag.40x)

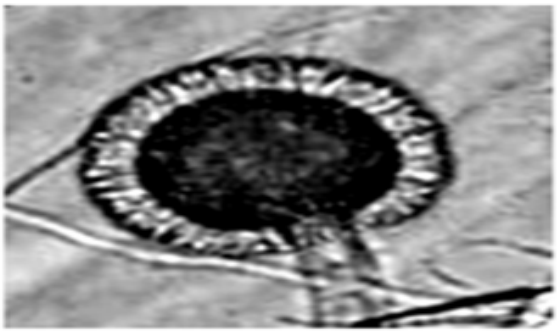

Plate IV. Microscopic Features of A. niger Isolate P2Stained with Lactophenol in Cotton Blue (Mag.40x)

3.2. Microscopic Examination of A. niger

Microscopy of P_1 and P_2 isolates showed a large black conidial that are arranged in a globose biseriate head arising from a spherical conidiophore. The black coloured colonies were identified as *A. niger* based on the structural morphologies as observed under the light microscope. It was observed that the isolates possessed distinct conidiophores terminated by a swollen vesicle bearing flask-shaped phialides. The black-coloured colonies consist of a compact white or yellow basal felt covered by a dense layer of dark-brown to black conidial heads similar to the observation of Ellis (2006). The organisms with the yellow basal felt (marked P_1 isolates) were isolated from Zone 1 Southern Guinea Savanna) while the ones with yellow and white basal felt (marked P_1 and P_2) were both isolated from Zones 2 and 3 (Tropical Rain Forest zones)

3.3 Macroscopic Characterization of P_1

Colonies on PDA plates attained 31mm in diameter in 7 days at 27^0C colony coloured brown to dark, reverse is light yellow and transparent (Plate I).

3.3.1.Microscopic Characterization of P1

The conidia head on PDA radiate, 80 – 100µ in diameter, conidiophores hyaline, smooth, 100 – 200µ long and 4-5µ wide with 1µ thick wall. Vesicle was globose and 10 – 18µ in diameter. Matulae was ampuliform 5 – 8µ by 1.5 – 2µwide. Phialides ampuliform, 5-7µ by 1.5-2µ wide. Conidia were globose and 1.5 – 2.5µ in diameter (Plate VII). The conidia head was compact columnar, 80-160µ long by 1.5 – 2µ wide and phialides ampuliform 5-8µ by 1.5 – 2µ wide. Conidia were also globose, 1.6 – 2.5µ in diameter

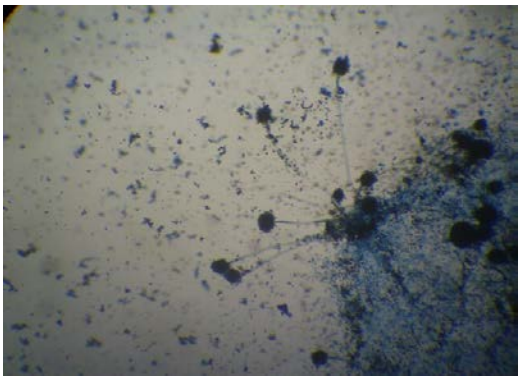

Plate V. Photomicrograh of *A.niger*Isolate P_1 Stained with Lactophenolin Cotton Blue

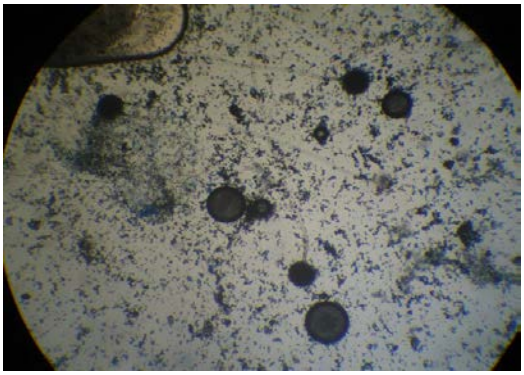

Plate VI. Photomicrograh of *A.niger*Isolate P_2 Stained with Lactophenolin Cotton Blue

3.4 Macroscopic Characterization of P_2

The conidia based on PDA plates attained 55mm after 7 days at 30ºc colony colour was black (Plates II and III). The reverse side was mostly hyaline to light yellow.

3.4.1Macroscopic Characterization of P_2

Conidial heads on PDA plates radiate conidiophores that are 300-400µ long, 8-12µ wide with 1.5-2.5µ thick wall. Vesicles are globose and 3.5 -4µ in diameter. Conidial heads are also globose 3.5 – 4µ in diameter. Phialides are ampuliform and metulae club shaped.

3.5 Molecular Characterization

The two different isolates of *A. niger* identified through their cultural, and morphological characteristics, were further characterized molecularly. When the DNA of the two isolates ($P_1$and P_2) were prepared, quantified and amplified for agarose-gel electrophoresis in each case, six distinct bands were observed suggesting that there are differences in the nucleotide base sequences coding in the two *A. niger* isolates for enzyme production in different isolates. The molecular detection and amplification of the gene coding for *A. niger* cellulase enzymes associated with yam rot was shown in the gel electrophoresis of the DNA fragments of *A.niger* isolates from different yam-growing environments. This is evident with the appearance of bands on the extracted DNA of *A.niger* as shown in Plate VII. The

extent of yam rot may depend on the sample of the *A.niger* associated with the different soil or environment. The strains of *A. niger* may vary depending on their location and the arrangement of the nucleotide sequences in the genome of the organism. This results suggest that cellulase, is associated with yam soft rot as observed from different environmental conditions and that the extent of rot is also dependent on the strain of *A. niger* that confers differences in pathology.

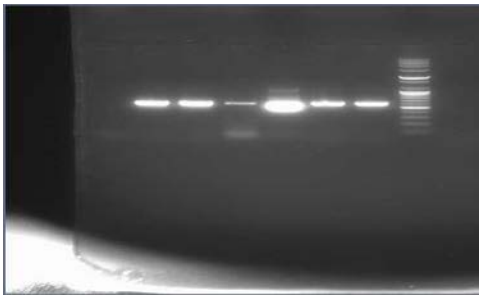

Plate VII: Agarose Gel Electrophoresis: Molecular Detection and Amplificationof DNA of A.niger Isolates fromRotten Yam

3.6. Infection of Yam by A. niger and Enzyme Production

Yam tissues infected with A. niger isolates exhibited cellulase activities (Figures 2, 3, 4, 5 and 6). Generally, the activity of each of the enzymes increased with the intensity of infection. Uninfected yam tissues lacked any appreciable decline in the infection of yam. In Zone 1 (Figure 2) the activity of cellulase increased progressively and continued until the eight day where it reached a maximum and in the ninth day when it started to decline. However, enzyme activity of A. niger from zones 2 and 3 could be noticed as from the second day of inoculation. Cellulase was the first to be detected in appreciable quantity. The activity of enzymes in yam Zone 2 continuously increased to the tenth day when it started to decline (Figure 2). An almost similar pattern of increase and decline was observed in yams infected with A. niger in yam Zone 3 (Figure 4).

The nature of the soil around which the tuber is grown or harvested and their physico-chemical properties was observed to contribute to the intensity of enzyme production, infectivity and tuber damage. Sporulation of A. Niger and yam rot was very slow when the yam was placed on bare ground. In some cases, sporulation was restricted to the zone of inoculation and rotting took a longer time than when the yam was damaged while attached to the plant or placed on the soil in ambient conditions after harvest underlining the influence of soil ecology on infectivity.

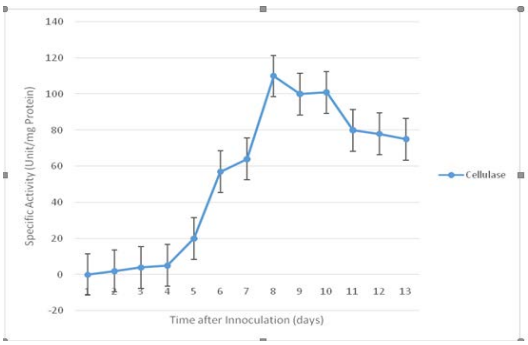

Figure 1. Enzymic Activities of Yam Tissues Infected by A. niger
(P1Isolate)in Env. 1(Southern Guinea Savanna) by Incubation Period

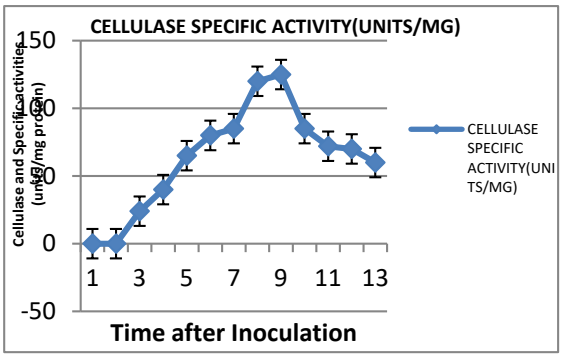

Figure 2. Enzymic Activities of Yam Tissues Infected by A. niger(P1 Isolate) Env. 2 (Tropical Rain Forest zone) by Incubation Period

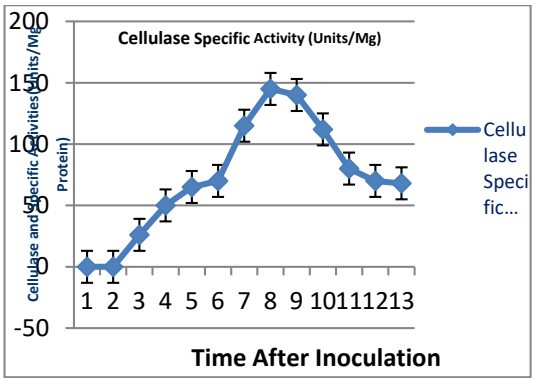

Figure 3. Enzymic Activities of Yam Tissues Infected by A. niger(P1 Isolate) Env. 3 (Tropical Rain Forest zone) by Incubation Period

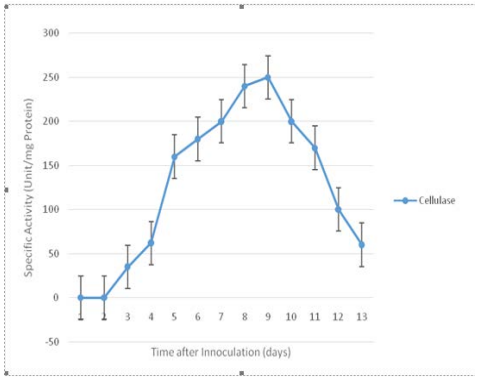

Figure 4. Enzymic Activities of Yam Tissues Infected by *A. niger*(P_2 Isolate) Env. 3 (Tropical Rain Forest zone) by Incubation Period

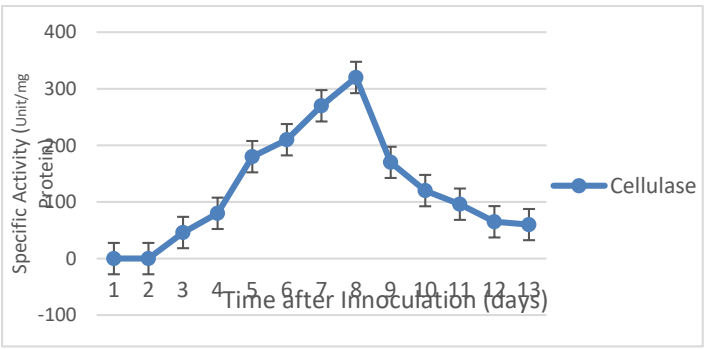

Figure 5. Enzymic Activities of Yam Tubers Infected by *A. niger*(P_2 Isolate) in Env. 3 (Tropical Rain Forest zone) by Incubation Period

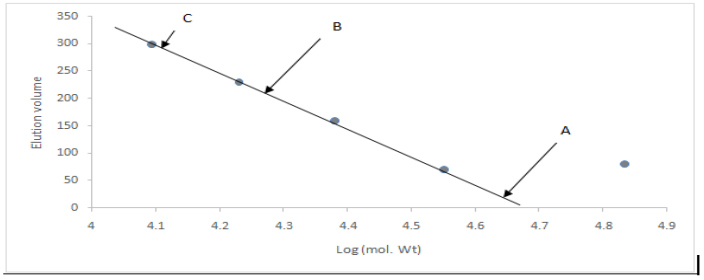

Figure 6. Elution Volume against log (M.WT) for proteins in Peaks A,B and C Calibrated by a Gel Filtration with Sephadex G-75

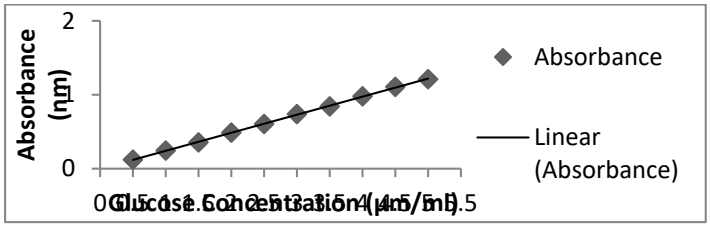

Figure 7. Standard Curve for Known Concentrations of Glucose at 540nm

3.7 Purification of Enzymes

3.7.1 Enzyme Separation on Sephadex G-75 and CM G-50

Fractionation of the enzyme concentrate on Sephadex G-75 produced three absorption peaks marked A, B and C. (Figure 8). The molecular weights of the components estimated from the calibration using their respective elution volumes are about 44,670 (Peak A), 17,780 (Peak B) and 12,590 (Peak C). The activities of cellulase was detected only in Peak A.

Further fractionation of Component A on CM-Sephadex CM-C50 gave two new absorption peaks marked (Aa) and (Ab) respectively (Figure 9). Similarly, the activity of cellulase was detected only in Peak (Aa).

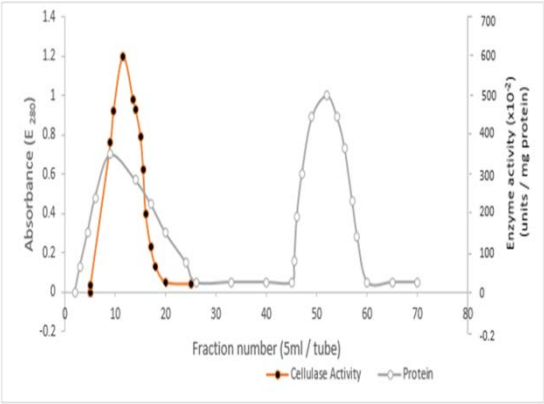

Figure 8. Figure 8.Separation of Protein in the Concentrated Extract of *A.niger* Infected Yam Tissues by Molecular Exclusion Chromatography and the Enzymic Activity of the Fraction towards Pectin and CM-cellulase

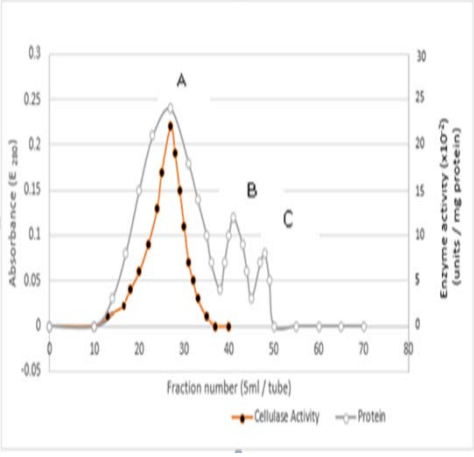

Figure 9. Separation by Ion-exchange Chromatography of High Molecular Weight Proteins (Fractions 12-50) Produced from *A. niger* Infected Yam Tissue Extracts by Gel Filtration and the Enzymic Activity of the Fractions towards Cellulase and Pectin.

3.7.2 Purification Table of Cellulase

Table 1 shows the purification levels of cellulase. The total activity of the crude enzyme at maximum yield was 29,400 units and specific activity of 73.3 units/mg protein. These mean activity values were derived from the replicates with the limit of standard error. When the proteins in the crude enzyme were subjected to

ammonium sulphate precipitation, the specific activity increased to 209.3 units/mg protein and a yield of 85.4% was obtained with 2.9 fold purification. Further fractunation and purification by molecular exclusion chromatography (Sephadex G-75) and ion-exchange chromatography (CM-Sephadex G-50) yielded much more purified enzyme up to 30.7 fold by gel filtration and 77.3 fold by ion-exchange chromatography. The specific enzyme activity increased to 2,215 units/mg protein and 5,581 units/mg protein by gel filtration and ion-exchange chromatography respectively. The partially-purified cellulase enzyme, G-75 fraction was used for further analysis

Table 1: Partial Purification of cellulose Obtained from Yam Infected with *A. niger*

Purification Step	Total Protein (mg)	Total Activity (Units)	Specific Activity (units/mg Protein)	Yield %	Purification (Fold)
Crude Enzyme	402 ± 1.0	29400 ± 1.7	73.3 ± 0.9	100	1.
$(NH4)_2S0_4$ Precipitate	120 ± 0.7	25120 ± 2.0	209.3 ± 1.0	85.4	2.9
Sephadex G-75 (Peak Aa)	8.4 ± 0.2	18610 ± 1.0	2215.5 ± 1.2	63.3	30.7
CM-Sephadex G-50	[2.9 ± 0.1	16185 ± 0.8	5581.0 ± 0.8	55.1	77.3

3.8 Effect of Soil Temperature

As shown in Figures 10, 11 and 12, optimum enzyme activity was observed at about 40ºC in yam rot caused by *A. niger* in all the three zones (Zones 1, 2 and 3). Temperatures lower than 25ºC and higher than 40ºC resulted in diminished enzymes activity and the enzyme was almost completely inactivated at 50ºC. This indicated that the quantity of cellulase activity was completely influenced by temperature. *Aspergillus niger* growing on yam tubers in the three ecozones achieved maximum sporulation and enzyme activity at ambient temperature of 40ºC.

In Zone 1, the enzyme activity of cellulase was very slow at temperature of 20^0Cand 30^0C. This might have contributed to the slow sporulation at the temperatures lower than 35^0C.

In Environment 2 (Tropical Rain Forest zone), there was a steady increase in the activity of cellulase as from20^0C until the activity of enzyme reached a maximum at 40^0C.

Enzyme activity of *A.niger* cellulase was affected by increasing soil temperature in Environment 3 (Tropical Rain Forest zone). The enzyme activity was optimum at 40^C after which increasing the temperature above resulted in a sharp decline of activity.

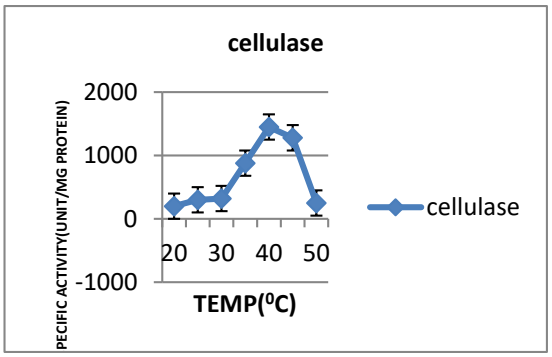

Figure 10. Effect of Soil Temperature on Cellulase Activity of ProteinExtracts of Infected Yam in Env.1(Guinea Savanna zone)

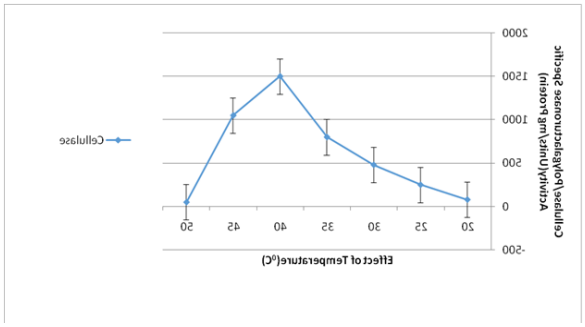

Figure 11. Effect of Soil Temperature on Enzyme Activity of ProteinExtracts of Infected Yam in Env. 2 (Tropical Rain Forest zone)

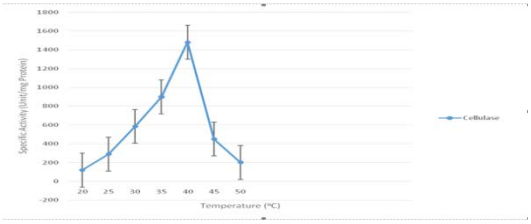

Figure 12. Effect of Soil Temperature on Enzyme Activity of Cellulase Extracts On Infected Yam in Env.3 (Tropical Rain Forest zone)

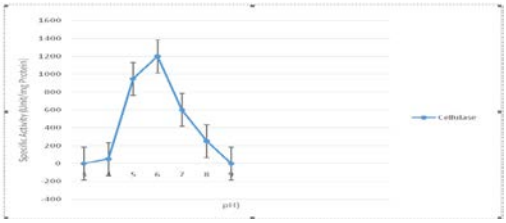

Figure 13. Effect of pH on Enzyme Activity Activity of Protein Extracts from YamInfected with A. niger in Env. 1 (Guinea Savanna zone)

3.9 Effect of Soil pH

Figures 14, 15 and 16 showed that the intensity of enzyme production is greatly influenced by changes in the hydrogen ion concentration (pH) of the soil. Optimum production occurred in slightly acidic medium of between pH 4.0 and 6.0 in the three environments.

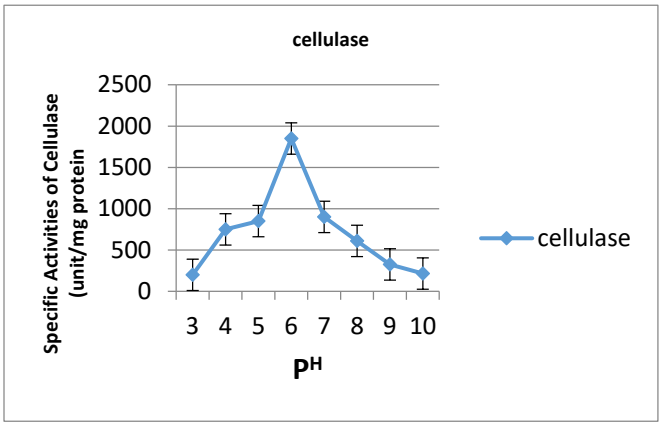

Figure 14: Effect of Soil pH on Enzyme Activity of Protein Extracts in Infected Yam from Env. 2 (Tropical Rain Forest zone)

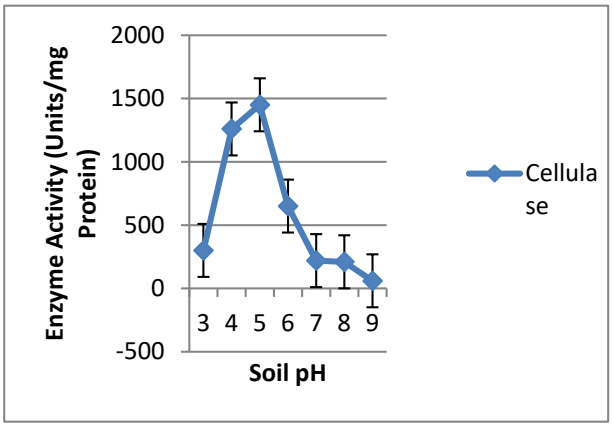

Figure 15. Effect of Soil pH on Enzyme Activity of Protein Extracts in Infected Yam from Env. 3 (Tropical Rain Forest zone)

Cellulase enzyme can tolerate high concentration of cations of up to 100mM for Ca^{2+},Na^{2+} and K^{+} with simulating effects before enzyme activity began to slow down gradually.

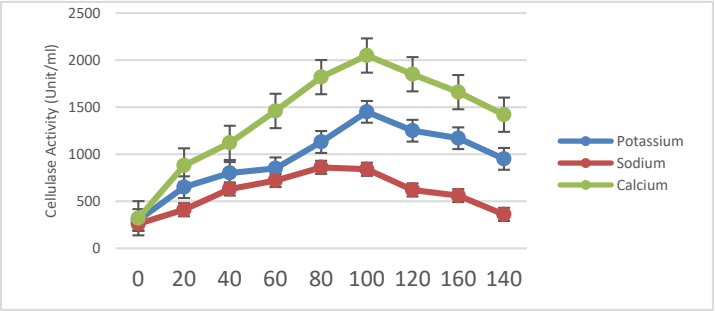

Figure 16. Effect of Cations on the Activity of Partially-Purified Cellulase (G-75 Fraction)

IV. DISCUSSION

The results showed that *A. Niger* caused extensive degradation of yam tissues after nine days of infection. The statistical significance is in agreement with the practical significance buttressed in the analysis of variance (ANOVA) of the mean of replicate values across the three environments which showed significant variations in the extent of cellulase produced. The sum of squares of between group was moderately high (23280.150 at 2,38, df respectively). The value of p = 0.48 is less than 0.05 indicating statistical significance in the pattern of cellulase production in the infection of yam by *A. niger*. The results of multiple comparisons also indicated that the mean difference in the intensity of enzyme production in the three yam – growing environments studied is significant at 0.05 level.

Soil ecology has also been observed to play a prominent role in the infection process as washed yams that were placed on bare concrete floor without soil on them took a much longer time to register decay of the yam tissues.

The increase in the rate of enzyme production and infectivity might be attributed to the virulence factor of the isolate of *Aspergillus niger* involved in the infection which has contributed to its pathogenicity.

Identified through their cultural, microscopic and morphological characteristics, the isolates of *A. niger* labelled P1 and P2 (isolated from infected yam) were the same organisms isolated from the soil of the yam-growing areas investigated.

When the DNA of the two isolates (P_1 and P_2) were prepared, quantified and amplified for agarose gel electrophoresis, six distinct bands were observed suggesting that there are possibly differences in the nucleotide bases sequences in the two *A. niger* isolates in the three environments. This may also be responsible for the variations in the production of cellulase as an aid to infection of yam in the three yam-growing environments studied. The mere fact that yam tubers placed on bare soil without the effect of the physico-chemical properties of the soil ecology playing a facilitative role failed to develop appreciable sporulation and decay at the point of infection emphasized the importance of the soil ecology on infection. Yam tubers grow in the soil and when harvested usually have soil particles attached to the root hairs. The knowledge of the understanding of the physico-chemical properties of the soil ecology is important to quantify the conditions that are favourable for infection and disease development.

This may provide insights into the development of measures that can be used to prevent or slow down the infection. This may also lead to the devising of mechanisms for preservation of the tubers while still attached to the plant in the soil and inhibit or slow down deterioration during storage. In a similar vein, having proper knowledge of the genetic blueprint for enzyme production by strains of *A.niger* will increase the understanding of the organisms metabolic pathway that can be used to slow down or prevent the infection process and increase the shelf-life of yam during storage. This of course, can be applied to other crops facing soft rot during storage.

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